

The logo of Drexel University, featuring a stylized blue dragon or griffin, is positioned in the upper left corner of the dark blue header.

Drexel University

Undergraduate Course Catalog

2015-2016



catalog.drexel.edu

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About Drexel University

Mission Statement

To serve our students and society through comprehensive integrated academic offerings enhanced by technology, co-operative education, and clinical practice in an urban setting, with global outreach embracing research, scholarly activities, and community initiatives.

Yesterday, Today, and Tomorrow

In 1891, near the end of a long and prosperous life, Philadelphia financier and philanthropist Anthony J. Drexel founded the Drexel Institute of Art, Science and Industry. As society's need for technically proficient leaders grew, so did Mr. Drexel's institution, first becoming the Drexel Institute of Technology in 1936, and then Drexel University in 1970. Drexel University is privately controlled, nonsectarian, and coeducational.

Today, nearly 16,000 undergraduate and over 9,000 graduate students attend Drexel's nine colleges and five schools:

- College of Arts and Sciences (www.drexel.edu/coas), which grants bachelor's, master's, and PhD degrees
- LeBow College of Business (www.lebow.drexel.edu), which grants bachelor's, master's, and PhD degrees
- Lebow College of Business: School of Economics (www.lebow.drexel.edu/faculty-and-research/disciplines/economics), which grants bachelors, master's and PhD degrees
- College of Computing & Informatics (www.drexel.edu/cqi), which grants bachelor's, master's, and PhD degrees
- College of Engineering (www.drexel.edu/coe), which grants bachelor's, master's, and PhD degrees
- Pennoni Honors College (www.drexel.edu/pennoni), which enriches the University experience for students from all majors with demonstrated academic achievement and broad intellectual interests
- Westphal College of Media Arts and Design (www.drexel.edu/westphal), which grants bachelor's and master's degrees
- Drexel College of Medicine (www.drexel.edu/medicine), which grants MD, master's and PhD degrees
- College of Medicine: School of Biomedical Science and Professional Studies (www.drexel.edu/medicine), which grants master's and PhD degrees
- College of Nursing and Health Professions (www.drexel.edu/cnhp), which grants bachelor's, master's, and PhD degrees
- Goodwin College of Professional Studies (www.drexel.edu/goodwin), which grants interdisciplinary bachelor's and master's degrees, provides academic and professional support for all part-time undergraduate students, and offers continuing professional education courses
- School of Biomedical Engineering, Science, and Health Systems (www.drexel.edu/biomed), which grants bachelor's, master's, and PhD degrees
- School of Education (www.drexel.edu/soe), which grants bachelor's, master's, EdD and PhD degrees, and recommends issuance of Pennsylvania instructional and teaching certificates

- Close School of Entrepreneurship (www.drexel.edu/close), providing curriculum and activities for students to learn and practice innovative behavior in alignment with all other colleges and schools at Drexel
- Center for Hospitality and Sport Management (www.drexel.edu/hsm), which grants bachelor's and master's degrees
- Dornsife School of Public Health (www.drexel.edu/dornsife), which grants master's and doctorate degrees
- Thomas R. Kline School of Law (<http://www.drexel.edu/law>), which prepares students for the practice of law by offering a JD degree

Drexel Co-op

Drexel University has been a pioneer in cooperative education since 1919—operating one of the largest cooperative education programs in the nation. Undergraduates alternate on-campus study with full-time employment in fields related to their academic interests. More than 1,300 employer organizations in business, government, health care and education participate at locations in 30 states and 24 countries. The Steinbright Career Development Center (SCDC) is one of the most highly ranked co-op and career service organizations at any university in the country and works to ensure that students and alumni get the most from their experiential and career placement activities.

Technology

Technology is integrated into every aspect of the Drexel educational experience, marking the university as a leader in educational innovation.

Drexel made history in 1983 when it became the first university to mandate that all students must have personal access to a microcomputer. This tradition of leadership in integrating state-of-the-art technologies into a Drexel education continued when Drexel, in early 1998, inaugurated the first totally wireless library in the nation. In 2000, Drexel again made history by becoming the nation's first major university to offer completely wireless Internet access across the entire campus.

A pioneer in online learning, Drexel offers distance education programs leading to certificates and degrees in areas including engineering management, business administration, information systems and library and information science. Drexel University Online has over 7,500 unique students from all 50 states and more than 20 countries pursuing one of more than 130 graduate and undergraduate degree and certificate programs. Over all, there are more than 13,000 Drexel University students taking at least one course online.

Drexel is widely recognized for excellence in technology-based, experiential learning and is ranked among the best national doctoral universities by *U.S. News & World Report* in its "America's Best Colleges 2013." Drexel ranked third in the *US News* 2013 poll of America's "Up-and-Coming Schools."

Location

Drexel's 74-acre University City Main Campus is located in the vibrant University City district of Philadelphia, Pennsylvania. Drexel makes full use of its metropolitan setting by integrating Philadelphia and its resources into the classroom, co-op/internship experience, and student life, making it a model for other urban universities. The main campus is a 10-minute walk from Center City, the core of Philadelphia's commercial and business district.

Drexel teaches at six additional locations: the Center City Hahnemann Campus for the College of Nursing and Health Professions and the School of Public Health; the Queen Lane Medical Campus in East Falls for the College of Medicine; the Drexel at Delaware County Community College campus in Media, Pennsylvania; the Drexel at Burlington County College campus in Mount Laurel, New Jersey; the Drexel at Montgomery County Community College campus in Blue Bell, Pennsylvania; and the Sacramento, California, Center for Graduate Studies.

Programs

Civic Engagement

Civic engagement, participation in the public life of the community, is important to the Drexel University's strategic plan. Civic engagement can take many forms, from volunteerism doing community service, to electoral participation and advocacy.

Drexel University offers a Certificate in Civic Engagement (<http://catalog.drexel.edu/additionalacademicprograms/lindycenterforcivicengagement/civicingagementcert>), designed for those whose commitment to civic engagement extends beyond the civic-engagement requirement of University 101, enables students of all majors to attach a recognized body of civic engagement work to their transcript. The program will also provide students with an intellectual core and an element of critical thinking for future civic engagement activities. The program is administered by the Lindy Center for Civic Engagement (<http://www.drexel.edu/lindycenter>).

Honors Program

The Pennoni College offers a number of academic options for its students. These opportunities are designed to be intensive, and are taught by faculty members who understand and accommodate Honors students' abilities and aspirations.

The Honors Program offers a number of academic options for its students. These opportunities are designed to be intensive, and are taught by faculty members who understand and accommodate Honors students' abilities and aspirations.

These options include:

- **Honors Colloquia:** These interdisciplinary courses introduce students to topics not typically covered elsewhere. These courses are small, discussion-based, seminar style classes. Past Honors Colloquia topics include: The Hidden God in Cinema; Theory of Special Relativity; The Graphic Novel; Torture and Terrorism, and many others.
- **Honors-Section Courses:** These courses fulfill traditional major requirements but offer Honors credit. While the subject remains the same, the classes are taught to smaller groups, consisting entirely of Honors students, and on an advanced level that encourages discussion and practical application. Honors-section courses include, among other subjects, physics, English, business, general psychology, chemistry, and biology.
- **Honors Options:** With permission from their instructors and approval from the Honors Program, Honors students may elect to enhance non-honors courses to yield honors credit. The student and faculty member conducting may agree on the specific terms before the course begins and jointly submit a proposal to the Honors Program.
- **Independent Study:** Honors students frequently come across topics in their general coursework that they would like to investigate in greater detail. To accommodate this, the Honors College encourages

students to study and research a topic of their choosing with guidance from a faculty member.

The Great Works Symposium

The Great Works Symposium (<http://www.drexel.edu/interdisciplinary-inquiry/great-works-symposium/overview>) is a series of team-taught, interdisciplinary courses, each one focused upon a great human achievement or important global problem. Each course typically has at least three instructors, representing three different academic disciplines, and typically there is a series of about ten guest lecturers, recognized experts on the topic, also representing a wide variety of disciplines and points of view. Each course is broader in its content than what could be covered by any one academic discipline or any single textbook, but each has a concrete center of focus. Each topic is broad and important enough that it is relevant to the education of any student.

ROTC

The Army Reserve Officers' Training Corps (<http://www.armyrotc.com/edu/drexel>), established at Drexel in 1918, is an integral part of the University. Army ROTC courses are open to all students, and enrollment alone does not carry a military obligation. Students selected for the advanced course (normally pre-junior, junior, and senior years) will complete their academic and military studies concurrently, and upon graduation will be commissioned as lieutenants in the United States Army, Army Reserve, or Army National Guard. Participation in the advanced course may qualify participants to receive financial aid through a series of scholarships and cooperative education programs. For further information, contact the Professor of Military Science, Drexel University, The Armory, 33rd and Market Streets, Philadelphia, PA 19104.

Drexel students are eligible to participate in the Naval Reserve Officers' Training Corps (<http://www.vpul.upenn.edu/nrotc>) (NROTC) through a cross-enrollment agreement with the University of Pennsylvania. All naval science courses are held on Penn's campus. The NROTC program enables a college student to earn a commission in the Navy or the Marine Corps while concurrently satisfying requirements for his or her baccalaureate degree. Scholarship and nonscholarship programs are available.

Drexel students are eligible to participate in the Air Force Reserve Officers' Training Corps (<http://www.sju.edu/afrotc>) (AFROTC) through a cross-enrollment agreement with St. Joseph's University. All aerospace studies courses will be held on the St. Joseph's campus. The AFROTC program enables a college student to earn a commission as an Air Force officer while concurrently satisfying requirements for his or her baccalaureate degree.

Study Abroad

Drexel University's Study Abroad (<http://drexel.edu/catalog/school/special/study-abroad.htm>) programs are open to students in all disciplines who meet the qualifications of each individual program. Please see the study abroad website (<http://www.drexel.edu/studyabroad>) for eligibility requirements of each individual program and for the most up to date program offerings.

Certification of Proficiency in a Foreign Language

The University awards an advanced-level Certification of Proficiency in a foreign language in recognition of exceptional ability in oral and written communication in that language. Certification is listed on the official college transcript.

Examinations leading to proficiency certification include listening comprehension, reading comprehension, and written analysis, and the ETS Achievement Test, which is also the qualifying examination for

proficiency testing. Certification also requires successful completion of an extensive oral interview, with at least a "2" rating on the FSI/ACTFL rating scale. Certification indicates proven ability to function effectively in professional and social situations in a country in which the target language is spoken.

Affirmative Action and Equal Opportunity

University Policy: Affirmative Action and Equal Opportunity

It is the policy of the University to provide a working and learning environment in which employees and students are able to realize their full potential as productive members of the University community. To this end, the University affirms its commitment to equal opportunity and nondiscrimination in employment and education for all qualified individuals regardless of race, religion, color, national origin, sex, age, sexual orientation, disability or applicable veteran status or any other characteristic protected by applicable federal or state law. Further, the University is committed to taking affirmative action to increase opportunities at all levels of employment and to increase opportunities for participation in programs and activities by all faculty, staff, and students.

Affirmative Action is directed toward racial and ethnic minorities, women, persons with disabilities, and Vietnam-era veterans. All member of the University community -- faculty, staff, and students -- are expected to cooperate fully in meeting these goals.

It is the policy of the University that no qualified individual with a disability shall, on the basis of the disability, be excluded from participation in University programs and activities. Disability is defined as any physical or mental impairment that substantially limits one or more major life activities; or having a record of such impairment; or being regarded as having such impairment. A qualified individual with a disability means an individual as defined above, who is capable of performing the essential functions of a particular job or of participating in a particular course of study, with or without reasonable accommodations for his/her disability. Reasonable accommodations are determined on a case-by-case basis.

Accreditation

Drexel University's educational programs are accredited by MSCHE (Middle States Commission on Higher Education).

The Antoinette Westphal College of Media Arts and Design

- Architecture is one of the few part-time evening programs accredited by NAAB (National Architectural Accrediting Board).
- Design curricula are accredited by NASAD (National Association of Schools of Arts and Design).
- Media arts curricula, with the exception of the BS in Dramatic Writing, are accredited by NASAD (National Association of Schools of Arts and Design).
- The BS in Interior Design is accredited by CIDA (Council for Interior Design Accreditation).
- The MS in Interior Architecture and Design is accredited by CIDA (Council for Interior Design Accreditation).

The Bennett S. LeBow College of Business

- The Bennett S. LeBow College of Business is accredited by AACSB (Association to Advance Collegiate Schools of Business).

The College of Engineering

- The undergraduate programs for Architectural Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Environmental Engineering, Materials Science and Engineering, and Mechanical Engineering are accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- The Construction Management program is accredited by ACCE (American Council for Construction Education).
- The undergraduate Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET, <http://www.abet.org>.

The College of Arts and Sciences

- The Chemistry BS is certified by ACS (American Chemical Society).
- The Clinical Psychology PhD program is accredited by APA (American Psychological Association).
- The English Language Center is accredited by CEA (Commission on English Language Program Accreditation).

The College of Nursing and Health Professions

- Nursing programs are accredited by the CCNE (Commission on Collegiate Nursing Education), and the PA State Board of Nursing.
- The Couple and Family Therapy MFT degree and Post-Master's Certificates are accredited by COAMFTE (Commission on Accreditation of Marriage and Family Therapy Education).
- The Creative Arts in Therapy MA degrees in Dance/Movement Therapy, Music Therapy, and Art Therapy are approved by the ADTA (American Dance Therapy Association), the AMTA (American Music Therapy Association), and the AATA (American Art Therapy Association), respectively.
- The Didactic Program in Nutrition is accredited by ADA (American Dietetic Association).
- The Health Services Administration program is certified by AUPHA (Association of University Programs in Health Administration).

- The Nurse Anesthesia program is accredited by COA (Council on Accreditation of Nurse Anesthesia Educational Programs).
- The Nutrition and Foods BS is accredited by ADA (American Dietetic Association, Commission on Accreditation of Dietetic Education).
- The Professional Physical Therapy (DPT) program is accredited by CAPTE (Commission on Accreditation in Physical Therapy Education).
- The Physician Assistant program is accredited by ARC-PA (Accreditation Review Commission on Education for the Physician Assistant).
- The Radiologic Technology program is accredited by JRCERT (Joint Review Committee on Education in Radiologic Technology).

The College of Computing & Informatics

- The Computer Science BS and BA programs are accredited by the Computing Accreditation Commission (CAC) of ABET (<http://catalog.drexel.edu/accreditation/%20http://www.abet.org>).
- The Information Systems BS is accredited by the Computing Accreditation Commission (CAC) of ABET (<http://catalog.drexel.edu/accreditation/%20http://www.abet.org>). The College of Information Science and Technology was in the first group of schools to have their information systems programs be accredited by ABET (<http://catalog.drexel.edu/accreditation/%20http://www.abet.org>).
- The Library and Information Science MS degree is accredited by ALA (American Library Association).

The Drexel University College of Medicine

- The MD degree is accredited by LCME (Liaison Committee on Medical Education).
- The MS degree in Pathologists' Assistant program is accredited by NAACLS (National Accrediting Agency for Clinical Laboratory Sciences).

The Dornsife School of Public Health

- The Dornsife School of Public Health is accredited by CEPH (Council on Education for Public Health).

The School of Biomedical Engineering, Science and Health Systems

- The undergraduate biomedical engineering curriculum is accredited by the Engineering Accreditation Commission of ABET (<http://catalog.drexel.edu/accreditation/%20http://www.abet.org>).

The School of Education

- Teacher education programs leading to Pennsylvania State Teacher Certification for various K-12 specialties as well as Instructional Technology Specialist, School Principal, and School Superintendent certification programs are approved by the Pennsylvania Department of Education. Other state-approved programs include K-12 Library Science certification in collaboration with the College of Information Science and Technology and K-12 English as a Second Language Program Specialist in collaboration with the English Language Center.

The Thomas R. Kline School of Law

- The Thomas R. Kline School of Law is accredited by ABA (American Bar Association).

Any student or prospective student may request a copy of the documents describing the institution's accreditation. This information is available in

the Provost's Office and in the Financial Aid Office, both located in the Main Building.

Tuition & Fees

Undergraduate

- Full-Time Undergraduate Programs (<http://www.drexel.edu/undergrad/financing/break-down>)
- Adult Education (<http://www.drexel.edu/em/goodwin/financialaid>)
(Part-time, Saturday Scholars, and non-enrolling students)
- Drexel at Burlington County College (<http://www.drexel.edu/bcc/admissions/financing/tuition>)
- Drexel at Delaware County Community College
(<http://www.drexel.edu/dccc/financing/cost>)
- Drexel at Montgomery County Community College
(<http://www.drexel.edu/mccc/financing/cost>)
- Drexel University Online (http://www.drexel.com/tuition/tuition_rates.aspx)

Graduate

Graduate Program Tuition, Fees and Expenses (<http://www.drexel.edu/grad/financing/tuition>) (Including College of Medicine)
School of Law Tuition, Fees, and Expenses (<http://drexel.edu/law/admissions/financing/Costs%20of%20Attendance>)

The Steinbright Career Development Center

The Steinbright Career Development Center (Steinbright) (<http://www.drexel.edu/scdc>) serves all students and recent alumni through cooperative education and career services offerings. This is an introduction to those programs, and includes a list of specific policies. For information about previous co-op experiences, or to access career guides for specific majors, visit the Steinbright Center's Co-op Career Guide (<http://www.drexel.edu/scdc/career-services/counseling/career-guides>) page.

I. Drexel Undergraduate Co-op

Cooperative Education at Drexel (<http://www.drexel.edu/scdc/coop>) enables full-time undergraduate students to alternate periods of classroom theory with professional experience prior to graduation. Participation in co-op is available in most academic programs. Successful completion of the cooperative education experience is a graduation requirement for students enrolled in a co-op degree program. Students have the opportunity to gain 6 to 18 months of career-related work experience integrated with their coursework. Cooperative education helps students explore and confirm their career choices by assisting students in several areas of career development, including self-assessment and career exploration. Through co-op students develop confidence, professionalism and a sense of purpose. Students are expected to take advantage of every possible opportunity to observe different aspects of the workplace and to gain experience.

All co-op students are assigned a co-op cycle (fall/winter, spring/summer or summer only) as well as a coordinator to assist them with their co-op experience and job search. Available job openings are advertised in SCDCOnline, Drexel's web-based job search tool and students participate in the job search process according to their designated cycle. Coordinators work closely with employers, assisting them in developing opportunities for co-op students, and they act as a point of contact for the students while on co-op. Upon completing a co-op experience, students submit their co-op job evaluation, meet with their coordinators to discuss the work experiences and determine a strategy for future experiences. Co-op experiences are credit bearing, pass/fail components of student academic plans.

Steinbright makes every effort to find sufficient numbers of co-op employment positions for students, but the University cannot make any guarantee of co-op employment. The co-op process is competitive, and a student's academic performance, skills, motivation, maturity, attitude, and potential will determine whether or not a student successfully obtains employment. If a student experiences difficulty in securing a co-op position, Steinbright will assist the student in a continuing job search. Failure to obtain a co-op experience does not entitle any student to a change of academic status, a change of co-op cycle, a refund, or an adjustment of tuition and fee charges.

A. Co-op Schedule Options

Co-op Schedule Key

Class = On-campus Study

Co-op = Cooperative Education Experience

Vacation

Four-year non-co-op program

Year	Fall	Winter	Spring	Summer
Freshman	Class	Class	Class	Vacation
Sophomore year	Class	Class	Class	Vacation
Junior year	Class	Class	Class	Vacation
Senior year	Class	Class	Class	

*Four-year program with co-op: fall/winter cycle**

Year	Fall	Winter	Spring	Summer
Freshman year	Class	Class	Class	Vacation
Sophomore year	Class	Class	Class	Class
Junior year	Co-op	Co-op	Class	Class
Senior year	Class	Class	Class	

Four-year program with co-op: summer only cycle

Year	Fall	Winter	Spring	Summer
Freshman year	Class	Class	Class	Vacation
Sophomore year	Class	Class	Class	Co-op
Junior year	Class	Class	Class	Co-op
Senior year	Class	Class	Class	

*Five-year program with co-op: fall/winter cycle**

Year	Fall	Winter	Spring	Summer
Freshman year	Class	Class	Class	Vacation
Sophomore year	Co-op	Co-op	Class	Class
Pre-junior year	Co-op	Co-op	Class	Class
Junior year	Co-op	Co-op	Class	Class
Senior year	Class	Class	Class	

* Students are randomly assigned to either the fall/winter (shown above) or spring/summer (not shown) co-op cycle, unless restricted by academic program.

B. Co-op Cycle Assignments and Eligibility

Students should note that all policies are subject to change. For the most current versions of all policies, please visit the Steinbright student policies web page (<http://www.drexel.edu/scdc/forms-policies/student-policies>).

Cycle Assignments and Adjustments

New students' co-op cycles are set annually in the fall of their freshman year and students are notified of their cycle by official Drexel email. Exceptions are as follows:

- Westphal College cycles are determined by the academic departments in consultation with Steinbright and students are notified of their cycle assignments their sophomore year.
- Transfer students' cycles are set upon review of transfer credits and are determined by Steinbright based on academic plans provided by academic advisors.

A co-op cycle, once assigned, will not change for the student's entire academic career. New freshmen, during a specific time-frame, may be allowed to swap their cycles by means of an application process. Cycle swaps are not permitted past the application deadline.

Steinbright registers all students for the prescribed cycle and number of co-op terms, as required by the student's academic major, program, and concentration. However, some adjustments may be undertaken by Steinbright under certain circumstances, such as documented need for medical leave, documentation of deployment for active military service, and combined degree programs, such as the BS/MS program.

Concentration Change and General Billing Statement

Students choose their co-op concentration upon applying to the University. The concentrations are 5-year with 3 co-op cycles (5COP), 4-year with one co-op cycle (4COP), and 4-year with no co-op cycle (NCOP). Currently, students are permitted to change their co-op concentration at any time; however, changes can have billing and financial aid implications. Changes can only be applied as follows:

- Change requests made at the start of the term, up until the add/drop deadline, can be made effective immediately (i.e., if requesting a change the first week of the spring term, the concentration change is effective that spring term). Change requests after the add/drop deadline are made effective the following term (i.e., if requesting a change the third week of the spring term, the concentration change is effective the start of the summer term).
- Students changing into a 5COP program must be able to complete three co-op cycles as well as meet all co-op eligibility requirements.
- The process of changing concentration requires the completion of a Change of Curriculum and Status Form and often can be accompanied by a Change of Cycle Form. The process is initiated by the student's academic advisor.

Co-op Eligibility

COOP 101

COOP 101 is a course designed to provide students with the skills necessary for career planning, the co-op job search and a successful workplace experience. It meets once a week for 10 weeks and is non-credit and pass/fail. Students in a co-op program are required to pass the class prior to beginning their first co-op experience. Students who fail COOP 101 must retake and pass the class in the next available term prior to participating in their first co-op. If a student fails COOP 101 twice, the student may be ineligible to participate in co-op. Not being able to participate in co-op can have significant financial aid and billing issues and may delay or prevent graduation.

Two-term Policy/Academic Progress

To be eligible for co-op, students must be full-time, making satisfactory academic progress and registered in a cooperative education concentration (5COP or 4COP). Students must also accumulate a minimum of 24 credits over the two terms prior to their scheduled co-op terms. Freshmen assigned to the fall/winter co-op cycle of their sophomore year are the exception since they are on vacation the summer prior to their first co-op. For those freshmen, their winter and spring credits will be reviewed instead.

Pre-registration

Before and after each scheduled co-op experience, students must meet with their co-op coordinators to obtain authorization for their next job search. First time co-op students must attend a pre-registration meeting before their job search can begin; students returning from co-op must schedule an appointment with their co-op coordinator to review the results

of their co-op evaluation, Employment Summary & Planner (ES&P), before they begin their next job search.

Failure to meet co-op eligibility will result in a significant change to the plan of study. The co-op cycle will be pushed out to a subsequent academic year and may impact graduation.

C. SCDCOnline Job Search

SCDCOnline is Drexel's proprietary, web-based job search tool which is available to eligible students approximately five months prior to the start of their co-op. It is one of the many resources that students can use during their job search.

Interview Policy

Students are required to attend all interviews granted by employers, whether on or off campus. Sophomores in a five year co-op program with a fall/winter co-op cycle may need to be available during the summer of their freshman year to interview for co-op positions. Students who do not schedule an interview or neglect to attend all scheduled interviews will receive a career block (see section K). Students are not allowed to miss classes for co-op interviews so interviews should be scheduled accordingly.

Offer Process

Students utilizing the SCDCOnline system for their co-op job search will receive one of the following designations as a result of their interviews: Job Offer, Qualified Alternate, or No Employer Interest. Students will be able to accept job offers or rank qualified alternates at which time they may be paired with an employer.

If a student has been paired with an employer, the results are final and the student may not renege on that offer or accept other offers. Additionally, the student must discontinue searching for other jobs immediately.

At no time are students permitted to negotiate salary with an employer for an online position. Steinbright takes a strong stand on this policy.

Failure to observe any of the above listed policies may include consequences such as: co-op probation and/or denial of the use of Steinbright's services, including SCDCOnline. These measures can delay graduation and/or negatively affect the student's transcript.

D. Academic Dismissal

The University Registrar informs Steinbright of those students who have been dismissed from the University due to poor scholarship. Students who are dismissed from the University due to poor scholarship and are scheduled for co-op will not receive credit for co-op. Instead, the co-op registration will be removed from the student's academic record. Employers of co-op students who have been dropped for poor scholarship will be notified of the University's action against the student and all co-op agreements will be considered terminated.

If a student is readmitted, a new academic plan from the academic advisor showing all cycles necessary to complete the co-op requirement is needed.

E. Registration of Co-op Placement

Co-op Must be Major-Related

All co-op positions must be related to a student's major or concentration. Students who locate co-op positions independently must have their co-

op coordinators review and approve the positions to ensure that they are major-related and take into account the long-term objectives of students.

Co-op Job Registration

If students obtain their job through the SCDCOnline pairing process, a Student Co-op Registration Agreement will be automatically generated. Students must electronically accept this form through DrexelOne before the start of their co-op position.

If students obtain a job independently, they must turn in the following to receive credit:

1. A completed and signed Student Co-op Registration Agreement (<http://www.drexel.edu/scdc/forms-policies/student-forms>).
2. An offer letter and job description on employer letterhead including salary information, hours per week, and start/end dates.
3. A signed Employer Agreement Form (<http://www.drexel.edu/scdc/forms-policies/employer-forms>) from the employer.

This paperwork must be submitted no later than the end of the second week of the term that co-op begins.

Paid vs. Unpaid Positions

Typically, co-op is a paid, full-time work experience. However, this sometimes varies based on industry, job market, or other special circumstances. Co-ops paid at minimum wage or higher are required to work full time (per the employer/industry standards). Co-ops that are unpaid or fall below the minimum wage are only required to work a minimum of twenty hours a week. Circumstances may arise that do not fall into either category listed above. If a situation warrants special consideration, students should contact their co-op coordinators.

Commitment of Time

Students must work the full 6-month cycle (or 3-month cycle for majors that apply) and must follow the employer's work schedule. Students are not entitled to Drexel holidays and breaks. Special exceptions may apply to athletes or for military obligations. Students employed by Drexel University in co-op positions will be paid for holidays when the University is closed. When emergency situations arise causing students to be absent from their co-op jobs for an extended period of time, students must inform both their co-op employers and their co-op coordinators.

Co-op Employment is Not Guaranteed

Students who participate in the co-op program are not guaranteed a co-op position. Steinbright makes every effort to find sufficient opportunities for co-op experiences for students, but the University cannot make any guarantee of employment. The employment process is competitive and the student's academic performance, skills, motivation, maturity, attitude, and employment potential will determine whether a student is offered a job. If a student experiences difficulty in securing a co-op, Steinbright will assist the student in a continuing job search. Steinbright requires a job search journal from students who are not placed by the beginning of the co-op term. The journal has specific requirements and due dates and it is the responsibility of the students to track their job search progress. If a job search journal is completed satisfactorily, students receive co-op credit for the applicable terms.

F. Classes During Co-op

In an effort to better couple academics with students' cooperative education experience, undergraduate students enrolled in a co-op program may register for one course up to four (4) credits during each term for which they are on a co-op assignment without additional charge. Students on co-op are permitted to register for a maximum of six (6) credits per co-op term. Registration is subject to the approval of both the student's co-op coordinator and academic advisor. The co-op coordinator will ensure that the requested course does not interfere with the student's co-op assignment. For more information on how to register for a class during co-op, go to the Provost's website (http://www.drexel.edu/provost/policies/pdf/ug_classes_coop.pdf).

G. Responsibilities of Students While on Co-op

Students are responsible for knowing the regulations that apply to them as co-op students. These regulations are documented in the Student Co-op Agreement which is signed by the student before each co-op period.

Even though students are on co-op, they are officially registered with the Office of the University Registrar and maintain their connections with the University, with all the rights and responsibilities of students. Students are required to use their designated drexel.edu email accounts to receive all university communications.

Students are required to adjust themselves completely to the daily routine of the organizations where they are employed and to adhere to the employer's policies and procedures in addition to the University's policies and procedures. If students encounter difficulties with their employer or the University while participating in the co-op program, they are to contact their coordinator immediately.

Salaries paid to co-op students are considered taxable income and should be reported as such.

Co-op students are subject to the same principles of personal conduct whether they are on the Drexel campus or working many miles away. Students are expected at all times to maintain behavioral standards that reflect favorably on themselves and on the University. While on co-op, students continue to be under the jurisdiction of the University. Any breach of conduct committed by a student on co-op that would be cause for disciplinary action were the student on campus shall also be cause for disciplinary action while the student is on co-op.

H. Co-op Probation

Students who refuse to honor a co-op pairing, are dismissed from a co-op job, engage in inappropriate behavior anytime during the co-op process, violate employer/University policy or resign from a co-op without prior approval from their coordinators may be placed on co-op probation. It is the responsibility of students to notify their co-op coordinators regarding any change in employment status. The terms of probation are decided at a probationary meeting attended by the student, the student's co-op coordinator, and an assistant director. Co-op probation can include actions up to and including failure of co-op. Co-op probation that results in failure of co-op may necessitate a new academic plan. Steinbright reserves the right to remove students from co-op programs.

I. Layoff from Co-op

When students are dismissed from a job due to company downsizing or restructuring, they need to contact their co-op coordinators immediately. Students will not be penalized but will be required to work with their

coordinators to locate another co-op position for the remaining time of their scheduled co-op cycle.

J. Co-op Evaluation Form (ES&P)

Students must finalize their co-op experiences during the last month of their co-op assignments by submitting their Student Employment Summary and Planner (ES&P) through the SCDCOnline system and attending a meeting with their coordinators when they return to campus at the end of co-op.

Failure to complete the ES&P will result in the following:

- Credit for co-op not being reflected on the transcript (NCUs).
- Lack of sufficient DCUs (co-op credits) may impact degree requirements for graduation.
- Inability to view the SCDCOnline jobs and submit resume and apply to jobs for the next interview cycle.

K. Hold Policies

Steinbright may place a hold on a student's account in cases where there is a failure to follow policy or procedures. This hold is called a career block and will prevent further use of the online system for co-op. It is the student's responsibility to contact his/her coordinator and to take the appropriate steps to have the hold resolved in a timely manner.

If a student's record reflects an unresolved hold from any other source (financial, health and immunization, academic, student conduct, or athletic), utilization of the SCDCOnline system will be prohibited. These holds must be resolved with the proper organization/department before access to the system can be restored. Unresolved holds may also impact student's ability to successfully complete the co-op experience.

L. Transfers

Transfer students must agree to complete the minimum co-op requirements of the major into which they are transferring. All students entering Drexel University as transfers will be required to have a plan of study prepared by their academic advisor outlining the classes and co-ops required for degree completion. Once matriculated into a co-op major, all co-op rules and policies apply.

M. Disabilities

Students who have disabilities may wish to speak with the Office of Disability Resources (ODR) prior to or during their co-op experience in order to discuss any reasonable accommodations which may be necessary. ODR can also advise students on appropriate ways to disclose a disability on the job, should they choose to do so.

The mission of the ODR is to advocate for people with disabilities and to provide equal opportunities and equal access to education, employment, programs and activities at Drexel. ODR collaborates with and empowers individuals who have documented disabilities by working together proactively to determine reasonable and appropriate accommodative measures. In efforts to ensure compliance with current legislation and eliminate attitudinal barriers against people with disabilities, ODR also provides guidance and education to the campus community.

N. International Students

International students, with the appropriate visas, can participate in the co-op program. In addition to adhering to all co-op policies and

procedures, all international students will also be required to obtain work authorization prior to each co-op position.

To obtain work authorization international students must meet with International Students and Scholars Services (ISSS), 210 Creese Student Center, after obtaining a co-op position, but prior to beginning work. Students who work without prior work authorization from the ISSS may be considered out-of-status by U.S. federal regulation. Questions about student visa/immigration status and responsibilities should be directed to ISSS.

O. International Co-op Program (Co-op Abroad)

To be eligible to participate in Drexel University's International Co-op program, students must attend Drexel full-time, be in good academic standing (minimum GPA of 2.0), and ideally have successfully completed at least one co-op experience with an "acceptable" or above evaluation, the exception being students in a 4COP program. All student applications will be reviewed on an individual basis. Approval for co-op experiences abroad is made by Steinbright.

For more information on the program, visit the International Co-op program (<http://www.drexel.edu/internationalcoop>) website.

P. Graduating on a Co-op Term

Drexel University students are required to graduate from an in-class term, that is, not immediately following a co-op. In response to changes in the university's student profile a number of scenarios have been identified which can be considered cause to appeal for permission to graduate from a co-op cycle.

Students wishing to file a request to graduate from a co-op term must develop a revised plan of study in conjunction with their academic advisors. In conjunction with an advisor, the student then submits the plan along with a letter of support from the program director or department head to the Steinbright Appeals Committee.

Due to program requirements, students in certain programs/majors cannot graduate after a co-op term. Complications arise from academic and co-op as well as billing areas that would preclude any exceptions. Case-by-case appeals may be considered in truly unique situations.

Q. Graduation Requirements

To graduate, students must complete the total number of Drexel Co-op Units (DCUs) required for the program or major in which they are enrolled. The number of DCUs in the various programs ranges from 32 to 96. Sixteen DCUs are awarded for successful completion of each term of co-op. For many colleges co-op is a part of the accreditation process and therefore degrees may not be awarded without the successful completion of the co-op requirement.

Colleges	Co-op terms	DCUs
College of Arts and Sciences; LeBow College of Business; College of Engineering; College of Nursing and Health Professions; School of Biomedical Engineering, Science, and Health Systems; College of Computing & Informatics; Center for Hospitality & Sports Management; Close School for Entrepreneurship; Pennoni Honors College:		
Five-year program	6	96
Four-year program	2	32
Westphal College of Media Arts and Design; School of Education; School of Public Health:		
Four-year program	2	32

II. Graduate Co-op Program (GCP)

Drexel's long tradition in the field of experiential education for undergraduates has been extended into its graduate programs.

Participating Graduate Co-op Programs

MS, MBA, LeBow College of Business

MS, Information Systems, College of Computing & Informatics

MS, Food Science, Center for Hospitality and Sport Management

MS, Engineering, College of Engineering

MS, Biomedical Engineering, School of Biomedical Engineering, Science, and Health Systems

Available as a special co-op track, which may entail more time to complete the degree, GCP enables students to accept paid positions in their career fields for a total of three or six months during their degree program. These cycles can either be the summer-fall or the fall-winter terms. For all GCP students, full-time employment during co-op is considered an integral part of their educational process; therefore, they will retain their full-time student status.

Eligibility

Eligibility must be sought from the Graduate Studies Office when a student has earned a minimum of 24.0 credits but no more than 34.0 credits before going out on co-op. Students should obtain the required signatures and submit the application directly to the Graduate Studies Office. A detailed plan of study together with a proposed project, to be completed during co-op, must accompany the form.

Beyond the credit and time requirements, the criteria for admission into and continuation in the program include satisfactory academic progress (GPA of at least 3.0, higher for some programs) and adherence to a

schedule whereby students complete all GCP requirements prior to graduation, that is, students must complete at least one term of classes prior to graduation.

Additional Requirements for International Students

International students should consult with International Students and Scholars Services (ISSS) to determine their eligibility before going out on co-op. All students must demonstrate business-usage English proficiency to the Graduate Co-op Coordinator.

Program Structure and Process

Students who participate will be required to enroll in a three-credit, pass/fail, GCP course for each three-month period of employment and will be billed for 3 credit hours at the appropriate credit hour rate for the course. In addition, students are allowed to take one online course each term while on co-op. Any such course will be charged at the appropriate credit hour rate.

Before co-op begins, students will be assigned a professor who will supervise the GCP courses. The professor will work with them throughout their experience and assist them in developing a project that reflects that work experience. Although students will not attend class, they are required to maintain regular contact with their faculty advisor. At the end of each quarter on co-op students will submit a written report of their project to their faculty advisor. Every GCP student must have a passing grade in each of the GCP courses. It is left to the discretion of the student's department to decide on what a student must do to make up a failing GCP grade. GCP courses will not be included in grade point average calculations.

Students should meet with the Graduate Co-op Coordinator to discuss their interest in participating in co-op as early as three months prior to the anticipated start date. This will ensure that there is ample time for them to understand the program, discuss their career objectives, review/amend their resumes, conduct practice interviews, and, if necessary, schedule language testing. Simultaneously, students should also meet with their graduate advisor to check on the enrollment procedures for the co-op track.

Additionally, while on co-op, students must keep their health insurance and immunizations current.

III. Career Services

Career Services offers assistance to all current students and alumni in securing employment consistent with personal career goals and objectives. All services are free of charge to active students and alumni. Services, resources, and events include:

- Individual career counseling, including assessments designed to help individuals choose long-range career goals consistent with their abilities, education, interests, values and personality.
- Individual appointments and group programs covering topics including resume writing, interview preparation, job search strategies and offer negotiation.
- On-Campus Interview Program arranges on-campus interviews with employers from business, industry, education, and government services.

- Dragon Jobs allows students to review job postings and schedule on-campus interviews with employers who are interested in hiring a Drexel students and alumni. Students can also research companies, information on career fairs, and company hosted information sessions with Dragon Jobs (<http://www.drexel.edu/scdc/dragonjobs>).
- Comprehensive pre-professional advising services to students and alumni who are considering careers in law or medicine.
- Steinbright hosts two of the largest career fairs in the Delaware Valley for all students and alumni in October and April. Engineering students are also invited to an engineering major specific career fair at their college.

Center for Hospitality and Sport Management

Launched in 2013, the Center for Hospitality and Sport Management includes programs in hospitality management, culinary arts, food science and sport management. Through a focus on experiential learning and co-op opportunities, the center is positioned to fulfill distinct market needs. It provides experience in sport ticketing, restaurant management, arena management, food product development, recipe development, coaching, commercial kitchen design and layout, kitchen gardening and hotel front desk operations.

The Department of Culinary Arts and Food Science provides students with a well-rounded education within the realm of fine foods, service product development and quality assurance.

The Department of Hospitality and Tourism Management offers programs for students who are interested in the fast-paced fields of hospitality management, tourism, and gaming and casino operations. Due largely in part to Drexel's co-op program, graduates have a competitive advantage and invaluable training for successful career in the industry.

The Department of Sport Management produces students that embody leadership, management skills and professionalism, with a focus on sport business, media, marketing and law.

Majors

- Culinary Arts & Science (p. 19)
- Culinary Arts (p. 24)
- Culinary Science (p. 30)
- Hospitality Management (p. 37)
- Sport Management (p. 40)

Minors

- Coaching Leadership (p. 19)
- Culinary Arts (p. 29)
- Food Science (p. 37)
- Gaming and Casino Operations (p. 37)

Minor in Coaching Leadership

The minor in coaching leadership, open to all undergraduate students across the University, provides the foundation for the effective coaching and managing of athletes at various levels.

On completion of the minor, students will have developed the ability to communicate and motivate athletes, enhance the social and emotional growth of athletes, develop sound physical training programs, use sport skills effectively, inform athletes about the principles of good nutrition, reduce injuries by managing roles better, effectively deal with equipment, facilities, scheduling and team logistics and understand the administrative facets of coaching.

SMT 101	Principles of Coaching	3.0
SMT 102	Principles of Coaching II	3.0
SMT 152	Leadership in Sports & Society	3.0
SMT 203	Sports Conditioning	3.0

SMT 210	Prevention and Care Athletic Injuries	3.0
PSY 245 [WI (p. 19)]	Sports Psychology	3.0
NFS 310	Nutrition and Sports	3.0
SMT 475	Sports Industry Practicum	3.0
Total Credits		24.0

Culinary Arts & Science

Major: Culinary Arts & Science

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 185.0

Classification of Instructional Program (CIP) code: 12.0503

Standard Occupational Classification (SOC) code: 35-2014

About the Program

The major in culinary arts and science allows students to deeply explore cuisine—the practical techniques of cooking, but also its science, history, culture, politics and economics. Students receive a broad overview of cooking and cuisine and can then specialize in a food and beverage management track that prepares students for leadership positions in the fine foods segment of the hospitality industry or a food science track that prepares students for work with food manufacturers, product development or quality assurance.

Students completing the food and beverage management track program also receive a business minor with a choice of one of the following areas:

- Business Administration
- Marketing
- Entrepreneurship

Culinary scientists learn to integrate and apply knowledge from the disciplines of chemistry, microbiology, culinary arts, hospitality management, food science, and nutrition in order to preserve, process, package, and distribute foods that are safe, nutritious, and delicious.

Students majoring in culinary arts and science are prepared for careers in the food industry such as a cook, pastry cook, chef, research chef or product developer. In such positions, graduates can combine their creative and aesthetic talents with their technical expertise as food scientists.

This baccalaureate degree in culinary arts and science is among the first of its kind in the United States. This program comprises approximately equal parts liberal arts, business, hospitality management, food science, and culinary arts. The aim of the program is to prepare students as independent thinkers who can work collaboratively in the food industry.

For more information, visit the Culinary Arts & Science (<http://drexel.edu/hsm/academics/Culinary-Arts-Food-Science>) page on the Center for Hospitality and Sport Management's website (<http://drexel.edu/hsm>).

Program Delivery Options

Drexel's BS degrees include courses in the liberal arts, the humanities, sciences, hospitality management and culinary arts. Three business minors are also offered. The BS degree can be completed on a full-time or part-time basis:

Traditional Four-year option, with one co-op experience:

This option includes one six-month period of full-time employment in the junior year.

Four plus One option BS/MBA combined degree, with co-op experience:

This option combines the four-year BS degree followed by the one-year Professional MBA to qualify freshmen applicants. Incoming freshmen will generally have a minimum of 1300 on the SAT, a GPA of 3.5 or higher, and be in the top 10% of their high school graduating class. For MBA requirements visit the LeBow College Professional MBA (<http://www.lebow.drexel.edu/academics/programs/mba>) website.

Full-time Status Evening option without co-op experience:

To be eligible, students should have a minimum of two years full-time work experience related to students' majors, and a minimum of one year of college level work. Full-time students are eligible for full-time financial aid packages.

Part-time option without co-op experience:

Students work closely with academic advisors to develop a customized plan of study toward degree completion.

London option:

(Available for Hospitality Management and Culinary Arts students.) Students are invited to spend a term in their sophomore, junior or senior year in the Study Abroad Program (<http://www.drexel.edu/studyabroad>), Drexel in London, while earning up to 18.0 credits. The program's emphasis is on the global implications of and opportunities within the hospitality industry.

Degree Requirements

Food & Beverage Management Concentration**General Education Requirements**

CHEM 201	Why Things Work: Everyday Chemistry	3.0
or CHEM 101	General Chemistry I	
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
UNIV SH101	The Drexel Experience	1.0
Arts & Humanities		9.0
Social Science		6.0

Food Science Courses

FDSC 100	ServSafe	1.0
FDSC 120	Food and the Senses	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 401	Modernist Cuisine	3.0

Culinary Arts Courses

CULA 115	Culinary Fundamentals	3.0
CULA 120	Techniques and Traditions I	3.0

CULA 121	Techniques and Traditions II	3.0
CULA 125	Foundations of Professional Baking	3.0
CULA 216	A la Carte	3.0
CULA 235	Professional Dining Room Management	3.0
CULA 291	Culinary Arts Practicum II	6.0
CULA 303	Global Cuisine Studio (Course taken twice for 6.0 credits total)	6.0
CULA 316	Butchery Laboratory	2.0
CULA 320	Advanced Culinary Studio	3.0
CULA 325	Garde Manger Laboratory	3.0
CULA 400	Directed Studies with a Master Chef	3.0
CULA 405 [WI (p. 19)]	Culture and Gastronomy I	3.0
CULA 440	Food in the Arts	3.0
CULA 421	Senior Design Project I	2.0
CULA 422	Senior Design Project II	2.0
CULA 423	Senior Design Project III	2.0

Hospitality Management Courses

HRM 120	Principles of Food-Service Management	3.0
HRM 150	Customer Service	3.0
HRM 160	Laws of the Hospitality Industry	3.0
HRM 220	Purchasing for the Hospitality Industry	3.0
HRM 330	Hotel and Restaurant Marketing	3.0
HRM 335	Beverage Management	3.0
HRM 350	Cost Controls in Hospitality	3.0
HRM 435	Wine and Spirits	3.0

CULA Electives

18.0

Free Electives

12.0

Business/Minor Requirements

24.0

Total Credits**185.0****Culinary Science Concentration****General Education Requirements**

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV SH101	The Drexel Experience	1.0
Arts/Humanities Electives		9.0
Social Science Electives		6.0

Math/Science

CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
CHEM 241	Organic Chemistry I	4.0
CHEM 242	Organic Chemistry II	4.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
NFS 215	Nutritional Chemistry	3.0

NFS 217	Nutrient Quality & Composition	1.0
PHYS 103	General Physics I	4.0
PHYS 104	General Physics II	4.0
STAT 201	Introduction to Business Statistics	4.0
STAT 202	Business Statistics II	4.0
Food Science Courses		
FDSC 100	ServSafe	1.0
FDSC 120	Food and the Senses	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 401	Modernist Cuisine	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0
FDSC 454	Microbiology & Chemistry of Food Safety	3.0
FDSC 456	Food Preservation Processes	3.0
FDSC 460	Food Chemistry	3.0
FDSC 461	Food Analysis	3.0
FDSC 468	Functional Foods	3.0
FDSC 477	Food Engineering	3.0
FDSC 490	Seminar in Food Science	1.0
Culinary Arts Courses		
CULA 115	Culinary Fundamentals	3.0
CULA 120	Techniques and Traditions I	3.0
CULA 121	Techniques and Traditions II	3.0
CULA 125	Foundations of Professional Baking	3.0
CULA 291	Culinary Arts Practicum II	6.0
CULA 303	Global Cuisine Studio (Course taken twice for 6.0 credits total)	6.0
CULA 405 [WI (p. 19)]	Culture and Gastronomy I	3.0
CULA 421	Senior Design Project I	2.0
CULA 422	Senior Design Project II	2.0
CULA 423	Senior Design Project III	2.0
Culinary Arts Electives		9.0
Free electives (or Business Minor)		23.0
Total Credits		185.0

Sample Plans of Study

		Credits
Term 1		
CHEM 101	General Chemistry I	3.5
CULA 115	Culinary Fundamentals	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FDSC 100	ServSafe	1.0
MATH 101	Introduction to Analysis I	4.0
UNIV SH101	The Drexel Experience	1.0
Term Credits		15.5
Term 2		
CIVC 101	Introduction to Civic Engagement	1.0
CHEM 102	General Chemistry II	4.5
CULA 120	Techniques and Traditions I	3.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
Term Credits		15.5
Term 3		
CHEM 103	General Chemistry III	5.0
CULA 121	Techniques and Traditions II	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
Arts/Humanities/Social Science		3.0
Term Credits		18.0
Term 4		
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition Food	1.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality Composition	1.0
STAT 201	Introduction to Business Statistics	4.0
Free elective		3.0
Term Credits		14.0
Term 5		
CHEM 241	Organic Chemistry I	4.0
CULA 125	Foundations of Professional Baking	3.0
FDSC 120	Food and the Senses	3.0
PHYS 103	General Physics I	4.0
STAT 202	Business Statistics II	4.0
Term Credits		18.0
Term 6		
CHEM 242	Organic Chemistry II	4.0
CULA 303	Global Cuisine Studio	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
PHYS 104	General Physics II	4.0
Free elective		3.0
Term Credits		18.0
Term 7		
CULA 291	Culinary Arts Practicum II	6.0
Free elective		3.0
Arts/Humanities/Social Science		3.0
Term Credits		12.0
Term 8		
CULA 405 [WI (p. 19)]	Culture and Gastronomy I	3.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0
Free elective		3.0
Arts/Humanities/Social Science		3.0
Term Credits		17.0
Term 9		
CULA 303	Global Cuisine Studio	3.0
FDSC 401	Modernist Cuisine	3.0
FDSC 460	Food Chemistry	3.0

CULA elective	3.0
Free elective	3.0
Arts/Humanities/Social Science	3.0

Term Credits	18.0
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Term 10

CULA 421	Senior Design Project I	2.0
FDSC 456	Food Preservation Processes	3.0
FDSC 477	Food Engineering	3.0
Arts/Humanities/Social Science Elective		3.0
Free elective		2.0

Term Credits	13.0
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Term 11

CULA 422	Senior Design Project II	2.0
FDSC 454	Microbiology Chemistry of Food Safety	3.0
CULA electives		6.0
Free elective		3.0

Term Credits	14.0
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Term 12

CULA 423	Senior Design Project III	2.0
FDSC 461	Food Analysis	3.0
FDSC 468	Functional Foods	3.0
FDSC 490	Seminar in Food Science	1.0
Free elective		3.0

Term Credits	12.0
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Total Credit: 185.0**Term 1**

CULA 115	Culinary Fundamentals	3.0	Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	
FDSC 100	ServSafe	1.0	
MATH 101	Introduction to Analysis I	4.0	
NFS 100	Nutrition, Foods, and Health	2.0	
NFS 101	Introduction to Nutrition Food	1.0	
UNIV SH101	The Drexel Experience	1.0	

Term Credits	15.0
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Term 2

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101	Introduction to Civic Engagement	1.0
CULA 120	Techniques and Traditions I	3.0
CULA 125	Foundations of Professional Baking	3.0
FDSC 120	Food and the Senses	3.0

Term Credits	13.0
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Term 3

CHEM 201 or 101	Why Things Work: Everyday Chemistry General Chemistry I	3.0
CULA 121	Techniques and Traditions II	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
CULA/HOSP elective		3.0

Term Credits	16.0
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Term 4

CULA 216	A la Carte	3.0
CULA 316	Butchery Laboratory	2.0
CULA 405 [WI (p. 19)]	Culture and Gastronomy I	3.0
HRM 120	Principles of Food-Service Management	3.0
HRM 220	Purchasing for the Hospitality Industry	3.0

Term Credits	14.0
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Term 5

CULA 235	Professional Dining Room Management	3.0
CULA 325	Garde Manger Laboratory	3.0
HRM 150	Customer Service	3.0
HRM 350	Cost Controls in Hospitality	3.0
Business Minor Course		4.0

Term Credits	16.0
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Term 6

CULA 303	Global Cuisine Studio	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
CULA/HOSP elective		3.0
Free elective		3.0
Business Minor Course		4.0

Term Credits	17.0
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Term 7

CULA 291	Culinary Arts Practicum II	6.0
Arts/Humanities/Social Science elective		3.0
CULA/HOSP elective		3.0

Term Credits	12.0
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Term 8

CULA 440	Food in the Arts	3.0
FDSC 350	Experimental Foods: Product Development	3.0
HRM 160	Laws of the Hospitality Industry	3.0
CULA/HOSP electives		6.0
Arts/Humanities/Social Science elective		3.0

Term Credits	18.0
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Term 9

FDSC 401	Modernist Cuisine	3.0
HRM 330	Hotel and Restaurant Marketing	3.0
HRM 335	Beverage Management	3.0
Arts/Humanities/Social Science elective		3.0
Business Minor Course		4.0

Term Credits	16.0
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Term 10

CULA 303	Global Cuisine Studio	3.0
CULA 400	Directed Studies with a Master Chef	3.0
CULA 421	Senior Design Project I	2.0
Free electives		6.0
Business Minor Course		4.0

Term Credits	18.0
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Term 11

CULA 320	Advanced Culinary Studio	3.0
CULA 422	Senior Design Project II	2.0

HRM 435	Wine and Spirits	3.0
	Arts/Humanities/Social Science Elective	3.0
	CULA/HOSP elective	3.0
Term Credits		14.0

Term 12

CULA 423	Senior Design Project III	2.0
	Arts/Humanities/Social Science Elective	3.0
	Business Minor Courses	8.0
	Free elective	3.0
Term Credits		16.0

Total Credit: 185.0

Co-op/Career Opportunities

The hospitality industry employs 15 million people nationwide. According to the National Restaurant Association statistics, employment is growing at the rate of eleven percent each year, making this industry one of the fastest growing in the country. The Hospitality Management program enjoys close relationships with the finest hotels, restaurants and tourism partners in the greater Philadelphia area, as well as interaction with professional organizations that represent the industry on a regional, national and international level. These relationships result in over \$80,000 a year in scholarship funding for our students.

Typical career paths for graduates include the following:

- Restaurants and private clubs, which employ over 9 million people in the US
- Hotels Resorts & Casinos with almost 2.5 million employees
- Airlines, tour operating companies, travel agencies and tourism consulting
- Convention, special events, meeting planning, and tourism agencies
- Cruise lines, the fastest growing segment of the industry
- Retirement and life-care facilities
- Food service and beverage brokers, distributors, and suppliers to the industry

Co-Op Opportunities

Drexel University has long been known for its cooperative education/ internship programs, which allow students to mix periods of full-time, career-related employment with their studies. All traditional Hospitality Management students pursue the 6-month co-op employment. This six-month experience during the junior year is in a supervisory or managerial capacity. The following hotels, facilities, restaurants and clubs have recently offered co-op positions to Drexel's Hospitality Management students. Although many of these examples are located in the Philadelphia area, co-op jobs are not limited to any region.

- Four Seasons Hotel
- Jose Garces - Garces Group
- Mark Vetri - Vetri Family of Restaurants
- Marriott Hotels and Resorts
- Philadelphia Convention and Visitors Bureau
- America's Test Kitchen
- Philadelphia Chamber of Commerce
- Frog Commissary Catering
- Ritz-Carlton Hotel

- Sbraga Restaurant
- Restaurant Business Magazine
- Union League (private club)
- Walt Disney World

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Facilities

The major facility of the Hospitality Management, Culinary Arts and Food Science programs is located on the sixth floor of the Academic Building. It is a 6,500 square foot space that includes three state-of-the-art commercial kitchens, bakery and laboratories, as well as the Academic Bistro (<http://drexel.edu/hsm/about/academic-bistro>), the student-run restaurant, bar and lounge. The facility also includes a sensory analysis lab, hospitality and gaming lab, conference room and the Les Dames d'Escoffier Library.

Philadelphia Location

A unique feature of the Hospitality Management program at Drexel is that it is located in Philadelphia, with close proximity to New York City, Baltimore, and Washington, as well as the resort centers on the Atlantic seacoast and in the Pocono Mountains. These regions include hundreds of hotels, restaurants, resorts, and casinos that are used for field trips and campus visits by hospitality resource professionals. Students also gain hands-on experience through faculty-directed field trips throughout the region.

Culinary Arts/Food Science Faculty

Edward Bottone, BS (*Temple University*). Instructor. French cuisine, American regional cuisine, food as a signifier in the social history of western culture; the semiotics of food; food in cinema.

Jonathan Deuthsch, PhD (*New York University*) *Program Director*. Professor. Social and cultural aspects of food, culinary education, culinary improvisation, recipe and product development.

James Feustel, MA (*New York University*). Instructor. Food service design; integrating new cooking technologies and equipment; culinary education.

Jake Lahne, PhD (*University of Vermont*). Assistant Professor. Sensory perception and preference in foods; flavor chemistry and sensory properties of alcoholic beverages; artisan, traditional, and local foods; consumer food choice and taste; cooking practice and food agency

Rosemary Trout, MS (*Drexel University*) *Interim Program Director, Culinary Arts and Food Science*. Instructor. Food labeling and regulations; food safety and sanitation in food service and food manufacturing; food processing; sensory evaluation.

Stephanie Yoon, PhD (*Texas Woman's University*). Visiting Associate Professor. Food trends and food business; consumer behavior; development of strategies for food industry and foodservice industry; school foodservice.

Charles Ziccardi, MS (*Drexel University*). Assistant Teaching Professor. Classic Italian cuisine, Italian culture, gardening for the kitchen, food sustainability, and professional hospitality management.

Interdepartmental Faculty

Brandy-Joe Milliron, PhD (*Arizona State University*). Assistant Professor. The development and evaluation of modifications in the natural environment to promote healthier living; farm to table school initiatives;

Michael Traud, JD (*Villanova University*) Program Director, *Hospitality and Tourism Management*. Assistant Clinical Professor. Implementation of Korean Cuisine in the United States; hospitality law; Italian cuisine.

Emeritus Faculty

A. Philip Handel, PhD (*University of Massachusetts*). Professor Emeritus. Food science, especially lipid chemistry; food composition and functionality; evaluation and analysis of frying fats and fried foods.

Culinary Arts

Major: Culinary Arts

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 184.0

Classification of Instructional Programs (CIP) code: 12.0503

Standard Occupational Classification (SOC) code: 25-1011; 11-9051

About the Program

Note: Effective Fall Term 2015, students are no longer being accepted into this program; however, students may apply to the combined BS in Culinary Arts & Science (p. 19) degree program.

The major in culinary arts prepares students for leadership positions in the fine foods segment of the hospitality industry. This baccalaureate degree in culinary arts is among the first of its kind in the United States. This program comprises approximately equal parts liberal arts, business, hospitality management, and culinary arts. The aim of the program is to prepare students as independent thinkers who can work collaboratively in the field of culinary arts.

Students completing this program also receive a business minor with a choice of one of the following areas:

- Business Administration
- Marketing
- Entrepreneurship

Alternatively, students may meet with their Advisor to select a minor that is more in line with their personal and professional goals.

For more information, visit the Culinary Arts (<http://drexel.edu/hsm/academics/Culinary-Arts-Food-Science>) page on the Center for Hospitality and Sport Management's website (<http://drexel.edu/hsm>).

Program Delivery Options

Drexel's BS degrees include courses in the liberal arts, the humanities, sciences, hospitality management and culinary arts. Three business minors are also offered. The BS degree can be completed on a full-time or part-time basis:

Traditional Four-year option, with one co-op experience:

This option includes one six-month period of full-time employment in the junior year.

Four plus One option BS/MBA combined degree, with co-op experience:

This option combines the four-year BS degree followed by the one-year Professional MBA to qualify freshmen applicants. Incoming freshmen will generally have a minimum of 1300 on the SAT, a GPA of 3.5 or higher, and be in the top 10% of their high school graduating class. For MBA requirements visit the LeBow College Professional MBA (<http://www.lebow.drexel.edu/academics/programs/mba>) website.

Full-time Status Evening option without co-op experience:

To be eligible, students should have a minimum of two years full-time work experience related to students' majors, and a minimum of one year of college level work. Full-time students are eligible for full-time financial aid packages.

Part-time option without co-op experience:

Students work closely with academic advisors to develop a customized plan of study toward degree completion.

London option:

(Available for Hospitality Management and Culinary Arts students.) Students are invited to spend a term in their sophomore, junior or senior year in the Study Abroad Program (<http://www.drexel.edu/studyabroad>), Drexel in London, while earning up to 18.0 credits. The program's emphasis is on the global implications of and opportunities within the hospitality industry.

Degree Requirements

General Education Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
MATH 101	Introduction to Analysis I	4.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
UNIV G101	The Drexel Experience	2.0
Arts and Humanities Electives **		9.0
Social Science Elective ***		3.0
Free Electives		15.0-19.0

Program Requirements

FDSC 270	Microbial Food Safety and Sanitation	4.0
HRM 110	Introduction to the Hospitality Industry	3.0
HRM 120	Principles of Food-Service Management	3.0
HRM 150	Customer Service	3.0
HRM 160	Laws of the Hospitality Industry	3.0
HRM 200	Software for Hospitality Industry	3.0
HRM 215	Commercial Food Production	4.0
HRM 220	Purchasing for the Hospitality Industry	3.0
HRM 225	Equipment Design and Layout	3.0
HRM 310	Hospitality Accounting Systems	3.0
HRM 320	Hospitality Management Information Systems	3.0
HRM 330	Hotel and Restaurant Marketing	3.0
HRM 335	Beverage Management	3.0

HRM 350	Cost Controls in Hospitality	3.0
HRM 360	Hospitality Industry Public Relations	3.0
HRM 455	Hospitality Human Resources Management	3.0

Culinary Arts Requirements

CULA 120	Techniques and Traditions I	3.0
CULA 121	Techniques and Traditions II	3.0
CULA 125	Foundations of Professional Baking	3.0
CULA 216	A la Carte	3.0
CULA 220	Patisserie I	2.0
CULA 225	Patisserie II	2.0
CULA 235	Professional Dining Room Management	3.0
CULA 300	Fundamentals of Vegetarian Cuisine	3.0
CULA 305	Fundamentals of Italian Cuisine	3.0
CULA 310	Fundamentals of French Cuisine	3.0
CULA 315	Fundamentals of American Cuisine	3.0
CULA 316	Butchery Laboratory	2.0
CULA 325	Garde Manger Laboratory	3.0
CULA 405 [WI (p. 24)]	Culture and Gastronomy I	3.0
CULA 410	Culture and Gastronomy II	3.0
CULA 415	Food Styling and Show Competition	3.0
CULA 420	Senior Design Project	3.0

Culinary Arts (CULA) Electives 6.0-9.0

Business Minor Requirements (See Options Below) 24.0

Total Credits 180.0-189.0

* Students who wish to minor in Business Administration must take MATH 101 and MATH 102 or MATH 181, 182 and 183. Marketing and Entrepreneurship minors need only take MATH 101.

** Students choose three classes from the following subject areas: ARTH, COM, ENGL, FMVD, HIST, HUM, JUDA, LING, MUSC, PHIL, PHTO, PRST, PSCI, THTR, WGST. Students can also select any of the language courses to fulfill Arts and Humanities requirements.

*** Students may choose from AFAS, ANTH, PSY, and SOC courses.

Business Minor Requirements

Students have the option of satisfying the business minor requirement by completing one of three possible business minors: **General Business Administration, Marketing or Entrepreneurship.**

Business Administration Minor Option

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 24)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Total Credits		24.0

Entrepreneurship Minor Option

ACCT 120	Accounting Essentials for New Ventures	4.0
MGMT 260	Introduction to Entrepreneurship	4.0
MGMT 364	Technology Management	4.0

MGMT 365	Business Plan for Entrepreneurs	4.0
Select two of the following:		8.0

BLAW 346	Entrepreneurial Law	
FIN 301	Introduction to Finance *	
FIN 335	Entrepreneurial Finance	
MKTG 347	New Product Development	
MGMT 363	Directed Study in Entrepreneurship	
ORGB 300 [WI (p. 24)]	Organizational Behavior	

Total Credits 24.0

* Prerequisites must be taken as unrestricted electives.

Marketing Minor Option

MKTG 301	Introduction to Marketing Management	4.0
MKTG 380	Seminar in Marketing Strategy	4.0

Select four of the following: 16.0

MKTG 321	Selling and Sales Management	
MKTG 322	Advertising & Integrated Marketing Communications	
MKTG 324	Marketing Channels and Distribution Systems	
MKTG 326	Marketing Insights	
MKTG 344	Professional Personal Selling	
MKTG 347	New Product Development	
MKTG 348	Services Marketing	
MKTG 351	Marketing for Non-Profit Organizations	
MKTG 353	Business-to-Business Marketing	
MKTG 355	Interactive Marketing	
MKTG 356	Consumer Behavior	
MKTG 357	Global Marketing	
MKTG 358	Transportation and Logistics	

Total Credits 24.0

Sample Plans of Study**BS in Culinary Arts: Minor in Business Administration**

(See below for the additional plans illustrating the other Business Minor options)

Term 1		Credits
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HRM 110	Introduction to the Hospitality Industry	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV G101	The Drexel Experience	1.0
Term Credits		14.5

Term 2		Credits
ANTH 101	Introduction to Cultural Diversity	3.0
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0

UNIV G101	The Drexel Experience	1.0
Term Credits		15.5
Term 3		
CHEM 103	General Chemistry III	5.0
CULA 120	Techniques and Traditions I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
MATH 239	Mathematics for the Life Sciences	4.0
Term Credits		19.0
Term 4		
BIO 122	Cells and Genetics	4.5
HRM 120	Principles of Food-Service Management	3.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality Composition	1.0
NFS 230	Intermediate Nutrition	4.0
Term Credits		15.5
Term 5		
CULA 315	Fundamentals of American Cuisine	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
HRM 215	Commercial Food Production	4.0
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		14.0
Term 6		
BIO 126	Physiology and Ecology	4.5
ECON 201	Principles of Microeconomics	4.0
ORGB 300 [WI (p. 24)]	Organizational Behavior	4.0
Free Elective		3.0
Term Credits		15.5
Term 7		
COM 230	Techniques of Speaking	3.0
COOP 101	Career Management and Professional Development	0.0
CULA 291	Culinary Arts Practicum II	6.0
ECON 202	Principles of Macroeconomics	4.0
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		16.0
Term 8		
CULA 310	Fundamentals of French Cuisine	3.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 456	Food Preservation Processes	3.0
PHYS 103	General Physics I	4.0
Term Credits		13.0
Term 9		
FDSC 460	Food Chemistry	3.0
FDSC 468	Functional Foods	3.0
NFS 365 [WI (p. 24)]	Nutrition Laboratory: Food and Nutrient Analysis	4.0
PHYS 104	General Physics II	4.0
Term Credits		14.0
Term 10		

CULA 125	Foundations of Professional Baking	3.0
CULA 405 [WI (p. 24)]	Culture and Gastronomy I	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0
MKTG 301	Introduction to Marketing Management	4.0
Term Credits		15.0
Term 11		
CULA 410	Culture and Gastronomy II	3.0
FDSC 454	Microbiology Chemistry of Food Safety	3.0
FDSC 461	Food Analysis	3.0
FDSC 491	Senior Project I	2.0
MKTG 347	New Product Development	4.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		19.0
Term 12		
COM 310 [WI (p. 24)]	Technical Communication	3.0
FDSC 490	Seminar in Food Science	1.0
FDSC 492	Senior Project II	2.0
STAT 202	Business Statistics II	4.0
Free Elective		3.0
Term Credits		13.0
Total Credit: 184.0		

BS in Culinary Arts: Minor in Entrepreneurship

Term		Credits
Term 1		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HRM 110	Introduction to the Hospitality Industry	3.0
HRM 200	Software for Hospitality Industry	3.0
MATH 181	Mathematical Analysis I	3.0
UNIV G101	The Drexel Experience	1.0
Term Credits		13.0
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
HRM 150	Customer Service	3.0
MATH 182	Mathematical Analysis II	3.0
UNIV G101	The Drexel Experience	1.0
Term Credits		14.0
Term 3		
CULA 120	Techniques and Traditions I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HRM 120	Principles of Food-Service Management	3.0
HRM 160	Laws of the Hospitality Industry	3.0
MATH 183	Mathematical Analysis III	3.0
NFS 100	Nutrition, Foods, and Health	2.0

NFS 101	Introduction to Nutrition Food	1.0
Term Credits		18.0
Term 4		
CULA 121	Techniques and Traditions II	3.0
CULA 125	Foundations of Professional Baking	3.0
HRM 220	Purchasing for the Hospitality Industry	3.0
MGMT 260	Introduction to Entrepreneurship	4.0
Free Elective		3.0
Term Credits		16.0
Term 5		
CULA 315	Fundamentals of American Cuisine	3.0
CULA 325	Garde Manger Laboratory	3.0
HRM 215	Commercial Food Production	4.0
MGMT 364	Technology Management	4.0
Arts and Humanities Elective		3.0
Term Credits		17.0
Term 6		
ACCT 120	Accounting Essentials for New Ventures	4.0
CULA 216	A la Carte	3.0
CULA 220	Patisserie I	2.0
CULA 235	Professional Dining Room Management	2.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
Term Credits		15.0
Term 7		
COOP 101	Career Management and Professional Development	0.0
CULA 300	Fundamentals of Vegetarian Cuisine	3.0
CULA 305	Fundamentals of Italian Cuisine	3.0
MGMT 365	Business Plan for Entrepreneurs	4.0
Arts and Humanities Elective		3.0
Free Elective		3.0
Term Credits		16.0
Term 8		
CULA 225	Patisserie II	2.0
CULA 310	Fundamentals of French Cuisine	3.0
CULA 405 [WI (p. 24)]	Culture and Gastronomy I	3.0
CULA 415	Food Styling and Show Competition	3.0
Free Elective		3.0
Term Credits		14.0
Term 9		
CULA 410	Culture and Gastronomy II	3.0
HRM 225	Equipment Design and Layout	3.0
HRM 310	Hospitality Accounting Systems	3.0
HRM 360	Hospitality Industry Public Relations	3.0
Free Elective		3.0
Term Credits		15.0
Term 10		
CULA 316	Butchery Laboratory	2.0
Free Elective		2.0
Culinary Arts (CULA) Elective		2.0

Arts and Humanities Elective		3.0
Entrepreneurship Elective *		4.0
Social Science Elective		3.0
Term Credits		16.0
Term 11		
HRM 320	Hospitality Management Information Systems	3.0
HRM 335	Beverage Management	3.0
HRM 350	Cost Controls in Hospitality	3.0
Culinary Arts (CULA) Elective		3.0
Free Elective		3.0
Term Credits		15.0
Term 12		
CULA 420	Senior Design Project	3.0
HRM 455	Hospitality Human Resources Management	3.0
Culinary Arts (CULA) Elective		2.0
Social Science Elective		3.0
Entrepreneurship Elective *		4.0
Term Credits		15.0
Total Credit: 184.0		

* See degree requirements (p.).

BS in Culinary Arts: Minor in Marketing

		Credits
Term 1		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HRM 110	Introduction to the Hospitality Industry	3.0
HRM 200	Software for Hospitality Industry	3.0
MATH 181	Mathematical Analysis I	3.0
UNIV G101	The Drexel Experience	1.0
Term Credits		13.0
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
HRM 150	Customer Service	3.0
MATH 182	Mathematical Analysis II	3.0
UNIV G101	The Drexel Experience	1.0
Term Credits		14.0
Term 3		
CULA 120	Techniques and Traditions I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HRM 120	Principles of Food-Service Management	3.0
HRM 160	Laws of the Hospitality Industry	3.0
MATH 183	Mathematical Analysis III	3.0
NFS 101	Introduction to Nutrition Food	3.0
Term Credits		18.0
Term 4		
CULA 121	Techniques and Traditions II	3.0
CULA 125	Foundations of Professional Baking	3.0
HRM 220	Purchasing for the Hospitality Industry	3.0
Free Elective		3.0

Social Science Elective		3.0
Term Credits		15.0
Term 5		
CULA 315	Fundamentals of American Cuisine	3.0
CULA 325	Garde Manger Laboratory	3.0
HRM 215	Commercial Food Production	4.0
Social science Elective		3.0
Arts and Humanities Elective		3.0
Term Credits		16.0
Term 6		
CULA 216	A la Carte	3.0
CULA 220	Patisserie I	2.0
CULA 235	Professional Dining Room Management	2.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
Free Elective		3.0
Term Credits		14.0
Term 7		
COOP 101	Career Management and Professional Development	0.0
CULA 300	Fundamentals of Vegetarian Cuisine	3.0
CULA 305	Fundamentals of Italian Cuisine	3.0
MKTG 301	Introduction to Marketing Management	4.0
Free Elective		3.0
Arts and Humanities Elective		3.0
Term Credits		16.0
Term 8		
CULA 225	Patisserie II	2.0
CULA 310	Fundamentals of French Cuisine	3.0
CULA 405 [WI (p. 24)]	Culture and Gastronomy I	3.0
CULA 415	Food Styling and Show Competition	3.0
Marketing (MKTG) Elective		4.0
Free Elective		3.0
Term Credits		18.0
Term 9		
CULA 410	Culture and Gastronomy II	3.0
HRM 225	Equipment Design and Layout	3.0
HRM 310	Hospitality Accounting Systems	3.0
HRM 360	Hospitality Industry Public Relations	3.0
Culinary Arts (CULA) Elective		2.0
Term Credits		14.0
Term 10		
CULA 316	Butchery Laboratory	2.0
Culinary Arts (CULA) Elective		2.0
Marketing (MKTG) Elective		4.0
Free Elective		2.0
Arts and Humanities Elective		3.0
Term Credits		13.0
Term 11		
HRM 320	Hospitality Management Information Systems	3.0
HRM 335	Beverage Management	3.0

HRM 350	Cost Controls in Hospitality	3.0
MKTG 380	Seminar in Marketing Strategy	4.0
Marketing (MKTG) Elective		4.0
Term Credits		17.0
Term 12		
CULA 420	Senior Design Project	3.0
HRM 455	Hospitality Human Resources Management	3.0
Marketing (MKTG) Elective		4.0
Culinary Arts (CULA) Elective		3.0
Free Elective		3.0
Term Credits		16.0
Total Credit: 184.0		

Co-op/Career Opportunities

The hospitality industry employs 15 million people nationwide. According to the National Restaurant Association statistics, employment is growing at the rate of eleven percent each year, making this industry one of the fastest growing in the country. The Hospitality Management program enjoys close relationships with the finest hotels, restaurants and tourism partners in the greater Philadelphia area, as well as interaction with professional organizations that represent the industry on a regional, national and international level. These relationships result in over \$80,000 a year in scholarship funding for our students.

Typical career paths for graduates include the following:

- Restaurants and private clubs, which employ over 9 million people in the US
- Hotels Resorts & Casinos with almost 2.5 million employees
- Airlines, tour operating companies, travel agencies and tourism consulting
- Convention, special events, meeting planning, and tourism agencies
- Cruise lines, the fastest growing segment of the industry
- Retirement and life-care facilities
- Food service and beverage brokers, distributors, and suppliers to the industry

Co-Op Opportunities

Drexel University has long been known for its cooperative education/ internship programs, which allow students to mix periods of full-time, career-related employment with their studies. All traditional Hospitality Management students pursue the 6-month co-op employment. This six-month experience during the junior year is in a supervisory or managerial capacity. The following hotels, facilities, restaurants and clubs have recently offered co-op positions to Drexel's Hospitality Management students. Although many of these examples are located in the Philadelphia area, co-op jobs are not limited to any region.

- Four Seasons Hotel
- Jose Garces - Garces Group
- Mark Vetri - Vetri Family of Restaurants
- Marriott Hotels and Resorts
- Philadelphia Convention and Visitors Bureau
- America's Test Kitchen
- Philadelphia Chamber of Commerce
- Frog Commissary Catering

- Ritz-Carlton Hotel
- Sbraga Restaurant
- Restaurant Business Magazine
- Union League (private club)
- Walt Disney World

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Culinary Arts

The minor in culinary arts is designed for students pursuing a variety of majors who also have an interest in food and cuisine. The required courses introduce the major cuisines, and develop necessary culinary technical skills and fundamental knowledge of foods and food preparation. Students are able to select elective courses in various cuisines or can explore more theoretical areas of the field through topics including gastronomy, food history, and food writing.

Required Courses

CULA 115	Culinary Fundamentals	3.0
or CULA 120	Techniques and Traditions I	
CULA 305	Fundamentals of Italian Cuisine	3.0
CULA 310	Fundamentals of French Cuisine	3.0
CULA 315	Fundamentals of American Cuisine	3.0
HRM 215	Commercial Food Production	4.0
Select three of the following:		8.0
CULA 121	Techniques and Traditions II	
CULA 125	Foundations of Professional Baking	
CULA 216	A la Carte	
CULA 220	Patisserie I	
CULA 225	Patisserie II	
CULA 226	Patisserie III	
CULA 240	Fundamentals of Chinese Cuisine	
CULA 306	Advanced Italian Cuisine	
CULA 311	Advanced French Technique	
CULA 320	Advanced Culinary Studio	
CULA 325	Garde Manger Laboratory	
CULA 316	Butchery Laboratory	
CULA 330	Charcuterie	
CULA 335	Fundamentals of Indian Cuisine	
CULA 400	Directed Studies with a Master Chef	
CULA 405 [WI (p. 24)]	Culture and Gastronomy I	
CULA 410	Culture and Gastronomy II	
CULA 415	Food Styling and Show Competition	
CULA 425	The Kitchen Garden	
CULA 426	The Kitchen Garden: Summer	
CULA 427	The Kitchen Garden: Fall	
HRM 315	Continental, Ethnic, and Regional Cuisine	
HRM 415	Fine Dining and Services	

Total Credits

24.0

Facilities

The major facility of the Hospitality Management, Culinary Arts and Food Science programs is located on the sixth floor of the Academic Building. It is a 6,500 square foot space that includes three state-of-the-art commercial kitchens, bakery and laboratories, as well as the Academic Bistro (<http://drexel.edu/hsm/about/academic-bistro>), the student-run restaurant, bar and lounge. The facility also includes a sensory analysis lab, hospitality and gaming lab, conference room and the Les Dames d'Escoffier Library.

Philadelphia Location

A unique feature of the Hospitality Management program at Drexel is that it is located in Philadelphia, with close proximity to New York City, Baltimore, and Washington, as well as the resort centers on the Atlantic seacoast and in the Pocono Mountains. These regions include hundreds of hotels, restaurants, resorts, and casinos that are used for field trips and campus visits by hospitality resource professionals. Students also gain hands-on experience through faculty-directed field trips throughout the region.

Culinary Arts/Food Science Faculty

Edward Bottone, BS (*Temple University*). Instructor. French cuisine, American regional cuisine, food as a signifier in the social history of western culture; the semiotics of food; food in cinema.

Jonathan Deuttsch, PhD (*New York University*) Program Director. Professor. Social and cultural aspects of food, culinary education, culinary improvisation, recipe and product development.

James Feustel, MA (*New York University*). Instructor. Food service design; integrating new cooking technologies and equipment; culinary education.

Jake Lahne, PhD (*University of Vermont*). Assistant Professor. Sensory perception and preference in foods; flavor chemistry and sensory properties of alcoholic beverages; artisan, traditional, and local foods; consumer food choice and taste; cooking practice and food agency

Rosemary Trout, MS (*Drexel University*) Interim Program Director, *Culinary Arts and Food Science*. Instructor. Food labeling and regulations; food safety and sanitation in food service and food manufacturing; food processing; sensory evaluation.

Stephanie Yoon, PhD (*Texas Woman's University*). Visiting Associate Professor. Food trends and food business; consumer behavior; development of strategies for food industry and foodservice industry; school foodservice.

Charles Ziccardi, MS (*Drexel University*). Assistant Teaching Professor. Classic Italian cuisine, Italian culture, gardening for the kitchen, food sustainability, and professional hospitality management.

Interdepartmental Faculty

Brandy-Joe Milliron, PhD (*Arizona State University*). Assistant Professor. The development and evaluation of modifications in the natural environment to promote healthier living; farm to table school initiatives;

Michael Traud, JD (*Villanova University*) Program Director, *Hospitality and Tourism Management*. Assistant Clinical Professor. Implementation of Korean Cuisine in the United States; hospitality law; Italian cuisine.

Emeritus Faculty

A. Philip Handel, PhD (*University of Massachusetts*). Professor Emeritus. Food science, especially lipid chemistry; food composition and functionality; evaluation and analysis of frying fats and fried foods.

Culinary Science

Major: Culinary Science

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 185.0

Classification of Instructional Programs (CIP) code: 12-9999

Standard Occupational Classification (SOC) code: 19-1012

About the Program

Note: Effective Fall Term 2015, students are no longer being accepted into this program; however, students may apply to the combined BS in Culinary Arts & Science (p. 19) degree program.

The Bachelor of Science (BS) in Culinary Science program at the Center for Hospitality and Sport Management combines the creative spirit of the culinary arts with the technical and scientific expertise of the food scientist. Combining courses in culinary arts, hospitality management, and food science, the program includes a strong base in the basic sciences and business.

Culinary scientists learn to integrate and apply knowledge from the disciplines of chemistry, microbiology, culinary arts, hospitality management, food science, and nutrition in order to preserve, process, package, and distribute foods that are safe, nutritious, and delicious. Students majoring in culinary science are prepared for careers in the food industry such as a research chef or product developer. In such positions, graduates can combine their creative and aesthetic talents with their technical expertise as food scientists.

Career possibilities for someone with a degree in culinary science include numerous positions in food companies such as research and development technologist, quality assurance manager, corporate executive chef, research and development chef, senior culinary research technologist, flavor development laboratory manager, and technical sales representative.

The Culinary Science program is committed to providing a professional, comprehensive, and challenging college experience as it prepares students for a variety of rewarding careers in the culinary field and food science and manufacturing industries. In order to provide students with a well-rounded educational experience, the culinary science curriculum is composed of approximately equal amounts of coursework in liberal arts, business administration, food science, natural sciences, and culinary arts. As part of the Culinary Science BS program, students choose from minors in business administration, entrepreneurship, marketing, or they can select a science concentration.

For more information, visit the Center for Hospitality and Sport Management (<http://www.drexel.edu/hsm>).

Program Delivery Options

Drexel's BS degrees include courses in the liberal arts, the humanities, sciences, hospitality management and culinary arts. Three business

minors are also offered. The BS degree can be completed on a full-time or part-time basis:

Traditional 4-year option, with one co-op experience

Traditional 5-year option, with 3 co-op experiences

Four plus One option BS/MBA combined degree, with co-op experience:

This option combines the four-year BS degree followed by the one-year Professional MBA to qualify freshmen applicants. Incoming freshmen will generally have a minimum of 1300 on the SAT, a GPA of 3.5 or higher, and be in the top 10% of their high school graduating class. For MBA requirements visit the LeBow College Professional MBA (<http://www.lebow.drexel.edu/academics/programs/mba/drexel-lebow-mba>) website.

Full-time Status Evening option without co-op experience:

To be eligible, students should have a minimum of two years full-time work experience related to students' majors, and a minimum of one year of college level work. Full-time students are eligible for full-time financial aid packages.

Part-time option without co-op experience:

Students work closely with academic advisors to develop a customized plan of study toward degree completion.

London option:

Students are invited to spend a term in their sophomore, junior or senior year in the Study Abroad Program (<http://www.drexel.edu/studyabroad>), Drexel in London, while earning up to 18 credits. The program's emphasis is on the global implications of and opportunities within the hospitality industry.

Degree Requirements

Written Analysis and Communication

COM 230	Techniques of Speaking	3.0
COM 310 [WI (p. 30)]	Technical Communication	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV G101	The Drexel Experience	2.0

Mathematical Analysis and Statistics

MATH 101	Introduction to Analysis I *	4.0
MATH 102	Introduction to Analysis II *	4.0
MATH 239	Mathematics for the Life Sciences	4.0
STAT 201	Introduction to Business Statistics	4.0
STAT 202	Business Statistics II	4.0

Nutrition

NFS 230	Intermediate Nutrition	4.0
NFS 365 [WI (p. 30)]	Nutrition Laboratory: Food and Nutrient Analysis	4.0

Humanities and Social Science

ANTH 101	Introduction to Cultural Diversity	3.0
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Biological Sciences

BIO 122	Cells and Genetics	4.5
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BIO 126	Physiology and Ecology	4.5
Chemistry		
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality & Composition	1.0

Physics

PHYS 103	General Physics I	4.0
PHYS 104	General Physics II	4.0

Food Science Requirements

FDSC 154	Foods: Composition, Interaction and Formulation	4.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0
FDSC 454	Microbiology & Chemistry of Food Safety	3.0
FDSC 456	Food Preservation Processes	3.0
FDSC 460	Food Chemistry	3.0
FDSC 461	Food Analysis	3.0
FDSC 468	Functional Foods	3.0
FDSC 490	Seminar in Food Science	1.0
FDSC 491	Senior Project I	2.0
FDSC 492	Senior Project II	2.0

Hospitality Management/Culinary Arts Requirements

HRM 110	Introduction to the Hospitality Industry	3.0
HRM 120	Principles of Food-Service Management	3.0
HRM 215	Commercial Food Production	4.0
CULA 120	Techniques and Traditions I	3.0
CULA 125	Foundations of Professional Baking	3.0
CULA 291	Culinary Arts Practicum II	6.0
CULA 310	Fundamentals of French Cuisine	3.0
CULA 315	Fundamentals of American Cuisine	3.0
CULA 405 [WI (p. 30)]	Culture and Gastronomy I	3.0
CULA 410	Culture and Gastronomy II	3.0

Business Minor or Science Requirements (See Options Below) 18.0-32.0**Hospitality Management/Culinary Arts Electives**

Two CULA or HRM electives	6.0
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Free Electives

	9.0
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Total Credits 185.0-1

* Students may substitute MATH 181, MATH 182, and MATH 183 with permission from an advisor.

Concentration Requirements 18.0 - 32.0 Credits

Students have the option of either satisfying the requirements for a business minor or completing a science concentration.

Science Concentration Option Requirements

CHEM 230	Quantitative Analysis	4.0
CHEM 231 [WI (p. 30)]	Quantitative Analysis Laboratory	2.0

CHEM 241	Organic Chemistry I	4.0
CHEM 242	Organic Chemistry II	4.0

Select two of the following: * 5.0-10.0

BIO 221	Microbiology	
& BIO 222	and Microbiology Laboratory	
BIO 312	Genetically Modified Foods	
BIO 424	Microbial Physiology	
CHEM 243	Organic Chemistry III	
CHEM 256	Physical Chemistry for Biological Sciences	
CHEM 430	Analytical Chemistry I	
CHEM 431 [WI (p. 30)]	Analytical Chemistry II	

Total Credits 19.0-24.0

* BIO 221 + BIO 222 counts as one course.

Business Administration Minor Option

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
MKTG 301	Introduction to Marketing Management	4.0
MKTG 347	New Product Development	4.0
ORGB 300 [WI (p. 30)]	Organizational Behavior	4.0

Total Credits 20.0**Entrepreneurship Minor Option**

ACCT 120	Accounting Essentials for New Ventures	4.0
MGMT 260	Introduction to Entrepreneurship	4.0
MGMT 364	Technology Management	4.0
MGMT 365	Business Plan for Entrepreneurs	4.0
MKTG 301	Introduction to Marketing Management	4.0
MKTG 347	New Product Development	4.0
ORGB 300 [WI (p. 30)]	Organizational Behavior	4.0

Total Credits 28.0**Marketing Minor Option**

MKTG 301	Introduction to Marketing Management	4.0
MKTG 347	New Product Development	4.0
MKTG 380	Seminar in Marketing Strategy	4.0

Select three of the following: 12.0

MKTG 324	Marketing Channels and Distribution Systems	
MKTG 326	Marketing Insights	
MKTG 353	Business-to-Business Marketing	
MKTG 356	Consumer Behavior	
MKTG 357	Global Marketing	
MKTG 358	Transportation and Logistics	

Total Credits 24.0

Sample Plans of Study

BS in Culinary Science: Science concentration

(See below for the additional plans illustrating the other Business Minor options)

Term 1		Credits
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HRM 110	Introduction to the Hospitality Industry	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV G101	The Drexel Experience	1.0
Term Credits		14.5
Term 2		
ANTH 101	Introduction to Cultural Diversity	3.0
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
UNIV G101	The Drexel Experience	1.0
Term Credits		15.5
Term 3		
CHEM 103	General Chemistry III	5.0
CULA 120	Techniques and Traditions I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
MATH 239	Mathematics for the Life Sciences	4.0
Term Credits		19.0
Term 4		
BIO 122	Cells and Genetics	4.5
HRM 120	Principles of Food-Service Management	3.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality Composition	1.0
NFS 230	Intermediate Nutrition	4.0
Term Credits		15.5
Term 5		
CULA 315	Fundamentals of American Cuisine	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
HRM 215	Commercial Food Production	4.0
Free Elective		3.0
Term Credits		14.0
Term 6		
BIO 126	Physiology and Ecology	4.5
CHEM 230	Quantitative Analysis	4.0
CHEM 231 [WI (p. 30)]	Quantitative Analysis Laboratory	2.0
CHEM 241	Organic Chemistry I	4.0
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		17.5
Term 7		

CHEM 242	Organic Chemistry II	4.0
COM 230	Techniques of Speaking	3.0
COOP 101	Career Management and Professional Development	0.0
CULA 291	Culinary Arts Practicum II	6.0
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		16.0
Term 8		
CULA 310	Fundamentals of French Cuisine	3.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 456	Food Preservation Processes	3.0
PHYS 103	General Physics I	4.0
Science concentration elective *		4.0
Term Credits		17.0
Term 9		
FDSC 454	Microbiology Chemistry of Food Safety	3.0
FDSC 461	Food Analysis	3.0
NFS 365 [WI (p. 30)]	Nutrition Laboratory: Food and Nutrient Analysis	4.0
PHYS 104	General Physics II	4.0
Term Credits		14.0
Term 10		
CULA 125	Foundations of Professional Baking	3.0
CULA 405 [WI (p. 30)]	Culture and Gastronomy I	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0
Science concentration elective *		4.0
Term Credits		15.0
Term 11		
CULA 410	Culture and Gastronomy II	3.0
FDSC 460	Food Chemistry	3.0
FDSC 468	Functional Foods	3.0
FDSC 491	Senior Project I	2.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		15.0
Term 12		
COM 310 [WI (p. 30)]	Technical Communication	3.0
FDSC 490	Seminar in Food Science	1.0
FDSC 492	Senior Project II	2.0
STAT 202	Business Statistics II	4.0
Free Elective		3.0
Term Credits		13.0
Total Credit: 186.0		

* See degree requirements (<http://catalog.drexel.edu/undergraduate/schooloftechnologyandprofessionalstudies/culinaryscience/#degreerequirementsbtext>).

BS in Culinary Science: Minor in Business Administration

Term 1		Credits
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HRM 110	Introduction to the Hospitality Industry	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV G101	The Drexel Experience	1.0
Term Credits		14.5
Term 2		
ANTH 101	Introduction to Cultural Diversity	3.0
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
UNIV G101	The Drexel Experience	1.0
Term Credits		15.5
Term 3		
CHEM 103	General Chemistry III	5.0
CULA 120	Techniques and Traditions I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
MATH 239	Mathematics for the Life Sciences	4.0
Term Credits		19.0
Term 4		
BIO 122	Cells and Genetics	4.5
HRM 120	Principles of Food-Service Management	3.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality Composition	1.0
NFS 230	Intermediate Nutrition	4.0
Term Credits		15.5
Term 5		
CULA 315	Fundamentals of American Cuisine	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
HRM 215	Commercial Food Production	4.0
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		14.0
Term 6		
BIO 126	Physiology and Ecology	4.5
ECON 201	Principles of Microeconomics	4.0
ORGB 300 [WI (p. 30)]	Organizational Behavior	4.0
Free Elective		3.0
Term Credits		15.5
Term 7		
COM 230	Techniques of Speaking	3.0
COOP 101	Career Management and Professional Development	0.0
CULA 291	Culinary Arts Practicum II	6.0
ECON 202	Principles of Macroeconomics	4.0

Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		16.0
Term 8		
CULA 310	Fundamentals of French Cuisine	3.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 456	Food Preservation Processes	3.0
PHYS 103	General Physics I	4.0
Term Credits		13.0
Term 9		
FDSC 460	Food Chemistry	3.0
FDSC 468	Functional Foods	3.0
NFS 365 [WI (p. 30)]	Nutrition Laboratory: Food and Nutrient Analysis	4.0
PHYS 104	General Physics II	4.0
Term Credits		14.0
Term 10		
CULA 125	Foundations of Professional Baking	3.0
CULA 405 [WI (p. 30)]	Culture and Gastronomy I	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0
MKTG 301	Introduction to Marketing Management	4.0
Term Credits		15.0
Term 11		
CULA 410	Culture and Gastronomy II	3.0
FDSC 454	Microbiology Chemistry of Food Safety	3.0
FDSC 461	Food Analysis	3.0
FDSC 491	Senior Project I	2.0
MKTG 347	New Product Development	4.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		19.0
Term 12		
COM 310 [WI (p. 30)]	Technical Communication	3.0
FDSC 490	Seminar in Food Science	1.0
FDSC 492	Senior Project II	2.0
STAT 202	Business Statistics II	4.0
Free elective		4.0
Term Credits		14.0
Total Credit: 185.0		

BS in Culinary Science: Minor in Entrepreneurship

Term 1		Credits
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HRM 110	Introduction to the Hospitality Industry	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV G101	The Drexel Experience	1.0
Term Credits		14.5

Term 2			MGMT 364	Technology Management	4.0
ANTH 101	Introduction to Cultural Diversity	3.0	NFS 365 [WI (p. 30)]	Nutrition Laboratory: Food and Nutrient Analysis	4.0
CHEM 102	General Chemistry II	4.5	PHYS 104	General Physics II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	Term Credits		18.0
MATH 102	Introduction to Analysis II	4.0	Term 10		
UNIV G101	The Drexel Experience	1.0	CULA 125	Foundations of Professional Baking	3.0
Term Credits		15.5	CULA 405 [WI (p. 30)]	Culture and Gastronomy I	3.0
Term 3			FDSC 450	Food Microbiology	3.0
CHEM 103	General Chemistry III	5.0	FDSC 451	Food Microbiology Laboratory	2.0
CULA 120	Techniques and Traditions I	3.0	MKTG 301	Introduction to Marketing Management	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	Term Credits		15.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0	Term 11		
MATH 239	Mathematics for the Life Sciences	4.0	CULA 410	Culture and Gastronomy II	3.0
Term Credits		19.0	FDSC 460	Food Chemistry	3.0
Term 4			FDSC 468	Functional Foods	3.0
BIO 122	Cells and Genetics	4.5	FDSC 491	Senior Project I	2.0
HRM 120	Principles of Food-Service Management	3.0	MKTG 347	New Product Development	4.0
NFS 215	Nutritional Chemistry	3.0	STAT 201	Introduction to Business Statistics	4.0
NFS 217	Nutrient Quality Composition	1.0	Term Credits		19.0
NFS 230	Intermediate Nutrition	4.0	Term 12		
Term Credits		15.5	COM 310 [WI (p. 30)]	Technical Communication	3.0
Term 5			FDSC 490	Seminar in Food Science	1.0
COM 230	Techniques of Speaking	3.0	FDSC 492	Senior Project II	2.0
CULA 315	Fundamentals of American Cuisine	3.0	STAT 202	Business Statistics II	4.0
FDSC 270	Microbial Food Safety and Sanitation	4.0	Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
HRM 215	Commercial Food Production	4.0	Term Credits		13.0
Term Credits		14.0	Total Credit: 186.0		
Term 6			BS in Culinary Science: Minor in Marketing		
ACCT 120	Accounting Essentials for New Ventures	4.0	Term 1		
BIO 126	Physiology and Ecology	4.5	Credits		
MGMT 260	Introduction to Entrepreneurship	4.0	CHEM 101	General Chemistry I	3.5
ORGB 300 [WI (p. 30)]	Organizational Behavior	4.0	ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
Term Credits		16.5	HRM 110	Introduction to the Hospitality Industry	3.0
Term 7			MATH 101	Introduction to Analysis I	4.0
COOP 101	Career Management and Professional Development	0.0	UNIV G101	The Drexel Experience	1.0
CULA 291	Culinary Arts Practicum II	6.0	Term Credits		14.5
MGMT 365	Business Plan for Entrepreneurs	4.0	Term 2		
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0	ANTH 101	Introduction to Cultural Diversity	3.0
Term Credits		13.0	CHEM 102	General Chemistry II	4.5
Term 8			ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CULA 310	Fundamentals of French Cuisine	3.0	MATH 102	Introduction to Analysis II	4.0
FDSC 350	Experimental Foods: Product Development	3.0	UNIV G101	The Drexel Experience	1.0
FDSC 456	Food Preservation Processes	3.0	Term Credits		15.5
PHYS 103	General Physics I	4.0	Term 3		
Term Credits		13.0	CHEM 103	General Chemistry III	5.0
Term 9			CULA 120	Techniques and Traditions I	3.0
FDSC 454	Microbiology Chemistry of Food Safety	3.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 461	Food Analysis	3.0			

FDSC 154	Foods: Composition, Interaction and Formulation	4.0
MATH 239	Mathematics for the Life Sciences	4.0
Term Credits		19.0
Term 4		
BIO 122	Cells and Genetics	4.5
HRM 120	Principles of Food-Service Management	3.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality Composition	1.0
NFS 230	Intermediate Nutrition	4.0
Term Credits		15.5
Term 5		
COM 230	Techniques of Speaking	3.0
CULA 315	Fundamentals of American Cuisine	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		13.0
Term 6		
BIO 126	Physiology and Ecology	4.5
HRM 215	Commercial Food Production	4.0
STAT 201	Introduction to Business Statistics	4.0
Free Elective		3.0
Term Credits		15.5
Term 7		
COOP 101	Career Management and Professional Development	0.0
CULA 291	Culinary Arts Practicum II	6.0
MKTG 301	Introduction to Marketing Management	4.0
STAT 202	Business Statistics II	4.0
Culinary Arts (CULA) or HRM (Hospitality Management) elective		3.0
Term Credits		17.0
Term 8		
CULA 310	Fundamentals of French Cuisine	3.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 456	Food Preservation Processes	3.0
PHYS 103	General Physics I	4.0
Marketing (MKTG) elective		4.0
Term Credits		17.0
Term 9		
FDSC 454	Microbiology Chemistry of Food Safety	3.0
FDSC 461	Food Analysis	3.0
NFS 365 [WI (p. 30)]	Nutrition Laboratory: Food and Nutrient Analysis	4.0
PHYS 104	General Physics II	4.0
Term Credits		14.0
Term 10		
CULA 125	Foundations of Professional Baking	3.0
CULA 405 [WI (p. 30)]	Culture and Gastronomy I	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0

Marketing (MKTG) elective		4.0
Term Credits		15.0
Term 11		
CULA 410	Culture and Gastronomy II	3.0
FDSC 460	Food Chemistry	3.0
FDSC 468	Functional Foods	3.0
FDSC 491	Senior Project I	2.0
MKTG 347	New Product Development	4.0
Term Credits		15.0
Term 12		
COM 310 [WI (p. 30)]	Technical Communication	3.0
FDSC 490	Seminar in Food Science	1.0
FDSC 491	Senior Project I	2.0
MKTG 380	Seminar in Marketing Strategy	4.0
Marketing (MKTG) elective		4.0
Term Credits		14.0

Total Credit: 185.0

Co-op/Career Opportunities

Career Outlook

Depending on what measures one uses, the food processing industry is the largest manufacturing segment of all industries in the US. Employment opportunities for college graduates in the food processing industry are expected to remain strong over the next five years. In fact, an estimated 20,000 positions in food and agriculture are filled by people who have had training in an allied field. The Central Atlantic region is home to a number of food processors and companies that supply ingredients to the food industry, but the industry is global in scope.

Typical career paths for culinary science graduates include the following:

- Food product developer
- Research chef
- Ingredient marketing and sales
- Food quality assurance manager
- Food microbiologist
- Food chemist
- Research food scientist

Co-Op Opportunities

Drexel University has long been known for its co-operative education/ internship programs, which allow students to mix periods of full-time, career-related employment with their studies. All traditional Culinary Science students pursue the 6-month co-op employment. This six-month experience during the junior year can be completed locally or nationally. The following employers have recently offered positions to Drexel's Culinary Science majors:

- Keystone Foods Corporation
- Campbell Soup Company
- Ottens Flavors
- Victory Brewing Company
- David Michael & Company
- Barry-Callebaut

- Virginia Dare Company
- Sweet Ovations

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Facilities

The major facility of the Hospitality Management, Culinary Arts and Food Science programs is located on the sixth floor of the Academic Building. It is a 6,500 square foot space that includes three state-of-the-art commercial kitchens, bakery and laboratories, as well as the Academic Bistro (<http://drexel.edu/hsm/about/academic-bistro>), the student-run restaurant, bar and lounge. The facility also includes a sensory analysis lab, hospitality and gaming lab, conference room and the Les Dames d'Escoffier Library.

Philadelphia Location

A unique feature of the Hospitality Management program at Drexel is that it is located in Philadelphia, with close proximity to New York City, Baltimore, and Washington, as well as the resort centers on the Atlantic seacoast and in the Pocono Mountains. These regions include hundreds of hotels, restaurants, resorts, and casinos that are used for field trips and campus visits by hospitality resource professionals. Students also gain hands-on experience through faculty-directed field trips throughout the region.

Program Delivery Options

Drexel's BS degrees include courses in the liberal arts, the humanities, sciences, hospitality management and culinary arts. Three business minors are also offered. The BS degree can be completed on a full-time or part-time basis:

Traditional Four-year option, with one co-op experience:

This option includes one six-month period of full-time employment in the junior year.

Four plus One option BS/MBA combined degree, with co-op experience:

This option combines the four-year BS degree followed by the one-year Professional MBA to qualify freshmen applicants. Incoming freshmen will generally have a minimum of 1300 on the SAT, a GPA of 3.5 or higher, and be in the top 10% of their high school graduating class. For MBA requirements visit the LeBow College Professional MBA (<http://www.lebow.drexel.edu/academics/programs/mba/drexel-lebow-mba>) website.

Full-time Status Evening option without co-op experience:

To be eligible, students should have a minimum of two years full-time work experience related to students' majors, and a minimum of one year of college level work. Full-time students are eligible for full-time financial aid packages.

Part-time option without co-op experience:

Students work closely with academic advisors to develop a customized plan of study toward degree completion.

Study Abroad in London:

Students are invited to spend a term in their sophomore, junior or senior year in the Study Abroad Program (<http://www.drexel.edu/studyabroad>), Drexel in London, while earning up to 18.0 credits. The program's

emphasis is on the global implications of and opportunities within the hospitality industry.

Study Abroad in Osnabruck Germany:

Students have the opportunity to participate in a two week interdisciplinary program which focuses on the practical application of state of the art food processing techniques.

Drexel University and Burlington County College (BCC) option:

(Available for currently enrolled, full-time Drexel at BCC Hospitality Management students.) Drexel University and Burlington County College (BCC) joined together to create a unique educational opportunity: Drexel at BCC. This partnership enabled BCC students to earn a bachelor's degree from Drexel University while remaining on BCC's Mount Laurel campus. Drexel University has elected to phase out its Drexel at BCC on-site program and will no longer be accepting students. For more information about the BS in Hospitality, visit the Center for Hospitality Management (<http://drexel.edu/hsm/academics/Culinary-Arts-Food-Science>) web site.

Culinary Arts/Food Science Faculty

Edward Bottone, BS (*Temple University*). Instructor. French cuisine, American regional cuisine, food as a signifier in the social history of western culture; the semiotics of food; food in cinema.

Jonathan Deuthsch, PhD (*New York University*) Program Director. Professor. Social and cultural aspects of food, culinary education, culinary improvisation, recipe and product development.

James Feustel, MA (*New York University*). Instructor. Food service design; integrating new cooking technologies and equipment; culinary education.

Jake Lahne, PhD (*University of Vermont*). Assistant Professor. Sensory perception and preference in foods; flavor chemistry and sensory properties of alcoholic beverages; artisan, traditional, and local foods; consumer food choice and taste; cooking practice and food agency

Rosemary Trout, MS (*Drexel University*) Interim Program Director, *Culinary Arts and Food Science*. Instructor. Food labeling and regulations; food safety and sanitation in food service and food manufacturing; food processing; sensory evaluation.

Stephanie Yoon, PhD (*Texas Woman's University*). Visiting Associate Professor. Food trends and food business; consumer behavior; development of strategies for food industry and foodservice industry; school foodservice.

Charles Ziccardi, MS (*Drexel University*). Assistant Teaching Professor. Classic Italian cuisine, Italian culture, gardening for the kitchen, food sustainability, and professional hospitality management.

Interdepartmental Faculty

Brandy-Joe Milliron, PhD (*Arizona State University*). Assistant Professor. The development and evaluation of modifications in the natural environment to promote healthier living; farm to table school initiatives;

Michael Traud, JD (*Villanova University*) Program Director, *Hospitality and Tourism Management*. Assistant Clinical Professor. Implementation of Korean Cuisine in the United States; hospitality law; Italian cuisine.

Emeritus Faculty

A. Philip Handel, PhD (*University of Massachusetts*). Professor Emeritus. Food science, especially lipid chemistry; food composition and functionality; evaluation and analysis of frying fats and fried foods.

Minor in Food Science

The minor in food science is designed for students interested in applying the basic sciences to the world's largest industry. The minor should be especially attractive to students in chemistry, chemical engineering, nutrition, and biological sciences, as it provides a background for excellent employment and post-baccalaureate study opportunities in areas closely allied to their basic disciplines.

The minor consists of 25.0 credits. Interested students should consult with a culinary science faculty member to schedule courses appropriate for their background and goals.

Required Courses

FDSC 154	Foods: Composition, Interaction and Formulation	4.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
FDSC 350	Experimental Foods: Product Development	3.0
FDSC 450	Food Microbiology	3.0
FDSC 451	Food Microbiology Laboratory	2.0
FDSC 456	Food Preservation Processes	3.0
FDSC 460	Food Chemistry	3.0
FDSC 461	Food Analysis	3.0

Total Credits **25.0**

Minor in Gaming and Casino Operations

The minor in gaming and casino operations provides individuals interested in careers in the casino resort industries with an in depth understanding of the unique aspects of casino and resort operations and management.

This minor focuses on the knowledge, skills, and abilities necessary to become a competent manager in a casino resort. The program is designed for people interested in a career in the casino industry or for existing casino employees looking to advance to higher levels of management.

Required Courses

HRM 110	Introduction to the Hospitality Industry	3.0
HRM 325	Hotel Rooms Division Management	3.0
HRM 355	Resort Management	3.0
HRM 370	Gaming and Casino Management I	3.0
HRM 371	Gaming and Casino Management II	3.0
HRM 470	Gaming Legislation, Policy and Law	3.0
HRM 472	Gaming Information Systems	3.0
HRM 475	Current Issues in Gaming	3.0

Total Credits **24.0**

Hospitality Management

Major: Hospitality Management

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 52.0904

Standard Occupational Classification (SOC) code: 11-9051; 11-9071; 11-9081

About the Program

The hospitality management major at Drexel University prepares students for leadership positions in the lodging, food service, and tourism and gaming industries. It also provides the necessary foundation for graduate school.

The hospitality management program recognizes the critical importance of an interdisciplinary education with a global perspective for tomorrow's leaders and managers. Committed to building student knowledge across functional areas and contributing disciplines, the program allows for increased specialization with concentrations in one of four areas:

- Food and Beverage Management
- Gaming and Resort Management
- Travel and Tourism
- Hotel Administration

Home to one of the top hospitality programs in the region, Drexel prides itself on its reputation for progressive, high-quality education. The thriving metropolis of Philadelphia serves as the learning lab for these unique programs. As the sixth largest city in the United States, Philadelphia is in the midst of a restaurant renaissance featuring world-class cuisine and entertainment. Student-focused faculty members are recognized for their professional affiliations, research, published work, and above all, teaching.

Students also receive a business minor with a choice of one of three areas:

- Business Administration
- Marketing
- Entrepreneurship

For more information, visit the Hospitality Management Program's (<http://www.drexel.edu/hsm>) website.

Program Delivery Options

Drexel's BS degrees include courses in the liberal arts, the humanities, sciences, hospitality management and culinary arts. Three business minors are also offered. The BS degree can be completed on a full-time or part-time basis:

Traditional Four-year option, with one co-op experience:

This option includes one six-month period of full-time employment in the junior year.

Four plus One option BS/MBA combined degree, with co-op experience:

This option combines the four-year BS degree followed by the one-year Professional MBA to qualify freshmen applicants. Incoming freshmen will generally have a minimum of 1300 on the SAT, a GPA of 3.5 or higher, and be in the top 10% of their high school graduating class. For MBA requirements visit the LeBow College Professional MBA (<http://www.lebow.drexel.edu/academics/programs/mba>) website.

Full-time Status Evening option without co-op experience:

To be eligible, students should have a minimum of two years full-time work experience related to students' majors, and a minimum of one year of college level work. Full-time students are eligible for full-time financial aid packages.

Part-time option without co-op experience:

Students work closely with academic advisors to develop a customized plan of study toward degree completion.

London option:

Students are invited to spend a term in their sophomore, junior or senior year in the Study Abroad Program (<http://www.drexel.edu/studyabroad>), Drexel in London, while earning up to 18.0 credits. The program's emphasis is on the global implications of and opportunities within the hospitality industry.

Drexel University and Burlington County College (BCC) option:

(Available for Hospitality Management students.) Drexel University and Burlington County College (BCC) joined together to create a unique educational opportunity: Drexel at BCC. This partnership enabled BCC students to earn a bachelor's degree from Drexel University while remaining on BCC's Mount Laurel campus. Drexel University has elected to phase out its Drexel at BCC on-site program and will no longer be accepting students. For more information about Drexel University's Hospitality, Culinary Arts, Culinary Science, and Food Science programs on the Philadelphia campus, visit the Center for Hospitality & Sport Management (<http://www.drexel.edu/hsm>) website.

Degree Requirements

General Education Requirements

COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 181	Mathematical Analysis I *	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
NFS 101	Introduction to Nutrition & Food	1.0
NFS 100	Nutrition, Foods, and Health	2.0
Arts and Humanities Electives **		12.0
Social Science Electives †		9.0
UNIV SH101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0

Hospitality Major Requirements

CULA 115	Culinary Fundamentals	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
HRM 110	Introduction to the Hospitality Industry	3.0
HRM 120	Principles of Food-Service Management	3.0
HRM 130	Introduction to Tourism	3.0
HRM 131	Tourism Geography	3.0
HRM 150	Customer Service	3.0
HRM 160	Laws of the Hospitality Industry	3.0
HRM 215	Commercial Food Production	4.0
HRM 220	Purchasing for the Hospitality Industry	3.0

HRM 225	Equipment Design and Layout	3.0
HRM 310	Hospitality Accounting Systems	3.0
HRM 320	Hospitality Management Information Systems	3.0
HRM 325	Hotel Rooms Division Management	3.0
HRM 330	Hotel and Restaurant Marketing	3.0
HRM 335	Beverage Management	3.0
HRM 360	Hospitality Industry Public Relations	3.0
HRM 415	Fine Dining and Services	4.0
HRM 450	Hospitality Leadership Seminar	3.0
HRM 455	Hospitality Human Resources Management	3.0
Concentration and Program Electives ‡		30.0
General Minor Requirement		24.0
Recommended minor options are Business Administration, Marketing or Entrepreneurship. Consult with Advisor for alternative options		
Free Electives		18.0
Total Credits		182.0

* Instead of the three course MATH 181, MATH 182 and MATH 183 sequence, students may substitute MATH 101 and MATH 102 with advisor's permission.

** Students choose classes from the following subject areas: AFAS, ARTH, COM, ENGL, FMVD, HIST, HUM, JUDA, LING, MUSC, PHIL, PHTO, THTR, WGST, WRIT. Students can also select any of the language courses to fulfill Arts and Humanities requirements.

† Students may choose from ANTH, CJS, PSCI, PSY, and SOC courses.

‡ The number of program electives depends on the chosen concentration. Students in the F & B concentration take 15.0 credits of program electives, students in the HA concentration take 14.0 credits of program electives, students in the T & T concentration take 15.0 credits of program electives, and students in the GRM concentration take 15.0 credits of program electives. The total number of concentration credits + program electives should come to 30.0 credits.

Concentrations

Food and Beverage Management (F&B)

HRM 250	Contract Foodservice Management	3.0
HRM 315	Continental, Ethnic, and Regional Cuisine	3.0
HRM 340	Catering Management	3.0
HRM 350	Cost Controls in Hospitality	3.0
HRM 435	Wine and Spirits	3.0
Program Electives		15.0
Total Credits		30.0

Hotel Management Administration

HRM 326	Hotel Rooms Division Management II	3.0
HRM 345	Convention Management	3.0
HRM 355	Resort Management	3.0
HRM 425	Hospitality Industry Administration	3.0
MKTG 348	Services Marketing	4.0
Program Electives		14.0
Total Credits		30.0

Travel and Tourism

HRM 345	Convention Management	3.0
HRM 365	Heritage Tourism	3.0
HRM 385	Tourism Guest Lecture Series	3.0
HRM 395	Economics of Tourism	3.0
HRM 405	Current Issues in Travel and Tourism	3.0
Program Electives		15.0
Total Credits		30.0

Gaming and Resort Management

Select five of the following:		15.0
HRM 355	Resort Management	
HRM 370	Gaming and Casino Management I	
HRM 371	Gaming and Casino Management II	
HRM 375	Security and Loss Prevention	
HRM 470	Gaming Legislation, Policy and Law	
HRM 472	Gaming Information Systems	
HRM 475	Current Issues in Gaming	
Program Electives		15.0
Total Credits		30.0

Sample Plan of Study

4 YR UG Co-op Concentration

		Credits
Term 1		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 181	Mathematical Analysis I	3.0
HRM 110	Introduction to the Hospitality Industry	3.0
HRM 130	Introduction to Tourism	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
UNIV SH101	The Drexel Experience	1.0
Term Credits		17.0
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 182	Mathematical Analysis II	3.0
HRM 131	Tourism Geography	3.0
HRM 150	Customer Service	3.0
CULA 115	Culinary Fundamentals	3.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		16.0
Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 183	Mathematical Analysis III	3.0
NFS 101	Introduction to Nutrition Food	1.0
NFS 100	Nutrition, Foods, and Health	2.0
HRM 120	Principles of Food-Service Management	3.0
HRM 160	Laws of the Hospitality Industry	3.0
Term Credits		15.0
Term 4		
HRM 215	Commercial Food Production	4.0

HRM 220	Purchasing for the Hospitality Industry	3.0
HRM 325	Hotel Rooms Division Management	3.0
Minor Course 1		4.0
Social Science elective		3.0

Term Credits **17.0**

Term 5

COM 230	Techniques of Speaking	3.0
HRM 310	Hospitality Accounting Systems	3.0
Concentration Requirement*		3.0
Minor Course 2		4.0
Free elective		3.0

Term Credits **16.0**

Term 6

Concentration Requirement		3.0
Arts and Humanities elective		3.0
Program elective		3.0
Minor Course 3		4.0
Free elective		3.0

Term Credits **16.0**

Term 7

COOP 101	Career Management and Professional Development	0.0
Concentration Requirement		3.0
Arts and Humanities elective		3.0
Minor Course 4		4.0
Social Science elective		3.0
Free elective		3.0

Term Credits **16.0**

Term 8

Concentration Requirement		3.0
Arts and Humanities elective		3.0
Minor Course 5		4.0
Free elective		3.0

Term Credits **13.0**

Term 9

HRM 225	Equipment Design and Layout	3.0
HRM 360	Hospitality Industry Public Relations	3.0
Social Science elective		3.0
Program elective		3.0
Free elective		3.0

Term Credits **15.0**

Term 10

HRM 330	Hotel and Restaurant Marketing	3.0
Arts and Humanities elective		3.0
Minor Course 6		4.0
Program elective		3.0

Term Credits **13.0**

Term 11

HRM 320	Hospitality Management Information Systems	3.0
HRM 335	Beverage Management	3.0
HRM 450	Hospitality Leadership Seminar	3.0
Concentration Requirement		3.0

Free Elective	3.0
Term Credits	15.0
Term 12	
HRM 415 Fine Dining and Services	4.0
HRM 455 Hospitality Human Resources Management	3.0
Program electives	6.0
Term Credits	13.0
Total Credit: 182.0	

Facilities

The major facility of the Hospitality Management, Culinary Arts and Food Science programs is located on the sixth floor of the Academic Building. It is a 6,500 square foot space that includes three state-of-the-art commercial kitchens, bakery and laboratories, as well as the Academic Bistro (<http://www.drexel.edu/hsm/about/academic-bistro>), the student-run restaurant, bar and lounge. The facility also includes a sensory analysis lab, hospitality and gaming lab, conference room and the Les Dames d'Escoffier Library.

Philadelphia Location

A unique feature of the Hospitality Management program at Drexel is that it is located in Philadelphia, with close proximity to New York City, Baltimore, and Washington, as well as the resort centers on the Atlantic seacoast and in the Pocono Mountains. These regions include hundreds of hotels, restaurants, resorts, and casinos that are used for field trips and campus visits by hospitality resource professionals. Students also gain hands-on experience through faculty-directed field trips throughout the region.

Hospitality and Tourism Faculty

Robert Ambrose, MS (*Fairleigh Dickinson University*). Instructor. Creative gaming floor applications, strategy development and implementation, executive decision making, the customer service experience within the casino/hospitality environment.

Linda Forristal, PhD (*Purdue University*). Associate Teaching Professor. Destination management, marketing, branding, communications, cultural heritage tourism including foodways, indigenous tourism.

Donna Maguire, MPS (*Cornell University's School of Hotel Administration*). Assistant Teaching Professor. Restaurant management, catering management, recipe and menu management, quality assurance, and food cost controls.

Michael Traud, JD (*Villanova University*) Program Director, Hospitality and Tourism Management. Assistant Clinical Professor. Implementation of Korean Cuisine in the United States; hospitality law; Italian cuisine.

Interdepartmental Faculty

Rosemary Trout, MS (*Drexel University*) Interim Program Director, Culinary Arts and Food Science. Instructor. Food labeling and regulations; food safety and sanitation in food service and food manufacturing; food processing; sensory evaluation.

Sport Management

Major: Sport Management

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 181.0

Classification of Instructional Programs (CIP) code: 31.0504

Standard Occupational Classification (SOC) code: 11-1021

About the Program

The Bachelor of Science in Sport Management program is designed for students who plan to pursue careers in sport-oriented organizations such as business, media, law, marketing and other similar areas of concentration. This major draws on the strengths of many of the University's academic programs, including business administration, communications and technology.

Through Drexel's Sport Management program (<http://drexel.edu/hsm/academics/Sport-Management>), students master the knowledge and skills necessary for success in professional sport organizations, collegiate athletics, event management and recreation industries.

The program incorporates four main points of emphasis: sport business, sport marketing, sport media and sport law. Covering a wide range of areas of study, this focus allows students to match their skills, abilities and interests with a specific niche within the sport industry. Through the program, students develop a professional portfolio that will include such items as a press kit, facility operations manual, sponsorship deck, and sports contract. Students will then refine their portfolio items and present the final product for review in their senior year.

Coursework

The sport management major consists of 181.0 credits. All students enrolled in the program are required to take 52.0 credits of general education courses plus 24.0 credits of general business. These courses are supplemented by 24.0 credits of free electives.

The balance of the program is based on technical elective courses drawn from four major concentrations, namely: sport business (21.0 credits); sport marketing (18.0 credits); sport law and ethics (21.0 credits); and sport media and technology (18.0 credits).

Degree Completion Options

The Bachelor of Science degree in sport management can be completed in either four or five years:

Five-year option, with co-op experience

This option allows for the greatest amount of employment experience, with three distinct six-month periods of employment included with studies. After the start of the sophomore year, students study or work through all terms, including summers.

Four-year option, with internship experience

This option includes just one six-month period of full-time employment. After the start of the sophomore year, students study or work through all terms, including summers.

For more information about this major, visit the Center for Hospitality and Sport Management's Sport Management (<http://drexel.edu/hsm/academics/Sport-Management>) web page.

Degree Requirements

General Education Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 230	Techniques of Speaking	3.0

COM 270 [WI (p. 40)]	Business Communication	3.0
CS 161	Introduction to Computing	3.0
or INFO 101	Introduction to Information Technology	
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
UNIV SH101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Three Natural Science Courses *		9.0
Four Courses from Social Science and Liberal Arts Courses **		12.0

General Business Requirements

BLAW 201	Business Law I	4.0
BUSN 101	Foundations of Business I	4.0
ACCT 115	Financial Accounting Foundations	4.0
ECON 201	Principles of Microeconomics	4.0
ORGB 300 [WI (p. 40)]	Organizational Behavior	4.0
MKTG 301	Introduction to Marketing Management	4.0

Areas of Sport Management

Sport Business Courses

SMT 110	The Business of Sport	3.0
SMT 200	Introduction to Sport Facility and Event Management	3.0
SMT 225	Sport Finance	3.0
SMT 320	Sport Economics	3.0
SMT 340 [WI (p. 40)]	International Aspects of Sport	3.0
Select two of the following:		6.0

SMT 220	Recreation, Wellness & Society	
SMT 240	Olympic Games	
SMT 270	Sports Facility Planning & Management	
SMT 275	Sports Event Management	

Sport Marketing Courses

SMT 201	Sports Marketing, Promotion, and Public Relations	3.0
SMT 215	Sports Ticket Sales & Operations	3.0
SMT 300	Quantitative Analysis and Statistics for Sports	3.0
SMT 305	Fundraising in Sports	3.0
SMT 307	Corporate Sponsorship in Sports	3.0
Select one of the following:		3.0

SMT 309	Capital Campaigns in Athletics	
SMT 345	Fan Experience Management	
SMT 347	Sport Tourism	

Sport Law and Ethics Courses

SMT 152	Leadership in Sports & Society	3.0
SMT 230	Sports and the Law	3.0
SMT 255	Legal Foundations of Title IX	3.0
SMT 310	Sports Contracts	3.0
PHIL 325	Ethics in Sports Management	3.0

or SMT 254	Women & Minority Opportunities in Sport	
SMT 260	Sports Agents & Labor Relations	3.0
or SMT 337	Risk Management in Sports	
SMT 235	Sports Administration and Governance	3.0
or SMT 245	NCAA Compliance	

Sport Media and Technology

SMT 205	Sports Information	3.0
SMT 250 [WI (p. 40)]	Technology and Sport	3.0
SMT 290	Digital Media in Sport	3.0
COM 290	Sports and the Mass Media	3.0
Select two of the following:		6.0

COM 260 [WI (p. 40)]	Fundamentals of Journalism	
COM 280	Public Relations Principles and Theory	
COM 305	Sports Journalism	
COM 335	Electronic Publishing	

Portfolio Requirement

SMT 401	Professional Portfolio	3.0
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Electives

Free Electives		24.0
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Total Credits		181.0
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* Natural science courses are any anatomy (ANAT), bioscience and biotechnology (BIO), chemistry (CHEM), food science (FDSC), nutrition and foods (NFS), physics-environmental (PHEV), and physics (PHYS) courses

** Social science and liberal arts courses are any psychology (PSY), sociology (SOC), anthropology (ANTH), african studies (AFAS), criminology and justice studies (CJS), history (HIST), international area studies (IAS), philosophy (PHIL) and political science (PSCI) courses.

Sample Plan of Study

5 YR UG Co-op Concentration

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
INFO 101 or CS 161	Introduction to Information Technology Introduction to Computing	3.0
MATH 101	Introduction to Analysis I	4.0
SMT 110	The Business of Sport	3.0
UNIV SH101	The Drexel Experience	1.0
Term Credits		18.0
Term 2		Credits
SMT 200	Introduction to Sport Facility and Event Management	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
Natural Science Elective		3.0

Social Science or Liberal Arts Course	3.0
Term Credits	17.0
Term 3	
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
SMT 340 [WI International Aspects of Sport (p. 40)]	3.0
Social Science or Liberal Arts Course	3.0
ACCT 115 Financial Accounting Foundations	4.0
ANTH 101 Introduction to Cultural Diversity	3.0
Term Credits	16.0
Term 4	
SMT 201 Sports Marketing, Promotion, and Public Relations	3.0
SMT 250 [WI Technology and Sport (p. 40)]	3.0
Natural Science Elective	3.0
BLAW 201 Business Law I	4.0
COM 290 Sports and the Mass Media	3.0
Term Credits	16.0
Term 5	
COM 230 Techniques of Speaking	3.0
ECON 201 Principles of Microeconomics	4.0
SMT 225 Sport Finance	3.0
SMT 230 Sports and the Law	3.0
Natural Science Elective	3.0
Term Credits	16.0
Term 6	
COM 270 [WI Business Communication (p. 40)]	3.0
SMT 205 Sports Information	3.0
SMT 215 Sports Ticket Sales Operations	3.0
SMT 255 Legal Foundations of Title IX	3.0
Free Elective	3.0
Term Credits	15.0
Term 7	
MKTG 301 Introduction to Marketing Management	4.0
Social Science or Liberal Arts Elective	3.0
Sport Management 'Area' Elective *	3.0
SMT 152 Leadership in Sports Society	3.0
SMT 310 Sports Contracts	3.0
Term Credits	16.0
Term 8	
ORGB 300 [WI Organizational Behavior (p. 40)]	4.0
SMT 290 Digital Media in Sport	3.0
Two Sport Management 'Area' Electives *	6.0
Free Elective	3.0
Term Credits	16.0
Term 9	
SMT 307 Corporate Sponsorship in Sports	3.0
SMT 309 Capital Campaigns in Athletics	3.0
Sport Management 'Area' Elective *	3.0

Social Science or Liberal Arts Elective	3.0
Free Elective	3.0
Term Credits	15.0
Term 10	
SMT 300 Quantitative Analysis and Statistics for Sports	3.0
SMT 305 Fundraising in Sports	3.0
Free Elective	3.0
Sport Management 'Area' Elective *	3.0
Term Credits	12.0
Term 11	
Two Sport Management 'Area' Electives *	6.0
Free Electives	6.0
Term Credits	12.0
Term 12	
SMT 401 Professional Portfolio	3.0
Free Electives	6.0
Sport Management 'Area' Elective *	3.0
Term Credits	12.0
Total Credit: 181.0	

* See degree requirements (p.).

Co-op/Career Opportunities

Co-op Opportunities

Drexel University has long been known for its co-operative education programs, through which students combine periods of full-time, career-related employment with their studies. Co-op employment is required for sport management students and is central to their experience.

Within the sport management major, co-operative education gives students experience in a range of sport related jobs and settings, from coaching to the business of sports to health-enhancing activities. Students may be placed with professional athletic teams, or with organizations aligned with sports (e.g., a sports agency). Co-op experiences are available with many of the region's sports, recreation, and health organizations, including professional sports teams, college athletic departments, sports media networks, non-profit organizations, law firms, youth fitness organizations, fitness centers, sports complexes, and others.

Career Opportunities

The multidisciplinary nature of the sport management program allows its graduates to be ready for a wide range of sport-related professions, including athletic management, sports and recreational activities at all levels (professional, semi-professional, collegiate, scholastic, and youth) within a range of organizations (public, private, community, recreation, scholastic, professional, and amateur), and for varying purposes (competitive, fitness, wellness, and rehabilitation). Sports management graduates are uniquely qualified for leadership, support, or coaching positions in professional and amateur sports organizations, in recreation and community centers, in high schools and colleges, and in other sports venues, as well as in the health and wellness industry. The program also prepares students for graduate or professional study in a variety of fields including sport management, sports psychology, communication, law, education, business administration, and other fields.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more information on career opportunities.

Sport Management Faculty

Lawrence Cohen, JD (*Temple University*). Assistant Teaching Professor. Sports and antitrust law; tickets sales data analytics; sport sponsorship trends.

Amy Giddings, PhD (*Temple University*) *Director, Sport Coaching Leadership*. Associate Teaching Professor. International aspects of sport and culture, principles of coaching, teambuilding, group dynamics, minority issues in sport including availability and accessibility concerns, character development.

Joel Maxcy, PhD (*Washington State University*) *Interim Program Director, Sport Management*. Associate Professor. Economics of sport; labor economics & policy; economics of antitrust & regulation; sports analytics.

Jim Reese, EdD (*University of Northern Colorado*). Associate Professor. Sport ticket sales, strategies, and operations; quantitative analysis and statistics for sport; economic aspects of sport management.

Ellen Staurowsky, EdD (*Temple University*). Professor. Social justice issues in sport; gender equity in sport; Title IX pay equity and equal employment opportunity; athlete exploitation; college sport reform; and misappropriation of American Indian imagery in sport.

Karen Weaver, EdD (*University of Pennsylvania*). Associate Clinical Professor. Sport marketing, promotions, public relations, media, and leadership in sport.

The Close School of Entrepreneurship

Entrepreneurship is a central theme of the Drexel University Strategic Plan 2012-2017: Transforming the Modern University. The cultivation of entrepreneurship and innovation is the key to success in today's world. Drexel's strong entrepreneurial and innovative culture extends across academic programs through curricular and experiential activities, faculty and student research, and various partnerships with business, non-profits, and government.

The Close School of Entrepreneurship is the hub of such activities, working in alignment with all colleges and schools at Drexel. As a freestanding academic school it provides curricula and activities for students to learn and practice innovative behavior.

The Close School defines entrepreneurship as more than starting a company or sparking innovation within established organizations. For the Close School, entrepreneurship consists of three dimensions:

- A habit of mind and an attitude; a skill set applicable to pursuing innovation in business, personal, and career contexts.
- An approach to life built around innovative thinking, calculated daring and proactive behavior.
- The process through which an individual or team creates or recognizes opportunities to pursue something of value, regardless of the resources available.

The Close School's academic programs prepare students to face the challenges of self-employment and new venture creation in an evolving 21st century workforce. This pioneering approach to entrepreneurship education addresses a very real market need — an extremely competitive global workforce that increasingly values initiative, independence, and the intellectual dexterity to rethink old ways of doing things and invent new ones.

Majors

- Entrepreneurship and Innovation (p. 45)

Minors

- Energy Innovations (p. 48)
- Entrepreneurship and Innovation (p. 48)
- Health Innovations (p. 48)
- Social Entrepreneurship (p. 48)

Background

Charles D. Close was a groundbreaking entrepreneur who experienced success as founder, leader, and investor in a series of technology companies. He also was one of Drexel University's most distinguished alumni, graduating in 1936 with a degree in electrical engineering.

Mr. Close was the former Chairman of the Board of Expansion Seal Technologies Group, and former Chairman of the Board of CDS Analytical. Earlier in his career he was President of Continental Disc Corporation, Technical Investor at Kellet Corp, President and Chairman of Compudyne Corporation, and Founder and President of Fluid Controls Company. Over the years, he also published a number of technical articles on instrument controls and systems. Mr. Close was a Director at J.W. Microelectronics, Athena Controls, Kellet Corp., Chemical Data

Systems, Instrument Society of America, and General Components. In addition, he was a trustee for the privately-held CDC Fund.

In addition to the Drexel 100, Mr. Close was also inducted into the Alumni Circle of Distinction for the College of Engineering. As a student, he was President of the Chess Club and a member of the American Institute of Electrical Engineers.

He and his late wife, Barbara, established a philanthropic legacy that included a sizable anonymous gift in 1999 to Drexel University that helped launch and build the Baiada Institute for Entrepreneurship (<http://www2.lebow.drexel.edu/Baiada>).

In March 2009, the Charles and Barbara Close Foundation gave Drexel \$1.5 million to establish the A.J. Drexel Autism Institute, and in December 2012, the foundation's gift of \$12.5 million established the Charles D. Close School of Entrepreneurship.

Mr. Close, whom friends knew as "Charley," enjoyed skiing, music, science, and was an avid golfer and member of the Cedarbrook Country Club in Blue Bell, PA. Charles D. Close passed away on September 6, 2009, at the age of 94. His legacy lives on in the generations of future entrepreneurs being educated in the Charles D. Close School of Entrepreneurship.

In 2014, the Charles D. Close School of Entrepreneurship became the first freestanding school of entrepreneurship in the nation to offer degrees.

Goals and Objectives

- Infuse entrepreneurship as a way to think, learn, and succeed across the University in terms of values, behaviors, and process, regardless of major.
- Provide a coordinated approach to entrepreneurship education throughout Drexel University.
- Complement and enhance undergraduate and graduate education outcomes for all Drexel University students by developing entrepreneurial thinking within the curriculum and opportunities for entrepreneurial practice.
- Provide students with different paths to engage, learn, and live entrepreneurship, depending on their personal level of interest and career ambitions, having exposed all to introductory concepts and approaches.
- Integrate academic and campus life activities as they relate to entrepreneurship providing multiple paths that align with student aspirations.
- Encourage and create a supportive academic and physical environment to allow the pursuit of student and faculty passions, and big ideas.

School Offerings

The Close School of Entrepreneurship offers students various paths to becoming an "entrepreneur." The School is based on the premise that all students have the potential to be innovative: to take their ideas, in whatever context, and make their ideas a reality. The curricular and co-

curricular programs are formulated to accommodate students' potential paths to learning and living entrepreneurship.

The School's curricular initiatives emphasize interdisciplinary coursework in collaboration with other academic units. The School offers a BA in Entrepreneurship and Innovation, minors in Energy Innovations, Entrepreneurship and Innovation, Health Innovations, and Social Entrepreneurship. In addition, elective courses with minimal or no prerequisites are available to all Drexel students to integrate entrepreneurial education with all other academic disciplines at the University. The School collaborates with the Office of Research and Technology Commercialization in developing programs and activities focused on academic entrepreneurship. Through the appointment of joint interdisciplinary faculty, a core of clinical faculty (serial entrepreneurs and seasoned executives) and tenured/tenure-track faculty, the Close School will cultivate a research agenda, providing thought leadership to academics and practitioners. Finally, the Close School of Entrepreneurship collaborates with regional and national organizations and the entrepreneurial community to advance innovation and entrepreneurial initiatives.

Entrepreneurship Living-Learning Community

The Close School of Entrepreneurship has created a community of young entrepreneurs at Drexel. Students of all backgrounds and interests, united by dreams of starting companies and pursuing their entrepreneurial passions, participate in a unique residential program supported by dedicated faculty and staff. This close-knit community of enterprising students lives together and enjoys targeted training, fun activities, and field trips as well as experienced and connected mentors able to foster their innovative aspirations.

The Entrepreneurship Living-Learning Community hosts approximately twenty incoming freshmen annually and is comprised of students from different majors across the University. All full-time entering freshmen planning to live on campus with an interest in innovation and entrepreneurship are encouraged to apply regardless of undergraduate major. Students in this community all live on the same floor and wing of Myers Hall.

Entrepreneurship Co-Op

The co-op experience is the hallmark of a Drexel education. Drexel students intersperse one or three six-month periods of work within their academic plans of study. By weaving together scholarly and practical experiences, Drexel students graduate with a unique set of skills that open up a diverse array of professional opportunities upon graduation.

The Close School recognizes that many undergraduates have already started their own companies. To encourage this entrepreneurial spirit within our student body, the Close School, in collaboration with the Steinbright Career Development Center, offers to all Drexel undergraduate students the opportunity to use their own company as their co-op experience. Students who qualify for this opportunity receive a salary (\$15,000), like other co-op students who work for established companies and organizations. Most importantly, students participating in the entrepreneurship co-op receive weekly mentoring from Close School faculty.

Launch It!

During this ten-week capstone course, students work on the actual launching of a start-up and de-risking their business model. Students will talk to customers, partners, and competitors as they engage the iterative

process of how a start-up actually works. Students learn how to use the business model canvas to brainstorm each part of a company. Each week will bring a new adventure outside of the classroom as students test each part of their business models, and then share their hard-earned knowledge with the rest of the class.

Entrepreneurship and Innovation

Major: Entrepreneurship and Innovation

Degree Awarded: Bachelor of Arts Degree (BA)

Calendar Type: Quarter

Total Credit Hours: 181.0

Classification of Instructional Programs (CIP) code: 52.0701

Standard Occupational Classification (SOC) code: 11-1011; 11-1021; 11-9199

About the Program

The BA in Entrepreneurship and Innovation is designed to prepare students to think and act entrepreneurially, in the context of established companies, in working for small and growing ventures, in starting a new venture or self-employment, and in an overall general approach to their personal and professional lives.

Within this innovative curriculum, students build entrepreneurial skills such as resilience, collaboration, negotiation and effective communication. Students will learn to manage the growth of their venture, secure funding, and how to run a franchise or family firm.

The program emphasizes interdisciplinary coursework in collaboration with other Drexel colleges and schools providing entrepreneurship students with the opportunity to take classes with future engineers, scientists, artists, and business leaders.

For additional information about the BA in Entrepreneurship and Innovation, please contact Jamuna Saha at js3599@drexel.edu.

Degree Requirements

- **Required Courses:**
 - **The Individual as Entrepreneur:** This is a suite of courses that addresses individual entrepreneurial skills such as resiliency, collaboration, innovative thinking and communication. These courses develop personal and interpersonal skills needed to be a successful "entrepreneur" in several contexts.
 - **The Process of Entrepreneurship:** This set of required courses covers a broad range of topics that immerse students in the entire landscape of entrepreneurship.
 - **A choice of three concentration areas:** Social Entrepreneurship, Energy Innovations, Health Innovations. These three areas are not only relevant for students as they begin their careers upon graduation, but they also reflect Drexel University's strategic research and outreach priorities.
- **Interdisciplinary electives:** Constitutes a group of courses from across the University that reflect the themes of innovation and entrepreneurship. These courses require few or no prerequisites.
- **A capstone course** for the Close School student, "Launch It," provides seed funding for student ideas.
- **Minors:** The Close School offers four minors available to all undergraduate students.
 - Energy Innovations Minor (p. 48)
 - Entrepreneurship and Innovation (p. 48)

- Health Innovations Minor (p. 48)
- Social Entrepreneurship Minor (p. 48)

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 210	Theory and Models of Communication	3.0
PHIL 105	Critical Reasoning	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV C101	The Drexel Experience	1.0

Two Mathematics Courses (MATH) 6.0-8.0**Two Science Courses** 6.0-8.0

Choose from Bioscience and Biotechnology (BIO), Chemistry (CHEM), Food Science (FDSC), Geoscience (GEO), Physics (PHYS), Physics-Environmental Science (PHEV)

Social/Behavioral Science

Social/Behavioral Science Electives 6.0

Choose 2 courses from Anthropology (ANTH), Communications (COM), Economics (ECON), History (HIST), Political Science (PSCI), Psychology (PSY), Sociology (SOC)

ECON 201 Principles of Microeconomics 4.0

Choose one of the following writing intensive courses: 3.0

COM 270 [WI] Business Communication (p. 45)

COM 310 [WI] Technical Communication (p. 45)

COM 317 [WI] Environmental Communication (p. 45)

COM 320 [WI] Science Writing (p. 45)

COM 375 [WI] Grant Writing (p. 45)

ECON 326 [WI] Economic Ideas (p. 45)

PSY 240 [WI] Abnormal Psychology (p. 45)

PSY 245 [WI] Sports Psychology (p. 45)

PSY 250 [WI] Industrial Psychology (p. 45)

Three Humanities/Fine Arts Courses 9.0

Choose from Africana Studies (AFAS), English (ENGL), Humanities-General (HUM), International Area Studies (IAS), Judaic Studies (JUDA), Philosophy (PHIL), Women's & Gender Studies (WGST); Any course from the Westphal College of Media Arts and Design

Two Technology Courses 6.0

Choose from Computer Science (CS), Information Science & Systems (INFO), Management Information Systems (MIS)

Three Language Course (Language to completion of 103 level) 12.0

Arabic (ARBC), Chinese (CHIN), French (FREN), German (GER), Greek (GREC), Hebrew (HBRW), Italian (ITAL), Japanese (JAPN), Korean (KOR), Portuguese (PORT), Russian (RUSS), Spanish (SPAN)

Two Ethics Courses 6.0

Select two of the following:

PHIL 251 Ethics

PHIL 301 Business Ethics

PHIL 305 Communication Ethics

PHIL 311 Computer Ethics

PHIL 315 Engineering Ethics

PHIL 321 Biomedical Ethics

PHIL 323 Organizational Ethics

PHIL 335 Global Ethical Issues

Entrepreneurship Requirements

ENTP 100 Innovation Neighborhood 1.0

ENTP 101 Life Strategies I 3.0

ENTP 102 Life Strategies II 3.0

CRTV 303 Creativity in the Workplace 3.0

ENTP 205 Ready, Set, Fail 3.0

ACCT 115 Financial Accounting Foundations 4.0

ENTP 210 Leading Start-Ups 3.0

ENTP 215 Building Entrepreneurial Teams 3.0

ENTP 250 Ideation 3.0

ENTP 325 Early Stage Venture Funding 3.0

ENTP 329 Entrepreneurship & New Technologies 3.0

ENTP 340 Managing Entrepreneurial Growth 3.0

ENTP 350 Dynamics of the Family Firm 3.0

ENTP 385 Innovation in Established Companies 3.0

ENTP 410 Thought Leadership 3.0

ENTP 450 Launch It! 3.0

Concentration Requirements 12.0

Select a concentration from the following options:

Social Entrepreneurship

ENTP 270 Social Entrepreneurship

ENTP 275 Women and Minority Entrepreneurship

Select two of the following:

ENTP 390 Clean Tech Ventures

ENTP 370 Global Entrepreneurship

PBHL 101 Public Health 101 *

Energy Innovations

ENTP 270 Social Entrepreneurship

ENTP 390 Clean Tech Ventures

ECEP 380 Introduction to Renewable Energy

MEM 462 [WI] Introduction to Engineering Management (p. 45)

Health Innovations

BIO 112 Biotechnology for Society

BMES 340 Health Care Administration

BMES 409 Entrepreneurship for BMES

PBHL 101 Public Health 101 *

Entrepreneurship Electives ** 21.0

Select seven of the following:

BLAW 346	Entrepreneurial Law
BMES 409	Entrepreneurship for BMES
DIGM 223	Creative Concept Design
DSMR 231	Retail Principles
EAM 211	Strategic Management for Entertainment and Arts Management
ECON 202	Principles of Macroeconomics
ENTP 275	Women and Minority Entrepreneurship
ENTP 270	Social Entrepreneurship
ENTP 360	Franchising
ENTP 370	Global Entrepreneurship
ENTP 390	Clean Tech Ventures
MEM 462 [WI (p. 45)]	Introduction to Engineering Management
MIS 200	Management Information Systems
MKTG 301	Introduction to Marketing Management
MKTG 347	New Product Development
MKTG 364	Marketing for New Ventures
PROD 210	Introduction to Product Design
PROD 345	Applied Human Centered Design
PSY 150	Introduction to Social Psychology
RETL 315	Power of Retail Brands
SOC 110	Sociology of the Future

Free Electives 26.0

Total Credits 181.0-185.0

* Students may also take any 3 credit Health and Society (HLSO) course.

** BMES 409, ENTP 270, 275, 345, 360 and 390 cannot satisfy both a concentration requirement and an entrepreneurship elective requirement.

Sample Plan of Study

Term		Credits	
Term 1	ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
	ENTP 100	Innovation Neighborhood	1.0
	ENTP 101	Life Strategies I	3.0
	Mathematics Course		3.0-4.0
	Language Course		4.0
	UNIV 101C	The Drexel Experience	1.0
Term Credits		15.0-16.0	
Term 2	CIVC 101	Introduction to Civic Engagement	1.0
	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
	ENTP 102	Life Strategies II	3.0
	Math Course		3.0-4.0
	Language Course		4.0
Term Credits		14.0-15.0	
Term 3	CRTV 303	Creativity in the Workplace	3.0

ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENTP 205	Ready, Set, Fail	3.0
PHIL 105	Critical Reasoning	3.0
Language Course		4.0

Term Credits 16.0

Term 4		
ACCT 115	Financial Accounting Foundations	4.0
ECON 201	Principles of Microeconomics	4.0
ENTP 210	Leading Start-Ups (WI)	3.0
Fine Arts/Humanities Course		3.0

Term Credits 14.0

Term 5		
COM 210	Theory and Models of Communication	3.0
ENTP 215	Building Entrepreneurial Teams	3.0
ENTP 250	Ideation	3.0
Ethics Course		3.0
Science Course		3.0-4.0

Term Credits 15.0-16.0

Term 6		
ENTP 325	Early Stage Venture Funding	3.0
Entrepreneurship elective		3.0
Science Course		3.0-4.0
Social/Behavioral Science Course		3.0
Technology Course		3.0

Term Credits 15.0-16.0

Term 7		
ENTP 329	Entrepreneurship New Technologies	3.0
ENTP 340	Managing Entrepreneurial Growth	3.0
Ethics Course		3.0
Social/Behavioral Science Course [WI]		3.0
Technology Course		3.0

Term Credits 15.0

Term 8		
ENTP 350	Dynamics of the Family Firm	3.0
ENTP 450	Launch It!	3.0
Fine Arts/Humanities Course		3.0
Social/Behavioral Science Course		3.0
Free elective		3.0

Term Credits 15.0

Term 9		
ENTP 385	Innovation in Established Companies	3.0
Concentration Requirement		3.0
Fine Arts/Humanities Course		3.0
Free electives		6.0

Term Credits 15.0

Term 10		
ENTP 410	Thought Leadership (WI)	3.0
Concentration Requirement		3.0
Entrepreneurship electives		6.0
Free elective		3.0

Term Credits 15.0

Term 11		
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Concentration Requirement	3.0
Entrepreneurship electives	6.0
Free electives	7.0
Term Credits	16.0

Term 12

Concentration Requirement	3.0
Entrepreneurship electives	6.0
Free electives	7.0
Term Credits	16.0

Total Credit: 181.0-185.0

The minor in entrepreneurship and innovation is designed for students from a range of backgrounds who are interested in starting their own ventures, working for start-up companies, or pursuing jobs within established corporations that embrace innovation. Students interested in launching a venture or innovate within a company will learn the process of how to test assumptions related to their new ideas using the lean startup model.

For additional information about the entrepreneurship minor, please contact Jamuna Saha at js3599@drexel.edu.

Required Courses

ENTP 101	Life Strategies I	3.0
ACCT 115	Financial Accounting Foundations	4.0
ENTP 325	Early Stage Venture Funding	3.0
ENTP 440	Launch It!: Early Stage	3.0
Select four of the following:		12.0
ENTP 205	Ready, Set, Fail	
ENTP 210	Leading Start-Ups	
ENTP 215	Building Entrepreneurial Teams	
ENTP 250	Ideation	
ENTP 270	Social Entrepreneurship	
ENTP 350	Dynamics of the Family Firm	
Total Credits		25.0

Minor in Energy Innovations

The Energy Innovations minor is designed for students interested in learning about renewable energy and clean technologies and their impact on society. Students interested in launching energy-related ventures will learn the process of how to test assumptions related to their new venture idea using the lean startup model.

Required Courses

ENTP 101	Life Strategies I	3.0
ENTP 205	Ready, Set, Fail	3.0
or ENTP 210	Leading Start-Ups	
ENTP 250	Ideation	3.0
ENTP 270	Social Entrepreneurship	3.0
ENTP 390	Clean Tech Ventures	3.0
ENTP 440	Launch It!: Early Stage	3.0
ECEP 380	Introduction to Renewable Energy	3.0

MEM 462 [WI (p. 48)]	Introduction to Engineering Management	3.0
Total Credits		24.0

For additional information about the Energy Innovations minor, please contact Jamuna Saha at js3599@drexel.edu.

Minor in Health Innovations

The Health Innovations minor is designed for students interested in how entrepreneurs can leverage their understanding of advancements in biotechnologies and health care to benefit society. Students interested in launching health-related ventures will learn the process of how to test assumptions related to their new venture idea using the lean startup model.

ENTP 101	Life Strategies I	3.0
ENTP 205 or ENTP 210	Ready, Set, Fail Leading Start-Ups	3.0
ENTP 250	Ideation	3.0
ENTP 440	Launch It!: Early Stage	3.0
BIO 112	Biotechnology for Society	3.0
BMES 340	Health Care Administration	3.0
BMES 409	Entrepreneurship for BMES	3.0
Select one of the following courses:		3.0
PBHL 101	Public Health 101	
	Health and Society Elective *	
Total Credits		24.0

* Any Health and Society (HLSO) course from HLSO 301 to HLSO 470. See the Course Descriptions (p. 580) page for more information on individual courses.

For additional information about the Health Innovations minor, please contact Jamuna Saha at js3599@drexel.edu.

Minor in Social Entrepreneurship

The Social Entrepreneurship minor is designed for students interested in learning how to create and sustain social value through the pursuit of a new venture. Students interested in launching a social venture will learn the process of how to test assumptions related to their new venture idea using the lean startup model.

ENTP 101	Life Strategies I	3.0
ENTP 205 or ENTP 210	Ready, Set, Fail Leading Start-Ups	3.0
ENTP 250	Ideation	3.0
ENTP 270	Social Entrepreneurship	3.0
ENTP 275	Women and Minority Entrepreneurship	3.0
ENTP 440	Launch It!: Early Stage	3.0
Select two of the following:		6.0
ENTP 370	Global Entrepreneurship	
ENTP 390	Clean Tech Ventures	
PBHL 101	Public Health 101	

Health and Society (HLSO) Courses *

Total Credits	24.0
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* Any Health and Society (HLSO) course from HLSO 301 to HLSO 470.
See the Course Descriptions (p. 580) page for more information on individual courses.

For additional information about the Social Entrepreneurship minor, please contact Jamuna Saha at js3599@drexel.edu.

College of Arts & Sciences

About the College

Mission Statement

By pursuing excellence in research and scholarship, we educate our students to become ethical professionals and citizens with knowledge of and appreciation for the fundamental interactions among the humanities, social sciences and the sciences in a fast-changing, challenging, and diverse world.

About the College of Arts and Sciences

The College of Arts and Sciences (<http://drexel.edu/coas>) was established in 1990. The educational objectives encompass a wide range of goals: to provide interdisciplinary study in the arts and sciences for our Bachelor of Science and Bachelor of Arts majors; to offer Master of Science and Doctoral programs in selected areas of faculty and research strength; to promote research, scholarship, and creative activities which expand disciplinary boundaries and enhance faculty expertise and the quality of the University's instruction; to provide general educational courses for the University's undergraduates; and to improve the quality of life for the University's community through co-curricular programming in the arts and sciences.

Each major combines interdisciplinary study with hands-on, experiential learning to prepare students for a variety of careers, as well as graduate or professional school. All undergraduate majors in the College offer co-operative education program options, with special opportunities relating academic study to work experience, or internships. Additionally, students across the College are encouraged to work alongside faculty in research projects that relate to their academic and professional goals.

Majors

- Anthropology (p. 52)
- Biological Sciences (p. 56)
- Chemistry (p. 68)
- Communication (p. 76)
- Criminal Justice (p. 86)
- Criminology and Justice Studies (p. 89)
- English (p. 98)
- Environmental Science (p. 104)
- Environmental Studies (p. 108)
- Environmental Studies and Sustainability (p. 112)
- Geoscience (p. 115)
- History (p. 121)
- International Area Studies (p. 127)
- Mathematics (p. 136)
- Philosophy (p. 143)
- Physics (p. 148)
- Political Science (p. 152)
- Psychology (p. 155)
- Sociology (p. 160)

Certificates

- Medical Humanities (p. 164)
- Philosophy in Science and Technology (p. 165)
- Philosophy in the Arts and Humanities (p. 165)
- Writing and Publishing (p. 165)

Minors

- Africana Studies (p. 52)
- Anthropology (p. 55)
- Arabic (p. 142)
- Astrophysics (p. 55)
- Bioinformatics (p. 56)
- Biological Sciences (p. 67)
- Bioscience and Society (p. 68)
- Chemistry (p. 74)
- Chinese (p. 142)
- Communication (p. 84)
- Computer Crime (p. 86)
- Criminal Justice (p. 89)
- Ecology (p. 98)
- English (p. 102)
- Environmental Studies (p. 110)
- French (p. 142)
- Geoscience (p. 118)
- German (p. 142)
- Greek Studies (p. 120)
- History (p. 126)
- Human Factors and Ergonomics (p. 126)
- International Area Studies (p. 134)
- Italian (p. 142)
- Japanese (p. 142)
- Judaic Studies (p. 136)
- Korean (p. 142)
- Mathematics (p. 140)
- Philosophy (p. 146)
- Physics (p. 150)
- Politics (p. 155)
- Psychology (p. 157)
- Russian (p. 142)
- Science, Technology and Society (p. 159)
- Sociology (p. 162)
- Spanish (p. 142)
- Women's and Gender Studies (p. 164)
- Writing (p. 168)

About the Curriculum

The College of Arts and Sciences is committed to providing high-quality education in the humanities, social sciences and sciences.

Bachelor of Arts Degree Programs

The Bachelor of Arts degree provides a broad-based liberal education while allowing students the option to apply their studies through Drexel's well-established co-operative education program.

The BA degree continues the Drexel focus on critical reasoning, a strong grounding in arts and sciences, and effective development of communication skills. The degree is intended to provide a solid liberal arts background for graduate study as well as for professional degrees in such areas as law, public policy, international relations, education, psychology, social work, public health, and medicine.

While the BA degree requires more liberal arts courses than the Bachelor of Science degree, it also allows more varied choices in the fulfillment of math and science requirements and requires study of a foreign language. The BA degree prepares students for an ever-changing and culturally diverse world, and provides them with the tools needed to be leaders in industry, arts, government, and human services.

Bachelor of Science Degree Programs

The College offers Bachelor of Science degrees in many of its majors. The BS degree is similar to the Bachelor of Arts degree, but requires more focused coursework in the sciences than the BA.

In several majors, both a BS and a BA are available. Both degrees provide the same foundation in the discipline. The BS is a more structured approach, while the BA allows for greater flexibility. Drexel's strong advising program helps students learn more about the degree options and which option matches each student's long-term goals.

Science and Mathematics Curriculum

All students in biology, environmental science, geoscience, chemistry, mathematics, and physics study similar subjects during the freshman year. This recognizes the fundamental knowledge common to those disciplines; it also allows for transfer between majors at the end of the freshman year without loss of time. Upper-class students in those disciplines are given the opportunity to take related electives in liberal, scientific, and technical fields.

The flexibility available in the elective programs, and the opportunity to complete an academic minor, permit students to prepare for continuing studies in graduate or professional school, for work in government or industry, or for a change in educational goals.

Generally the basic requirements in each major are completed prior to the senior year. Thus, for science and mathematics majors, the technical electives in the last year may be selected in some advanced specialty within the specific major, and free electives may be used for enrichment or to prepare for a change of field. Each student's elective program must be approved by an advisor from his or her major department.

Humanities and Social Science Curriculum

Students majoring in the humanities and social sciences complete similar sets of courses in the first two years. Some of these courses may be identical (the freshmen year English sequence) while others will vary by discipline, such as major-specific freshmen courses or the math and science requirements in the BA and BS options.

Students in the communication major will take at least one course in their proposed concentration of public relations, journalism, or technical communication in each term during the freshman year. More intensive

work in the concentration begins in the sophomore year, as do elective options.

All humanities and social science students have a significant degree of flexibility, allowing them to complete disciplinary requirements, and, through free electives, to take a minor or perhaps another major to prepare for entry into graduate or professional school.

Secondary and Elementary Teacher Certification

The School of Education offers innovative curricula that combine academic majors with appropriate coursework to satisfy state requirements for certification in English, and sciences—including biology, chemistry, earth and space sciences, physics—as well as mathematics and elementary education. Students interested in the teacher education programs should contact the School of Education (<http://www.drexel.edu/grad/programs/edu>).

Accelerated Degree Program

The Accelerated Degree Program in the College of Arts and Sciences provides opportunities for highly talented and strongly motivated students to complete both an undergraduate degree and a master's degree in five years. Students generally enroll in a five year co-op program and replace the third co-op with courses to complete the graduate degree requirements; some majors require that students enroll for the four-year one co-op program. Students may be offered preliminary admission to such a program when they start at Drexel or can apply when they have completed 90 credits. In both instances, admission to the dual program must be approved before students complete 120 credits.

Accelerated Preprofessional Degree

The College accepts highly qualified and motivated students into accelerated BS/BA +MD and BS/BA +JD degrees. Students must apply to be admitted into these programs before starting at Drexel. For more information, students should contact the Office of Undergraduate Admissions (<http://www.drexel.edu/undergrad>).

Preprofessional Programs

Students wishing to prepare for admission to professional schools of medicine, veterinary medicine, dentistry, or public health may obtain preprofessional counseling and application assistance at the Steinbright Career Development Center (<http://www.drexel.edu/scdc>). For health profession application assistance, students may call 215.895.2437. For law school admission assistance, students may call 215.895.1632.

Degree Requirements

Certification for graduation is provided by the individual department or program according to the requirements for each major, which are set forth in subsequent pages. The minimum number of credits required for the degrees of Bachelor of Arts and Bachelor of Science varies from one department and program to another but in no case does it exceed 192 credits of academic work with two to six terms of co-operative experience.

Writing-Intensive Course Requirements

In order to graduate, all students must pass three writing-intensive courses after their freshman year. Two writing-intensive courses must be in a student's major. The third can be in any discipline. Students are advised to take one writing-intensive class each year, beginning with the sophomore year, and to avoid "clustering" these courses near the end of their matriculation. Transfer students need to meet with an academic

advisor to review the number of writing-intensive courses required to graduate.

A "WI" next to a course in this catalog may indicate that this course can fulfill a writing-intensive requirement. For the most up-to-date list of writing-intensive courses being offered, students should check the Writing Intensive Course List (http://drexel.edu/engphil/about/drexelwritingcenter/wicourses/course_list) on the Drexel University Writing Center (<http://drexel.edu/writingcenter>) page. Students scheduling their courses in Banner/DrexelOne can also conduct a search for courses with the attribute "WI" to bring up a list of all writing-intensive courses available that term.

The Drexel Writing Center

The Drexel Writing Center (DWC) is dedicated to helping students, faculty, and staff, at all levels of experience and across all disciplines, in their development as writers.

- The DWC works with writers at all stages in the writing process, from brainstorming ideas to polishing final drafts.
- The DWC focus is on individual, one-on-one sessions that feature a conversational, collaborative relationship between the reader and the writer they work with.
- Interaction with the DWC will help writers develop not just writing but critical thinking and reading skills.
- While DWC readers do not perform copy-editing services, they will help students learn strategies for proofreading and editing their documents.

The DWC is located at 0032 MacAlister Hall and can be reached at 215.895.6633. Further information can be found at the Drexel Writing Center (<http://drexel.edu/writingcenter>) website.

English Language Center

As part of the College of Arts and Sciences, Drexel's English Language Center (<http://www.drexel.edu/elc>) offers an accredited intensive English program throughout the year. In addition to classes in academic skills such as essay writing and oral presentations, the Center offers the pre-MBA Global Business English program (GLOBE), English for academic purposes, TOEFL and IELTS preparation, and other subjects. Many graduate students begin their studies at Drexel in the English Language Center for a rigorous and supportive environment to develop or enhance their academic English language knowledge and skills. International teaching assistants are oriented through a summer course in the language, culture, and pedagogy of the U.S. classroom. Accepted graduate students have access to free oral communications courses, tutoring, and other academic skills workshops throughout the academic year.

Some graduate programs within the COAS may accept students who are academically admissible but need further English language study. For more information, see the ELC website or contact the Center at:

English Language Center
229 N. 33rd Street
Philadelphia, PA 19104

Phone: 215-895-2022
Fax: 215-895-6775
E-mail: elc@drexel.edu

Minor in Africana Studies

The minor in Africana studies was created to provide the opportunity for undergraduate students throughout the University to gain an understanding of and background in the history and cultures of peoples of African descent in North and South America, the Caribbean, and Africa.

This interdisciplinary minor includes courses in anthropology, history, literature, music, political science, and sociology, and provides an opportunity for directed study in areas of particular interest to the students. The Africana studies minor has intrinsic intellectual value and helps prepare individuals to become contributors to an increasingly pluralistic society. At the same time, this minor allows students interested in business, the sciences, engineering, government, and social services to present to prospective employers a unique academic background.

Required Courses

AFAS 101	Introduction to Africana Studies	3.0
AFAS 201	Cross Currents in Africana Studies	3.0
Select six of the following: *		18.0
AFAS 250	African American Herstories	
AFAS 260	Race, Politics and Religion	
AFAS 301	Politics of Hip Hop	
AFAS 385	Rum, Rice and Revolution: Caribbean History	
AFAS 401	Urban Social Justice Practicum I	
AFAS 402	Urban Social Justice Practicum II	
AFAS I299	Independent Study in AFAS	
AFAS T280	Special Topics in Africana Studies	
AFAS T380	Special Topics in Africana Studies	
ANTH 101	Introduction to Cultural Diversity	
ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	
ENGL 203 [WI (p. 52)]	Post-Colonial Literature I (WI)	
ENGL 204	Post-Colonial Literature II	
ENGL 325	Topics in World Literature **	
HIST 216	Freedom in America	
HIST 215	American Slavery	
MUSC 107	Jazz Ensembles	
MUSC 333	Afro-American Music USA	
PSCI 354	United States & the Third World	
PSCI 372	City in United States Political Development	
WGST 240	Women and Society in a Global Context	
WGST T280	Special Topics in Women's and Gender Studies ***	

Total Credits **24.0**

* Students take an additional 18.0 credits including-but not limited to the following courses. (Students must check with the Program Director for approval prior to making substitutions.)

** With a focus on the Caribbean, Latin America or the Diaspora.

*** With a focus on race or the Diaspora.

Anthropology

Major: Anthropology

Degree Awarded: Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 45.0201

Standard Occupational Classification (SOC) code: 19-3091

About the Program

Anthropology is the study of human beings — past and present. Students majoring in anthropology broaden their understanding of the ways of life on planet Earth through courses that explore the diversity of human cultures, courses that explore the range of theoretical ideas about culture and human organization, and specialized courses in field techniques and methodology.

The anthropology major is a small, highly specialized program. The program has emphases in digital and media anthropology, symbolic communication, and community organization. Students are provided with an exceptional background in theory, and methodology, and fieldwork that will open doors to various career paths or lead to graduate training.

Two options exist in the anthropology bachelor of arts degree program. The first option is a four-year program with a single six month co-op in the junior year. For the majority of anthropology majors, the co-op will provide a fieldwork experience for students. Students who select to undertake a co-op are guided by interaction with faculty both inside and outside the classroom. The second option is a four-year non-co-op option. The core of the major in this option is the seminar in ethnography which majors are required to take each fall term for a total of 12.0 credits.

Additional Information

Dr. Wesley Shumar
Anthropology Department Head
Room 117, PSA Bldg #47
215-895-2060
shumarw@drexel.edu

Caroline Chmielewski
Department Administrator
Anthropology Department
Room 118, PSA Bldg #47
215- 895-2455
chmielcm@drexel.edu (%20chmielcm@drexel.edu)

For more details about the Anthropology major, visit the Anthropology (<http://www.drexel.edu/coas/academics/departments-centers/anthropology>) web site.

Degree Requirements

General Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Two Mathematics Courses		6.0-8.0
Two Science Courses		6.0-8.0

Foreign Language Courses

A minimum of two consecutive language courses * 8.0

Humanities and Fine Arts

LING 102	Language and Society	3.0
COM 150	Mass Media and Society	3.0
Two Humanities and Fine Arts Courses		6.0

Social and Behavioral Sciences

ANTH 110	Human Past: Anthropology and Prehistoric Archeology	3.0
ANTH 330	Media Anthropology	3.0
COM 355	Ethnography of Communication	3.0
SOC 101	Introduction to Sociology	3.0

International Studies

ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	3.0
International Studies Elective		3.0

Studies in Diversity

ANTH 101	Introduction to Cultural Diversity	3.0
ANTH 215	Anthropology of Gender	3.0

Anthropology Requirements

Community Research

SOC 270	Theory of Applied and Community Sociology	3.0
ANTH 370	Ethnographic Methods	3.0
ANTH 390	Seminar in Ethnography (3-credit course taken 4 terms)	12.0

Methods Sequence

COM 220	Qualitative Research Methods	3.0
SOC 250	Research Methods I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0

Theory Sequence

COM 210	Theory and Models of Communication	3.0
SOC 260 [WI (p. 52)]	Classical Social Theory (WI)	3.0
ANTH 410	Cultural Theory	3.0

Anthropology Program Requirements

Select ten of the following: 30.0

ANTH 120	Biblical Archaeology: The Archaeology of Israel and Jordan	
ANTH 210 [WI (p. 52)]	Worldview: Science, Religion and Magic	
ANTH 212 [WI (p. 52)]	Topics in World Ethnography	
ANTH 220	Aging In Cross-Cultural Perspective	
ANTH 240	Urban Anthropology	
ANTH 255	Psychological Anthropology	
ANTH 312	Approaches to Intercultural Behavior	
ANTH 355	Anthropology of Cyberspace	
ANTH 360	Culture and the Environment	
ANTH 365	Family and Kinship	
ANTH 380	Special Topics in Anthropology	
COM 345	Intercultural Communication	
COM 360	International Communication	
SOC 125	Sociology of Aging	
SOC 210	Race, Ethnicity and Social Inequality	

SOC 220	Wealth and Power		ANTH 390	Seminar in Ethnography	3.0
SOC 335	Sociology of Education		LING 102	Language and Society	3.0
Electives			SOC 364	Computer-Assisted Data Analysis	3.0
Free Electives			Anthropology Program Requirement*		3.0
Total Credits			182.0-186.0		Term Credits
			Term 7		
			ANTH 330	Media Anthropology	3.0
			Free Electives		12.0
			Term Credits		15.0
			Term 8		
			ANTH 390	Seminar in Ethnography	3.0
			UNIV H201	Looking Forward: Academics and Careers	1.0
			Free Elective		4.0
			Anthropology Program Requirements*		6.0
			Term Credits		14.0
			Term 9		
			Anthropology Program Requirements*		6.0
			Free Electives		10.0
			Term Credits		16.0
			Term 10		
			ANTH 410	Cultural Theory	3.0
			COM 355	Ethnography of Communication	3.0
			Anthropology Program Requirements*		6.0
			Free Electives		6.0
			Term Credits		18.0
			Term 11		
			Anthropology Program Requirements*		6.0
			Social and Behavioral Sciences Elective		3.0-4.0
			Free Electives		7.0
			Term Credits		16.0-17.0
			Term 12		
			ANTH 390	Seminar in Ethnography	3.0
			Anthropology Program Requirement*		3.0
			Free Electives		9.0
			Term Credits		15.0
			Total Credit: 182.0-185.0		

* See degree requirements (p. 53).

Co-op/Career Opportunities

C0-0p Opportunities

In order for majors to take the required seminar in ethnography, all anthropology co-ops are scheduled for the fall/winter cycle. Anthropology co-ops are student initiated and developed through discussions with faculty, rather than being selected from an existing list. Co-op ideas frequently emerge from discussions in the seminar in ethnography as students who have undertaken co-ops report on their experiences. Past co-ops have included: teaching English in Costa Rica; working on an archeological dig in the Yucatan; studying agricultural practices in Hawaii; working with an arts program in Oaxaca. In addition, several majors have

SOC 220	Wealth and Power	
SOC 335	Sociology of Education	
Electives		
Free Electives		48.0
Total Credits		182.0-186.0

* At least one foreign language course must be at the 200-level.

Sample Plan of Study

	Credits	
Term 1		
ANTH 101	Introduction to Cultural Diversity	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV H101	The Drexel Experience	1.0
Math Elective		3.0-4.0
Foreign Language Course		4.0
Term Credits		14.0-15.0
Term 2		
ANTH 110	Human Past: Anthropology and Prehistoric Archeology	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101	Introduction to Civic Engagement	1.0
Math Elective		3.0-4.0
Foreign Language Course		4.0
Term Credits		14.0-15.0
Term 3		
ANTH 390	Seminar in Ethnography	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
SOC 101	Introduction to Sociology	3.0
SOC 260 [WI (p. 52)]	Classical Social Theory	3.0
SOC 270	Theory of Applied and Community Sociology	3.0
Term Credits		15.0
Term 4		
ANTH 215	Anthropology of Gender	3.0
COM 150	Mass Media and Society	3.0
COM 220	Qualitative Research Methods	3.0
Lab Science Elective		3.0
Humanities/Fine Arts Elective		3.0
Term Credits		15.0
Term 5		
ANTH 370	Ethnographic Methods	3.0
COM 210	Theory and Models of Communication	3.0
SOC 250	Research Methods I	3.0
Lab Science Elective		3.0
Humanities/Fine Arts Elective		3.0
Term Credits		15.0
Term 6		
ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	3.0

collaborated on faculty research, while others have been engaged in community outreach projects.

Post-Graduate Opportunities

Many corporations, schools and health-care institutions are using ethnographic field techniques and qualitative methods in order to understand their markets and clientele, or for that matter, their own organizational structure. The Anthropology major prepares students for employment in these areas, as well as for further graduate work in anthropology, public policy, law and other social and behavioral sciences.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) web page for more detailed information on post-graduate opportunities.

Minor in Anthropology

The anthropology minor provides students in other fields with a cross-cultural awareness that will enable them to interact with a variety of people in a wide range of situations. By giving students a respect for and understanding of the basis of cultural variation, the minor can facilitate working in international settings. Even for students working within the United States, anthropology offers increased sensitivity to ethnic and population diversity. Medicine, law, counseling, nursing, and nutrition are only a few of the fields in which clients and professionals may come from different parts of our heterogeneous society.

Please note: No more than three courses that are required for a student's major can count towards fulfilling requirements for the minor.

Required (Core) Courses

ANTH 101	Introduction to Cultural Diversity	3.0
ANTH 110	Human Past: Anthropology and Prehistoric Archeology	3.0
ANTH 210 [WI (p. 52)]	Worldview: Science, Religion and Magic	3.0
ANTH 370	Ethnographic Methods	3.0
ANTH 410	Cultural Theory	3.0
Select three of the following:		9.0
ANTH 215	Anthropology of Gender	
ANTH 330	Media Anthropology	
ANTH 120	Biblical Archaeology: The Archaeology of Israel and Jordan	
ANTH 212 [WI (p. 52)]	Topics in World Ethnography	
ANTH 220	Aging In Cross-Cultural Perspective	
ANTH 240	Urban Anthropology	
ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	
ANTH 312	Approaches to Intercultural Behavior	
ANTH 355	Anthropology of Cyberspace	
ANTH 360	Culture and the Environment	
ANTH 365	Family and Kinship	
ANTH 380	Special Topics in Anthropology	

Total Credits

24.0

Anthropology Faculty

Anthony Glascock, PhD (*University of Pittsburgh*) *Coordinator of the Anthropology Program*. Professor. Aging and health, definitions of functionality and impairment, technology and aging, social organization, Ireland, East Africa.

Barbara Hornum, PhD (*Bryn Mawr College*) *Director of Center for Academic Excellence (DCAE)*. Associate Professor. Comparative gerontology, planned communities, continuing care communities, retirement, faculty development.

David Kutzik, PhD (*Temple University*). Professor. Sociology and philosophy of science; applied gerontological research; political economy of health care; microprocessor-based assistive technologies to improve case management and increase independent living among frail populations.

Brent Luvaas, PhD (*UCLA*). Assistant Professor. DIY and independent media production; transnational consumer culture; popular music; new media and mediated subjectivities; youth culture in the US and Indonesia.

Usha Menon, PhD (*University of Chicago*). Associate Professor. Self, identity & personhood, emotional functioning, Hindu morality, gender relations in Hindu society, adult development, popular Hinduism, post-colonial feminism, Hindu religious nationalism and Islamic radicalism.

Rakhmiel Peltz, PhD (*Columbia University, Linguistics; University of Pennsylvania, Biological Sciences*) *Director of Judaic Studies Program*. Professor. Sociolinguistics, ethnography of communication, social history of Yiddish language and culture, Yiddish culture of Eastern Europe, language planning, language and ethnic identity, language and group memory, aging and ethnicity, history of urban neighbors.

Douglas V. Porpora, PhD (*Temple University*). Professor. International political economy, culture, social theory, and philosophy of social science.

Robert Powell, PhD (*Temple University*). Assistant Teaching Professor. Early and Middle Bronze Age Crete; archaeoastronomy; early state formation; archaeology and anthropology of frontiers; mass communication.

Rachel R. Reynolds, PhD (*University of Illinois at Chicago*). Associate Professor. Sociolinguistics, ethnography of communication, intercultural communication, globalization and the rhetoric of community, political economy of immigration, race and ethnicity, new African immigrants in the United States, Igbo studies.

Wesley Shumar, PhD (*Temple University*) *Department Head, Anthropology*. Professor. Ethnography of cyberspace, online learning communities, political economy of higher education, globalization, activity theory, semiotics, critical realism, psychoanalysis, identity and the self.

Judith Storniolo, PhD (*University of Pennsylvania*). Teaching Professor. Historical and comparative linguistics, Mesoamerican languages and culture, applied anthropology, public policy, oral traditions and narratives, ideology and ritual, Mesoamerican ethnohistory; and pre-Columbian literature.

Minor in Astrophysics

Astrophysics brings together many disparate areas of physics—gravitational physics govern the evolution of galaxies and clusters, nuclear physics dominates the cores of stars, electromagnetism governs the

radiation that we use to observe these objects. Students majoring in mathematics and computer science, as well as other disciplines, are often fascinated by the questions raised by astrophysics.

Because of the overlap in requirements between the astrophysics minor and the physics minor, (p. 150) students cannot minor in both.

Admission requirements: Consultation with the Physics Department.

Required Prerequisite Courses

PHYS 113 & PHYS 114 & PHYS 115 OR	Contemporary Physics I and Contemporary Physics II and Contemporary Physics III
PHYS 101 & PHYS 102 & PHYS 201	Fundamentals of Physics I and Fundamentals of Physics II and Fundamentals of Physics III

Required Courses

PHYS 217	Thermodynamics	4.0
PHYS 231	Introductory Astrophysics	3.0
PHYS 232	Observational Astrophysics	3.0
PHYS 311	Classical Mechanics I	4.0
PHYS 321	Electromagnetic Fields I	4.0
PHYS 431	Galactic Astrophysics	3.0
PHYS 432	Cosmology	3.0

Total Credits **24.0**

Minor in Bioinformatics

The bioinformatics minor examines the application of computer technology and programming to biological fields such as genomics or proteomics. This multidisciplinary program is designed for students majoring in biomedical engineering, biological sciences, computer science, information systems, or mathematics. Combination with other majors is possible through consultation with the program director. The minor is divided among courses in biology, programming and computation, human-computer interface design, databases, and statistics.

Students must complete a minimum of 24 credits of coursework as follows:

Core Courses

BIO 331	Bioinformatics I	3.0
BIO 332	Bioinformatics II	3.0
Two Senior Research Project Courses *		

* Until research project courses are developed specifically for this minor, the department will accept whatever research project(s) the student has taken as part of their major under the number for that major.

Area-specific courses

In each of the following five areas, the requirements of a student's major cover some of the competencies for Bioinformatics, while the remaining requirements will be fulfilled within the minor itself.

A plan of study is determined by an Advisor in the Department of Biology based on the student's major field of study. Thus, the requirements for

completing the minor are determined on a case-by-case basis. Possible options for area-specific courses include the following:

Bioscience

BIO 107	Cells, Genetics & Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
BIO 109	Biological Diversity, Ecology & Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
BIO 449	Recombinant DNA Laboratory	5.0

Programming and Computation

CS 171	Computer Programming I	3.0
CS 172	Computer Programming II	3.0
CS 260	Data Structures	3.0

Human/Computer Interface Design

CS 337	The Psychology of Human-Computer Interaction	3.0
INFO 110	Human-Computer Interaction I	3.0

Databases

CS 461	Database Systems	3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0

Statistics

MATH 310	Probability and Statistics	4.0
MATH 311	Probability and Statistics I	4.0
MATH 312	Probability and Statistics II	4.0
MATH 410	Scientific Data Analysis I	3.0
MATH 411	Scientific Data Analysis II	3.0

Biological Sciences

Major: Biological Sciences

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.5

Classification of Instructional Programs (CIP) code: 26.0101

Standard Occupational Classification (SOC) code: 19-1029

About the Program

The curricular choices are designed to provide a sound basis for careers in the private sector, government and research laboratories, and for advanced study in graduate and professional programs in medicine, other health related areas, or in teaching.

The biological sciences encompass many areas of study. Biologists study the structure and functions of living organisms from the individual cell to the full organism, and collectively to the community level. Discoveries in the biological sciences influence many aspects of our daily lives and have become the foundation of most new developments of the new century. In the past two decades, advances in molecular biology and genetics have been rapid, opening many new, exciting career opportunities in the fields of biotechnology and genetic engineering. Biologists can pursue a variety of options including careers in medicine, dentistry, veterinary medicine or other health-related areas; in research or commercial laboratories at pharmaceutical companies, medical research laboratories, biotechnology companies or in government agencies; and in teaching. In fact, more than 100 different occupations have been listed for biologists. Graduates in the

biological sciences are in demand and enjoy a high placement rate with competitive salaries.

The biological sciences major resides in the Department of Biology (<http://www.drexel.edu/coas/academics/departments-centers/biology>). Students earn a bachelor's degree in the biological sciences and are prepared for technical careers in research or commercial laboratories, or for professional schools or graduate study.

The course requirements identifies required support courses in chemistry, physics, mathematics, humanities, and science and human affairs. With proper selection of electives, students can meet teacher certification requirements or complete a minor in another field. Students are encouraged to consult frequently with their academic advisor for curriculum planning.

In addition to the core requirements, students select one of five concentrations in a field of interest:

- Cell/Molecular Biology/Genetics/Biochemistry
- Organismal Biology/Physiology
- Ecology/Evolution/Genomics
- Pathobiology
- General Biology

Program Options

Co-op/internship employment is an option for biological science students. The major offers three distinct plans:

Five-year option with co-op/internship experience

This option allows for the greatest amount of employment experience, with three distinct six-month periods of employment included with studies. After the start of the sophomore year, students study or work through all terms, including summer.

Four-year option with one co-op/internship experience

The degree includes just one six-month period of full-time employment. After the start of sophomore year, students study or work through all terms, including summer.

Four-year option without co-op experience

The degree can be completed in four years without co-op/internship employment. Students are not required to pursue studies during any of the summer terms.

Degree Requirements

The Biological Sciences curriculum is designed to provide students with both depth and flexibility within the field of biology. In addition to the core requirements, students select one of five concentrations in a field of interest.

- Cell/Molecular Biology/Genetics/Biochemistry
- Organismal Biology/Physiology
- Ecology/Evolution/Genomics
- Pathobiology
- General Biology

Concentration requirements and elective options are outlined below. Within each concentration, students are able to further specialize in a focus area by taking recommended electives.

Requirements

Humanities and Social Sciences

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0
COM 310 [WI (p. 56)]	Technical Communication	3.0
or COM 320	Science Writing	
PHIL 251	Ethics	3.0
UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV S201	Looking Forward: Academics and Careers	1.0
Humanities and Social Science Electives		9.0
Science, Technology, Health and Human Affairs Elective		3.0

Mathematics and Statistics

Select one of the following sequences:		12.0
Intro to Analysis		
MATH 101	Introduction to Analysis I	
MATH 102	Introduction to Analysis II	
MATH 239	Mathematics for the Life Sciences	
Calculus		
MATH 121	Calculus I	
MATH 122	Calculus II	
MATH 123	Calculus III	

MATH 410	Scientific Data Analysis I	3.0
MATH 411	Scientific Data Analysis II	3.0

Physical Sciences

CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
CHEM 241	Organic Chemistry I	4.0
CHEM 242	Organic Chemistry II	4.0
BIO 311	Biochemistry	4.0
or CHEM 243	Organic Chemistry III	
PHYS 152	Introductory Physics I	4.0
PHYS 153	Introductory Physics II	4.0
PHYS 154	Introductory Physics III	4.0

Core Biology Courses

BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
BIO 207	Applications in Biology I	1.0
BIO 208	Applications in Biology II	1.0
BIO 209	Cell, Molecular & Developmental Biology I	4.0
BIO 211	Cell, Molecular & Developmental Biology II	4.0
BIO 219 [WI (p. 56)]	Techniques in Molecular Biology	3.0

BIO 224	Form, Function & Evolution of Vertebrates	4.0	BIO 415	Proteins	3.0
BIO 225	Vertebrate Biology and Evolution Laboratory	2.0	BIO 416	Biochemistry of Major Diseases	3.0
ENVS 212	Evolution	4.0	BIO 421	Biomembranes	3.0
BIO 471	Seminar in Biological Sciences	2.0	BIO 430	Cell Biology of Disease	3.0
BIO 472	Seminar in Biological Sciences	2.0	BIO 433	Advanced Cell Biology	3.0
BIO 473 [WI (p. 56)]	Seminar in Biological Sciences	2.0	BIO 444	Human Genetics	3.0
			BIO 445	Microbial Genetics	3.0
Concentration Courses		28.0-30	BIO 447	Advanced Genetics and Molecular Biology	3.0
Free electives		24.0	BIO 451	Genetic Reg Development	3.0
Total Credits		183.5	BIO 462	Biology of Neuron Function	3.0

Students select one of five concentration and fulfill the requirements, as outlined below.

1. The Cell/Molecular/Genetics/Biochemistry (CMGB) Concentration

This concentration provides exposure to several vital disciplines within Biology, and will prepare students for a diversity of careers in research, medicine, and industry. Students interested in tailoring their studies more specifically may follow the suggested "focus areas" when selecting their two CMGB Concentration electives.

Cell/Molecular/Genetics/Biochemistry (CMGB) Concentration Requirements

BIO 244	Genetics I	3.0
or BIO 444	Human Genetics	
BIO 314	Pharmacology	3.0
or BIO 404	Structure and Function of Biomolecules	
BIO 318	Biology of Cancer	3.0
or BIO 430	Cell Biology of Disease	
BIO 410	Advanced Molecular Biology	3.0

Cell/Molecular/Genetics/Biochemistry (CMGB) Concentration Electives (See Lists Below)

Two Cell/Molecular/Genetics/Biochemistry (CMGB) Electives (see list below)

Organismal/Physiology Elective (see list below)	3.0
Ecology/Evolution/Genomics Elective (see list below)	3.0

Concentration Laboratory Courses

Two Laboratory Electives (see list below)	4.0
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Total Credits **28.0**

* Students interested in pursuing a focus area in Neurobiology, Pharmaceuticals, Cell Biology, Biochemistry, Molecular Biology or Genetics should contact the academic advisor in the Biology Department for specific focus recommendations.

Cell/Molecular/Genetics/Biochemistry (CMGB) Electives

BIO 231	Cell Physiology	3.0
BIO 244	Genetics I	3.0
BIO 285	Forensic Biology	3.0
BIO 311	Biochemistry	4.0
BIO 314	Pharmacology	3.0
BIO 318	Biology of Cancer	3.0
BIO 346	Stem Cell Research	3.0
BIO 404	Structure and Function of Biomolecules	4.0
BIO 414	Behavioral Genetics	3.0

BIO 415	Proteins	3.0
BIO 416	Biochemistry of Major Diseases	3.0
BIO 421	Biomembranes	3.0
BIO 430	Cell Biology of Disease	3.0
BIO 433	Advanced Cell Biology	3.0
BIO 444	Human Genetics	3.0
BIO 445	Microbial Genetics	3.0
BIO 447	Advanced Genetics and Molecular Biology	3.0
BIO 451	Genetic Reg Development	3.0
BIO 462	Biology of Neuron Function	3.0
BIO 463	Molecular Mechanisms of Neurodegeneration	3.0
BIO 465	Neurobiology of Disease	3.0

Organismal/Physiology Electives

BIO 201	Human Physiology I	4.0
BIO 221	Microbiology	3.0
BIO 223	Parasitology	3.0
BIO 256	Vertebrate Morphology and Physiology	3.0
BIO 270	Development Biology	3.0
BIO 284	Biology of Stress	3.0
BIO 286	Forensic Toxicology	3.0
BIO 310	Comparative Physiology	3.0
BIO 322	Mycology	4.5
BIO 368	Embryology	4.0
BIO 370	Teratology	3.0
BIO 372	Histology	4.0
BIO 386	Gross Anatomy I	2.0
BIO 412	Biology of Aging	3.0
BIO 420	Virology	3.0
BIO 426	Immunology	3.0
BIO 461	Neurobiology of Autism Disorders	3.0
ENVS 254	Invertebrate Morphology and Physiology	3.0
ENVS 392	Ichthyology and Herpetology	3.0
ENVS 393	Entomology	3.0

Ecology/Evolution/Genomics Electives

BIO 228	Evolutionary Biology & Human Health	3.0
BIO 331	Bioinformatics I	3.0
BIO 413	Genomics	3.0
BIO 436	Human Population Genetics	4.0
ENVS 230	General Ecology	3.0
ENVS 247	Native Plants and Sustainability	3.0
ENVS 323	Tropical Field Studies	3.0
ENVS 328	Conservation Biology	3.0
ENVS 343	Equatorial Guinea: Field Methods	3.0
ENVS 360	Evolutionary Developmental Biology	3.0
ENVS 364	Animal Behavior	3.0
ENVS 382	Field Botany of the New Jersey Pine Barrens	4.0
ENVS 383	Ecology of the New Jersey Pine Barrens	4.0
ENVS 391	Diversity, Evolution and Ecology of Algae	3.0
ENVS 470	Advanced Topics in Evolution	3.0

Laboratory Electives

BIO 202	Human Physiology Laboratory	2.0
BIO 213	Drosophila Neural Research	3.0

BIO 215 [WI (p. 56)]	Techniques in Cell Biology	2.5
BIO 222	Microbiology Laboratory	2.0
BIO 229	Dictyostelium Research	3.0
BIO 232	Discovering Antibiotics	3.0
BIO 257	Vertebrate Morphology & Physiology Lab	2.0
BIO 271	Developmental Biology Laboratory	2.0
BIO 306	Biochemistry Laboratory	2.0
BIO 313	Comparative Physiology Laboratory	2.0
BIO 387	Gross Anatomy I Laboratory	2.0
BIO 389	Gross Anatomy II Lab	2.0
BIO 406	Computational Biochemistry Laboratory	2.0
BIO 427	Immunology Laboratory	2.0
BIO 497	Research	0.5-12.0
ENVS 255	Invertebrate Morphology and Physiology Lab	2.0
ENVS 344	Equatorial Guinea: Field Research	6.0
ENVS 365	Animal Behavior Laboratory	2.0
ENVS 394	Entomology Laboratory	2.0

2. The Organismal Biology/Physiology Concentration

This concentration combines courses in organismal biology and physiology with an opportunity to focus on human physiology. The concentration is designed to appeal to students interested in health and medicine, but also accommodates students seeking a wider breadth of knowledge in organismal diversity. Students can focus their electives in human physiology or can choose courses that study non-human organisms.

Organismal Biology/Physiology Concentration Requirements

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0
or BIO 256	Vertebrate Morphology and Physiology	
BIO 270	Development Biology	3.0

Select one of the following:

BIO 412	Biology of Aging	3.0
or BIO 284	Biology of Stress	
or BIO 466	Endocrinology	

Organismal Biology/Physiology Concentration Concentration Electives (See List Below)

Cell/Molecular/Genetics/Biochemistry (CMGB) Elective	3.0
Two Organismal/Physiology Electives	6.0
Ecology/Evolution/Genomics Elective	3.0

Concentration Laboratory Courses

Two Laboratory Electives	4.0
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Total Credits **30.0**

* Students interested in pursuing a focus area in Human Physiology or Organismal Biology should contact the academic advisor in the Biology Department for specific focus recommendations.

*Cell/Molecular/Genetics/Biochemistry (CMGB) electives

BIO 244	Genetics I	3.0
BIO 285	Forensic Biology	3.0

BIO 311	Biochemistry	4.0
BIO 314	Pharmacology	3.0
BIO 318	Biology of Cancer	3.0
BIO 346	Stem Cell Research	3.0
BIO 404	Structure and Function of Biomolecules	4.0
BIO 410	Advanced Molecular Biology	3.0
BIO 414	Behavioral Genetics	3.0
BIO 416	Biochemistry of Major Diseases	3.0
BIO 430	Cell Biology of Disease	3.0
BIO 444	Human Genetics	3.0
BIO 449	Recombinant DNA Laboratory	5.0
BIO 462	Biology of Neuron Function	3.0
BIO 463	Molecular Mechanisms of Neurodegeneration	3.0

**Organismal/Physiology electives

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0
BIO 221	Microbiology	3.0
BIO 223	Parasitology	3.0
BIO 256	Vertebrate Morphology and Physiology	3.0
BIO 264	Ethnobotany	3.0
BIO 284	Biology of Stress	3.0
BIO 286	Forensic Toxicology	3.0
BIO 310	Comparative Physiology	3.0
BIO 320	Microbial Pathogenesis	3.0
BIO 322	Mycology	4.5
BIO 368	Embryology	4.0
BIO 370	Teratology	3.0
BIO 372	Histology	4.0
BIO 386	Gross Anatomy I	2.0
BIO 388	Gross Anatomy II	2.0
BIO 412	Biology of Aging	3.0
BIO 420	Virology	3.0
BIO 424	Microbial Physiology	3.0
BIO 426	Immunology	3.0
BIO 435	Immunobiology of Disease	3.0
BIO 461	Neurobiology of Autism Disorders	3.0
BIO 466	Endocrinology	4.0
BIO 468	Pathophysiology	4.0
ENVS 254	Invertebrate Morphology and Physiology	3.0
ENVS 392	Ichthyology and Herpetology	3.0
ENVS 393	Entomology	3.0

*** Ecology/Evolution/Genomics electives

BIO 228	Evolutionary Biology & Human Health	3.0
BIO 331	Bioinformatics I	3.0
BIO 413	Genomics	3.0
BIO 436	Human Population Genetics	4.0
ENVS 230	General Ecology	3.0
ENVS 247	Native Plants and Sustainability	3.0
ENVS 323	Tropical Field Studies	3.0
ENVS 328	Conservation Biology	3.0

ENVS 343	Equatorial Guinea: Field Methods	3.0
ENVS 360	Evolutionary Developmental Biology	3.0
ENVS 364	Animal Behavior	3.0
ENVS 382	Field Botany of the New Jersey Pine Barrens	4.0
ENVS 383	Ecology of the New Jersey Pine Barrens	4.0
ENVS 388	Marine Field Methods	4.0
ENVS 391	Diversity, Evolution and Ecology of Algae	3.0
ENVS 438	Biodiversity	3.0
ENVS 470	Advanced Topics in Evolution	3.0

+Laboratory electives

BIO 202	Human Physiology Laboratory	2.0
BIO 213	Drosophila Neural Research	3.0
BIO 215 [WI (p. 56)]	Techniques in Cell Biology	2.5
BIO 222	Microbiology Laboratory	2.0
BIO 229	Dictyostelium Research	3.0
BIO 232	Discovering Antibiotics	3.0
BIO 257	Vertebrate Morphology & Physiology Lab	2.0
BIO 271	Developmental Biology Laboratory	2.0
BIO 306	Biochemistry Laboratory	2.0
BIO 313	Comparative Physiology Laboratory	2.0
BIO 333	Bioinformatics Laboratory	2.0
BIO 387	Gross Anatomy I Laboratory	2.0
BIO 389	Gross Anatomy II Lab	2.0
BIO 406	Computational Biochemistry Laboratory	2.0
BIO 427	Immunology Laboratory	2.0
BIO 434 [WI (p. 56)]	Advanced Cell Biology Laboratory	2.0
BIO 449	Recombinant DNA Laboratory	5.0
ENVS 255	Invertebrate Morphology and Physiology Lab	2.0
ENVS 344	Equatorial Guinea: Field Research	6.0
ENVS 365	Animal Behavior Laboratory	2.0
ENVS 394	Entomology Laboratory	2.0

3. The Ecology/Evolution/Genomics Concentration

This concentration focuses on ecological and evolutionary aspects of biology for biology majors who also have specific interests in ecology, evolution or genomics. This concentration is designed to maintain a breadth of knowledge in biology, but also allows students to tailor their course work more specifically to reflect their specific area of interest.

Ecology/Evolution/Genomics Concentration requirements

ENVS 326	Molecular Ecology	3.0
BIO 228	Evolutionary Biology & Human Health	3.0
or BIO 331	Bioinformatics I	
BIO 436	Human Population Genetics	3.0-4.0
or ENVS 230	General Ecology	
Select one of the following:		3.0-5.0
BIO 221	Microbiology	
BIO 223	Parasitology	

BIO 256	Vertebrate Morphology and Physiology	
BIO 413	Genomics	
BIO 420	Virology	
ENVS 254	Invertebrate Morphology and Physiology	
ENVS 360	Evolutionary Developmental Biology	
ENVS 382	Field Botany of the New Jersey Pine Barrens	
ENVS 391	Diversity, Evolution and Ecology of Algae	
ENVS 392	Ichthyology and Herpetology	
ENVS 393	Entomology	
ENVS 438	Biodiversity	

Ecology/Evolution/Genomics concentration electives

Select one Cell/Molecular/Genetics/Biochemistry (CMGB) elective (see list below)	3.0
Select one Organismal/Physiology elective (see list below)	3.0
Select two Ecology/Evolution/Genomics electives (see list below)	6.0

Concentration Laboratory Courses

Select two Laboratory electives (see list below)	4.0
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Total Credits **28.0-31.0**

* Students interested in pursuing a focus area in Ecology, Evolutionary Biology or Genomics should contact the academic advisor in the Biology Department for specific focus recommendations.

Cell/Molecular/Genetics/Biochemistry (CMGB) electives

BIO 244	Genetics I	3.0
BIO 285	Forensic Biology	3.0
BIO 311	Biochemistry	4.0
BIO 314	Pharmacology	3.0
BIO 318	Biology of Cancer	3.0
BIO 346	Stem Cell Research	3.0
BIO 404	Structure and Function of Biomolecules	4.0
BIO 410	Advanced Molecular Biology	3.0
BIO 414	Behavioral Genetics	3.0
BIO 415	Proteins	3.0
BIO 416	Biochemistry of Major Diseases	3.0
BIO 421	Biomembranes	3.0
BIO 430	Cell Biology of Disease	3.0
BIO 433	Advanced Cell Biology	3.0
BIO 444	Human Genetics	3.0
BIO 449	Recombinant DNA Laboratory	5.0
BIO 462	Biology of Neuron Function	3.0
BIO 463	Molecular Mechanisms of Neurodegeneration	3.0
ENVS 326	Molecular Ecology	3.0

Organismal/Physiology electives

BIO 201	Human Physiology I	4.0
BIO 221	Microbiology	3.0
BIO 223	Parasitology	3.0
BIO 256	Vertebrate Morphology and Physiology	3.0
BIO 284	Biology of Stress	3.0
BIO 286	Forensic Toxicology	3.0
BIO 310	Comparative Physiology	3.0

BIO 322	Mycology	4.5
BIO 368	Embryology	4.0
BIO 372	Histology	4.0
BIO 386	Gross Anatomy I	2.0
BIO 388	Gross Anatomy II	2.0
BIO 412	Biology of Aging	3.0
BIO 420	Virology	3.0
BIO 426	Immunology	3.0
BIO 461	Neurobiology of Autism Disorders	3.0
ENVS 254	Invertebrate Morphology and Physiology	3.0
ENVS 392	Ichthyology and Herpetology	3.0
ENVS 393	Entomology	3.0

Ecology/Evolution/Genomics electives

BIO 228	Evolutionary Biology & Human Health	3.0
BIO 331	Bioinformatics I	3.0
BIO 332	Bioinformatics II	3.0
BIO 413	Genomics	3.0
BIO 436	Human Population Genetics	4.0
ENVS 230	General Ecology	3.0
ENVS 247	Native Plants and Sustainability	3.0
ENVS 284	Physiological and Population Ecology	3.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 315	Plant Animal Interactions	3.0
ENVS 322	Tropical Ecology	3.0
ENVS 328	Conservation Biology	3.0
ENVS 330	Aquatic Ecology	3.0
ENVS 336	Terrestrial Ecology	5.0
ENVS 343	Equatorial Guinea: Field Methods	3.0
ENVS 360	Evolutionary Developmental Biology	3.0
ENVS 364	Animal Behavior	3.0
ENVS 382	Field Botany of the New Jersey Pine Barrens	4.0
ENVS 383	Ecology of the New Jersey Pine Barrens	4.0
ENVS 390	Marine Ecology	3.0
ENVS 391	Diversity, Evolution and Ecology of Algae	3.0
ENVS 410	Physiological Ecology	3.0
ENVS 412	Biophysical Ecology	3.0
ENVS 413	Advanced Population Ecology	3.0
ENVS 414	Advanced Community Ecology	3.0
ENVS 438	Biodiversity	3.0
ENVS 470	Advanced Topics in Evolution	3.0

Laboratory electives

BIO 202	Human Physiology Laboratory	2.0
BIO 213	Drosophila Neural Research	3.0
BIO 215 [WI (p. 56)]	Techniques in Cell Biology	2.5
BIO 222	Microbiology Laboratory	2.0
BIO 229	Dictyostelium Research	3.0
BIO 232	Discovering Antibiotics	3.0
BIO 257	Vertebrate Morphology & Physiology Lab	2.0
BIO 271	Developmental Biology Laboratory	2.0
BIO 306	Biochemistry Laboratory	2.0

BIO 313	Comparative Physiology Laboratory	2.0
BIO 333	Bioinformatics Laboratory	2.0
BIO 387	Gross Anatomy I Laboratory	2.0
BIO 389	Gross Anatomy II Lab	2.0
BIO 406	Computational Biochemistry Laboratory	2.0
BIO 427	Immunology Laboratory	2.0
BIO 449	Recombinant DNA Laboratory	5.0
BIO 497	Research (by permission of the department)	0.5-12.0
ENVS 255	Invertebrate Morphology and Physiology Lab	2.0
ENVS 285 [WI (p. 56)]	Population Ecology Laboratory	2.0
ENVS 287	Community Ecology Laboratory	2.0
ENVS 327	Molecular Ecology Laboratory	2.0
ENVS 336	Terrestrial Ecology	5.0
ENVS 344	Equatorial Guinea: Field Research	6.0
ENVS 365	Animal Behavior Laboratory	2.0
ENVS 382	Field Botany of the New Jersey Pine Barrens	4.0
ENVS 383	Ecology of the New Jersey Pine Barrens	4.0
ENVS 388	Marine Field Methods	4.0
ENVS 394	Entomology Laboratory	2.0

4. The Pathobiology Concentration

The Pathobiology concentration focuses on pathogenesis, and provides a unique option for students that differs from the more traditional disciplines in cell/molecular/genetics/biochemistry. This concentration is designed to appeal to students with an interest in pursuing careers in areas of public and allied health.

BIO 221	Microbiology	3.0
BIO 223	Parasitology	3.0
or BIO 420	Virology	
or BIO 435	Immunobiology of Disease	
BIO 320	Microbial Pathogenesis	3.0
BIO 426	Immunology	3.0
Select one Cell/Molecular/Genetics/Biochemistry (CMGB) elective (see list below)		3.0
Select two Organismal/Physiology electives (see list below)		6.0
Select one Evolutionary Bio/Ecology elective (see list below)		3.0
Concentration Laboratory Courses		
Two Laboratory electives (see list below)		4.0
Total Credits		28.0

Cell/Molecular/Genetics/Biochemistry (CMGB) electives:

BIO 244	Genetics I	3.0
BIO 285	Forensic Biology	3.0
BIO 311	Biochemistry	4.0
BIO 314	Pharmacology	3.0
BIO 318	Biology of Cancer	3.0
BIO 346	Stem Cell Research	3.0
BIO 404	Structure and Function of Biomolecules	4.0
BIO 410	Advanced Molecular Biology	3.0
BIO 414	Behavioral Genetics	3.0
BIO 415	Proteins	3.0

BIO 421	Biomembranes	3.0
BIO 430	Cell Biology of Disease	3.0
BIO 433	Advanced Cell Biology	3.0
BIO 444	Human Genetics	3.0
BIO 449	Recombinant DNA Laboratory	5.0
BIO 462	Biology of Neuron Function	3.0
BIO 463	Molecular Mechanisms of Neurodegeneration	3.0

Organismal/Physiology electives

BIO 201	Human Physiology I	4.0
BIO 221	Microbiology	3.0
BIO 223	Parasitology	3.0
BIO 256	Vertebrate Morphology and Physiology	3.0
BIO 270	Development Biology	3.0
BIO 284	Biology of Stress	3.0
BIO 286	Forensic Toxicology	3.0
BIO 310	Comparative Physiology	3.0
BIO 322	Mycology	4.5
BIO 368	Embryology	4.0
BIO 370	Teratology	3.0
BIO 372	Histology	4.0
BIO 386	Gross Anatomy I	2.0
BIO 388	Gross Anatomy II	2.0
BIO 412	Biology of Aging	3.0
BIO 420	Virology	3.0
BIO 424	Microbial Physiology	3.0
BIO 435	Immunobiology of Disease	3.0
BIO 461	Neurobiology of Autism Disorders	3.0
BIO 466	Endocrinology	4.0
BIO 468	Pathophysiology	4.0
ENVS 254	Invertebrate Morphology and Physiology	3.0

Ecology/Evolution/Genomics electives

BIO 228	Evolutionary Biology & Human Health	3.0
BIO 331	Bioinformatics I	3.0
BIO 413	Genomics	3.0
BIO 436	Human Population Genetics	4.0
ENVS 230	General Ecology	3.0
ENVS 247	Native Plants and Sustainability	3.0
ENVS 323	Tropical Field Studies	3.0
ENVS 328	Conservation Biology	3.0
ENVS 343	Equatorial Guinea: Field Methods	3.0
ENVS 360	Evolutionary Developmental Biology	3.0
ENVS 364	Animal Behavior	3.0
ENVS 382	Field Botany of the New Jersey Pine Barrens	4.0
ENVS 383	Ecology of the New Jersey Pine Barrens	4.0
ENVS 391	Diversity, Evolution and Ecology of Algae	3.0
ENVS 438	Biodiversity	3.0
ENVS 470	Advanced Topics in Evolution	3.0

Laboratory electives

BIO 202	Human Physiology Laboratory	2.0
BIO 213	Drosophila Neural Research	3.0

BIO 215 [WI (p. 56)]	Techniques in Cell Biology	2.5
BIO 222	Microbiology Laboratory	2.0
BIO 229	Dictyostelium Research	3.0
BIO 232	Discovering Antibiotics	3.0
BIO 257	Vertebrate Morphology & Physiology Lab	2.0
BIO 271	Developmental Biology Laboratory	2.0
BIO 306	Biochemistry Laboratory	2.0
BIO 313	Comparative Physiology Laboratory	2.0
BIO 333	Bioinformatics Laboratory	2.0
BIO 387	Gross Anatomy I Laboratory	2.0
BIO 389	Gross Anatomy II Lab	2.0
BIO 406	Computational Biochemistry Laboratory	2.0
BIO 427	Immunology Laboratory	2.0
BIO 449	Recombinant DNA Laboratory	5.0
BIO 497	Research (by permission of the department)	0.5-12.0
ENVS 255	Invertebrate Morphology and Physiology Lab	2.0
ENVS 344	Equatorial Guinea: Field Research	6.0
ENVS 365	Animal Behavior Laboratory	2.0

5. The General Biology Concentration

This concentration will allow maximum flexibility for students who want to develop their own unique plan of study. The concentration is designed for students who may not have one specific area of interest, but who are looking to be well-rounded in the biological sciences. Students pursuing careers in education, where a wider breadth of knowledge in biology is desirable, may choose to select this concentration.

General Biology Concentration Electives 24.0

2 or 3 Cell/Molecular/Genetics/Biochemistry (CMGB) electives (see list below)

2 or 3 Organismal/Physiology electives (see list below)

2 or 3 Ecology/Evolution/Genomics electives (see list below)

Concentration Laboratory Courses

Two Laboratory electives (see list below) 4.0

Total Credits 28.0

Cell/Molecular/Genetics/Biochemistry (CMGB) electives

BIO 231	Cell Physiology	3.0
BIO 244	Genetics I	3.0
BIO 285	Forensic Biology	3.0
BIO 311	Biochemistry	4.0
BIO 314	Pharmacology	3.0
BIO 318	Biology of Cancer	3.0
BIO 331	Bioinformatics I	3.0
BIO 332	Bioinformatics II	3.0
BIO 346	Stem Cell Research	3.0
BIO 404	Structure and Function of Biomolecules	4.0
BIO 413	Genomics	3.0
BIO 415	Proteins	3.0
BIO 421	Biomembranes	3.0
BIO 430	Cell Biology of Disease	3.0
BIO 433	Advanced Cell Biology	3.0

BIO 444	Human Genetics	3.0
BIO 445	Microbial Genetics	3.0
BIO 447	Advanced Genetics and Molecular Biology	3.0
BIO 449	Recombinant DNA Laboratory	5.0
BIO 451	Genetic Reg Development	3.0
BIO 462	Biology of Neuron Function	3.0
BIO 465	Neurobiology of Disease	3.0
ENVS 326	Molecular Ecology	3.0

Organismal/Physiology electives

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0
BIO 221	Microbiology	3.0
BIO 223	Parasitology	3.0
BIO 256	Vertebrate Morphology and Physiology	3.0
BIO 264	Ethnobotany	3.0
BIO 270	Development Biology	3.0
BIO 284	Biology of Stress	3.0
BIO 286	Forensic Toxicology	3.0
BIO 310	Comparative Physiology	3.0
BIO 320	Microbial Pathogenesis	3.0
BIO 322	Mycology	4.5
BIO 368	Embryology	4.0
BIO 370	Teratology	3.0
BIO 372	Histology	4.0
BIO 386	Gross Anatomy I	2.0
BIO 388	Gross Anatomy II	2.0
BIO 412	Biology of Aging	3.0
BIO 420	Virology	3.0
BIO 424	Microbial Physiology	3.0
BIO 426	Immunology	3.0
BIO 435	Immunobiology of Disease	3.0
BIO 461	Neurobiology of Autism Disorders	3.0
BIO 466	Endocrinology	4.0
BIO 468	Pathophysiology	4.0
ENVS 254	Invertebrate Morphology and Physiology	3.0
ENVS 392	Ichthyology and Herpetology	3.0
ENVS 393	Entomology	3.0

Ecology/Evolution/Genomics electives

BIO 228	Evolutionary Biology & Human Health	3.0
BIO 331	Bioinformatics I	3.0
BIO 332	Bioinformatics II	3.0
BIO 413	Genomics	3.0
ENVS 230	General Ecology	3.0
ENVS 247	Native Plants and Sustainability	3.0
ENVS 284	Physiological and Population Ecology	3.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 315	Plant Animal Interactions	3.0
ENVS 322	Tropical Ecology	3.0
ENVS 323	Tropical Field Studies	3.0
ENVS 324	Microbial Ecology	3.0

ENVS 328	Conservation Biology	3.0
ENVS 330	Aquatic Ecology	3.0
ENVS 336	Terrestrial Ecology	5.0
ENVS 343	Equatorial Guinea: Field Methods	3.0
ENVS 360	Evolutionary Developmental Biology	3.0
ENVS 364	Animal Behavior	3.0
ENVS 382	Field Botany of the New Jersey Pine Barrens	4.0
ENVS 383	Ecology of the New Jersey Pine Barrens	4.0
ENVS 388	Marine Field Methods	4.0
ENVS 390	Marine Ecology	3.0
ENVS 391	Diversity, Evolution and Ecology of Algae	3.0
ENVS 410	Physiological Ecology	3.0
ENVS 412	Biophysical Ecology	3.0
ENVS 413	Advanced Population Ecology	3.0
ENVS 414	Advanced Community Ecology	3.0
ENVS 438	Biodiversity	3.0
ENVS 470	Advanced Topics in Evolution	3.0

Laboratory electives

BIO 202	Human Physiology Laboratory	2.0
BIO 213	Drosophila Neural Research	3.0
BIO 215 [WI (p. 56)]	Techniques in Cell Biology	2.5
BIO 222	Microbiology Laboratory	2.0
BIO 229	Dictyostelium Research	3.0
BIO 232	Discovering Antibiotics	3.0
BIO 257	Vertebrate Morphology & Physiology Lab	2.0
BIO 271	Developmental Biology Laboratory	2.0
BIO 306	Biochemistry Laboratory	2.0
BIO 313	Comparative Physiology Laboratory	2.0
BIO 333	Bioinformatics Laboratory	2.0
BIO 387	Gross Anatomy I Laboratory	2.0
BIO 389	Gross Anatomy II Lab	2.0
BIO 406	Computational Biochemistry Laboratory	2.0
BIO 427	Immunology Laboratory	2.0
BIO 449	Recombinant DNA Laboratory	5.0
BIO 497	Research (by permission of the department)	0.5-12.0
ENVS 255	Invertebrate Morphology and Physiology Lab	2.0
ENVS 285 [WI (p. 56)]	Population Ecology Laboratory	2.0
ENVS 287	Community Ecology Laboratory	2.0
ENVS 327	Molecular Ecology Laboratory	2.0
ENVS 344	Equatorial Guinea: Field Research	6.0
ENVS 365	Animal Behavior Laboratory	2.0
ENVS 382	Field Botany of the New Jersey Pine Barrens	4.0
ENVS 383	Ecology of the New Jersey Pine Barrens	4.0
ENVS 388	Marine Field Methods	4.0
ENVS 394	Entomology Laboratory	2.0

Note about laboratory credits: BIO 449, ENVS 336, ENVS 382 and ENVS 388 have both a lecture and laboratory component.

Sample Plans of Study

Biological Sciences Major: Four-year Co-op

(Additional sample plans for other co-op options can be viewed below.)

Term 1		Credits
BIO 122	Cells and Genetics	4.5
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121 or 101	Calculus I Introduction to Analysis I	4.0
UNIV S101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		Credits
BIO 124	Evolution Organismal Diversity	4.5
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122 or 102	Calculus II Introduction to Analysis II	4.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		17.0
Term 3		Credits
BIO 126	Physiology and Ecology	4.5
CHEM 103	General Chemistry III	5.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 239 or 123	Mathematics for the Life Sciences Calculus III	4.0
COOP 101	Career Management and Professional Development	0.0
Term Credits		16.5
Term 4		Credits
BIO 207	Applications in Biology I	1.0
BIO 209	Cell, Molecular Developmental Biology I	4.0
BIO 219 [WI (p. 56)]	Techniques in Molecular Biology	3.0
CHEM 241	Organic Chemistry I	4.0
PHYS 152	Introductory Physics I	4.0
Term Credits		16.0
Term 5		Credits
BIO 208	Applications in Biology II	1.0
BIO 211	Cell, Molecular Developmental Biology II	4.0
	Biology Laboratory Requirement*	2.0
CHEM 242	Organic Chemistry II	4.0
PHYS 153	Introductory Physics II	4.0
UNIV S201	Looking Forward: Academics and Careers	1.0
Term Credits		16.0
Term 6		Credits
BIO 311 or CHEM 243	Biochemistry Organic Chemistry III	4.0
ENVS 212	Evolution	4.0
PHYS 154	Introductory Physics III	4.0

PHIL 251	Ethics	3.0
Term Credits		15.0
Term 7		Credits
	Sci, tech, health & human affairs elective	3.0
BIO 224	Form, Function Evolution of Vertebrates	4.0
BIO 225	Vertebrate Biology and Evolution Laboratory	2.0
	BIO/ENVS Elective	3.0
	Biology Laboratory Requirement	2.0
Term Credits		14.0
Term 8		Credits
	Free Elective	3.0
	BIO/ENVS Elective	3.0
COM 230	Techniques of Speaking	3.0
MATH 410	Scientific Data Analysis I	3.0
	Free Elective	3.0
Term Credits		15.0
Term 9		Credits
COM 310 [WI (p. 56)]	Technical Communication	3.0
MATH 411	Scientific Data Analysis II	3.0
	Humanities/Social Science Elective	3.0
	BIO/ENVS Elective	3.0
	Free Elective	3.0
Term Credits		15.0
Term 10		Credits
BIO 471	Seminar in Biological Sciences	2.0
	BIO/ENVS Electives	6.0
	Free Electives	6.0
Term Credits		14.0
Term 11		Credits
BIO 472	Seminar in Biological Sciences	2.0
	Free Elective	3.0
	Humanities/Social Science Elective	3.0
	BIO/ENVS Electives	6.0
Term Credits		14.0
Term 12		Credits
BIO 473 [WI (p. 56)]	Seminar in Biological Sciences	2.0
	Free Electives	6.0
	Humanities/Social Science Elective	3.0
	BIO/ENVS Elective	3.0
Term Credits		14.0

Total Credit: 182.5

* See degree requirements (p. 57).

Biological Sciences Major: Five-year Co-op

Term 1		Credits
BIO 122	Cells and Genetics	4.5
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

MATH 121 or 101	Calculus I Introduction to Analysis I	4.0	COM 230	Techniques of Speaking	3.0
UNIV S101	The Drexel Experience	1.0	MATH 410	Scientific Data Analysis I	3.0
Term Credits		16.0	BIO/ENVS Elective		3.0
Term 2			Free Elective		6.0
BIO 124	Evolution Organismal Diversity	4.5	Term Credits		15.0
CHEM 102	General Chemistry II	4.5	Term 9		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	COM 310 [WI	Technical Communication (p. 56)]	3.0
MATH 122 or 102	Calculus II Introduction to Analysis II	4.0	MATH 411	Scientific Data Analysis II	3.0
CIVC 101	Introduction to Civic Engagement	1.0	Biology Laboratory Requirement Course*		2.0
Term Credits		17.0	BIO/ENVS Elective		3.0
Term 3			Free Elective		3.0
BIO 126	Physiology and Ecology	4.5	Term Credits		14.0
CHEM 103	General Chemistry III	5.0	Term 10		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	BIO 471	Seminar in Biological Sciences	2.0
MATH 239 or 123	Mathematics for the Life Sciences Calculus III	4.0	BIO/ENVS Electives		6.0
COOP 101	Career Management and Professional Development	0.0	Free Electives		6.0
Term Credits		16.5	Term Credits		14.0
Term 4			Term 11		
BIO 207	Applications in Biology I	1.0	BIO 472	Seminar in Biological Sciences	2.0
BIO 209	Cell, Molecular Developmental Biology I	4.0	Free Elective		3.0
BIO 219 [WI (p. 56)]	Techniques in Molecular Biology	3.0	Humanities/Social Science Elective		3.0
CHEM 241	Organic Chemistry I	4.0	BIO/ENVS Electives		6.0
PHYS 152	Introductory Physics I	4.0	Term Credits		14.0
Term Credits		16.0	Term 12		
Term 5			BIO 473 [WI	Seminar in Biological Sciences (p. 56)]	2.0
BIO 208	Applications in Biology II	1.0	Free Electives		6.0
BIO 211	Cell, Molecular Developmental Biology II	4.0	Humanities/Social Science Elective		3.0
Biology Laboratory Requirement		2.0	BIO/ENVS Elective		3.0
CHEM 242	Organic Chemistry II	4.0	Term Credits		14.0
PHYS 153	Introductory Physics II	4.0	Term 1		
UNIV S201	Looking Forward: Academics and Careers	1.0	BIO 122	Cells and Genetics	4.5
Term Credits		16.0	CHEM 101	General Chemistry I	3.5
Term 6			ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
BIO 311	Biochemistry	4.0	MATH 121 or 101	Calculus I Introduction to Analysis I	4.0
or CHEM 243	Organic Chemistry III	4.0	UNIV S101	The Drexel Experience	1.0
ENVS 212	Evolution	4.0	Term Credits		16.0
PHYS 154	Introductory Physics III	4.0	Term 2		
PHIL 251	Ethics	3.0	BIO 124	Evolution Organismal Diversity	4.5
Term Credits		15.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
Term 7			CHEM 102	General Chemistry II	4.5
BIO 224	Form, Function Evolution of Vertebrates	4.0	MATH 122 or 102	Calculus II Introduction to Analysis II	4.0
BIO 225	Vertebrate Biology and Evolution Laboratory	2.0			
BIO/ENVS Elective		3.0			
Humanities/Social Science Elective		3.0			
Sci, tech, health & human affairs elective		3.0			
Term Credits		15.0			
Term 8					

* See degree requirements (p. 57).

Biological Sciences Major: Four-year Non-co-op

		Credits
Term 1		
BIO 122	Cells and Genetics	4.5
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121 or 101	Calculus I Introduction to Analysis I	4.0
UNIV S101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		
BIO 124	Evolution Organismal Diversity	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CHEM 102	General Chemistry II	4.5
MATH 122 or 102	Calculus II Introduction to Analysis II	4.0

CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		17.0
Term 3		
BIO 126	Physiology and Ecology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CHEM 103	General Chemistry III	5.0
MATH 239 or 123	Mathematics for the Life Sciences Calculus III	4.0
Term Credits		16.5
Term 4		
BIO 207	Applications in Biology I	1.0
BIO 209	Cell, Molecular Developmental Biology I	4.0
BIO 219 [WI (p. 56)]	Techniques in Molecular Biology	3.0
CHEM 241	Organic Chemistry I	4.0
PHYS 152	Introductory Physics I	4.0
Term Credits		16.0
Term 5		
BIO 208	Applications in Biology II	1.0
BIO 211	Cell, Molecular Developmental Biology II	4.0
Biology Laboratory Requirement		2.0
CHEM 242	Organic Chemistry II	4.0
PHYS 153	Introductory Physics II	4.0
UNIV S201	Looking Forward: Academics and Careers	1.0
Term Credits		16.0
Term 6		
BIO 224	Form, Function Evolution of Vertebrates	4.0
BIO 225	Vertebrate Biology and Evolution Laboratory	2.0
BIO 311 or CHEM 243	Biochemistry Organic Chemistry III	4.0
PHYS 154	Introductory Physics III	4.0
PHIL 251	Ethics	3.0
Term Credits		17.0
Term 7		
Humanities/Social Science Elective		3.0
MATH 410	Scientific Data Analysis I	3.0
ENVS 212	Evolution	4.0
BIO/ENVS Elective		3.0
Sci, tech, health & human affairs elective		3.0
Term Credits		16.0
Term 8		
Humanities/Social Science Elective		3.0
COM 310 [WI (p. 56)]	Technical Communication	3.0
MATH 411	Scientific Data Analysis II	3.0
BIO/ENVS Elective		3.0
Term Credits		12.0
Term 9		
BIO/ENVS Elective		3.0
Biology Laboratory Requirement Course*		2.0
COM 230	Techniques of Speaking	3.0
Humanities/Social Science Elective		3.0

Free Elective		3.0
Term Credits		14.0
Term 10		
BIO 471	Seminar in Biological Sciences	2.0
BIO/ENVS Electives		6.0
Free Electives		6.0
Term Credits		14.0
Term 11		
BIO 472	Seminar in Biological Sciences	2.0
Free Elective		6.0
BIO/ENVS Electives		6.0
Term Credits		14.0
Term 12		
BIO 473 [WI (p. 56)]	Seminar in Biological Sciences	2.0
Free Electives		9.0
BIO/ENVS Elective		3.0
Term Credits		14.0

Total Credit: 182.5

* See degree requirements (p. 57).

Co-op/Career Opportunities Opportunities

Students earn a bachelor's degree in the biological sciences and are prepared for technical careers in research or commercial laboratories or for professional schools.

Graduates typically work for pharmaceutical companies, medical research laboratories, biotechnology companies, or in government laboratories. Many graduates also choose to pursue an advanced degree in the field.

Co-op Opportunities

Past co-op employers of biosciences majors have included:

- GlaxoSmithKline
- AstraZeneca Pharmaceuticals
- Wistar Institute
- Moss Rehab
- ViroPharma, Inc.
- NovaFlora, Inc.
- Wyeth

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Dual/Accelerated Degree Combined Bachelors/Masters Degree

Qualified students can take graduate courses in their junior and senior years for undergraduate or graduate credit. They can also complete a combined BS /MS degree in five years. Further questions about the BS / MS degree program should be directed to the departmental graduate advisor:

Krista Featherstone
 Graduate Program Manager
 Department of Biology
 215.895.6374
 kaf344@drexel.edu (coless@drexel.edu)

Minor in Biological Sciences

The minor in biological sciences is designed for students who wish to become acquainted with the life sciences while pursuing a major in another area. This option should be particularly useful for students majoring in areas such as chemistry, engineering, physics, or psychology who are interested in admission to medical schools or graduate programs. Students interested in the minor should consult with an academic advisor in the department for help with course selections.

Required Courses *

BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
BIO 218	Principles of Molecular Biology	4.0
BIO 224	Form, Function & Evolution of Vertebrates	4.0
BIO ELECTIVE OR ENVS 212 **		3.0
Total Credits		24.5

* A grade of "C" or better must be earned for each course in this minor for the course to meet the requirement.

** The Biology Elective can be selected from any of the regularly offered Biology department lecture courses 200-level and above according to your specific interests. Note that existing course pre-requisites may affect which courses may be selected.

Facilities

The Department of Biology has well-equipped teaching laboratories with networked computers and advanced digital image analysis capability. Both teaching and research laboratories contain a range of modern equipment including microscopes, centrifuges, chromatographs, spectrophotometers, scintillation counters, culture chambers, and densitometers.

Visit the Research in Biology (<http://www.drexel.edu/coas/academics/departments-centers/biology/research>) web page for more information.

Biology Faculty

Michael Akins, PhD (*Yale University*). Assistant Professor. The neural mechanisms underlying how organisms interact with the environment; circuit formation, particularly of sensory circuits, and neural diseases including autism and Fragile X syndrome (FXS).

Shivanthi Anandan, PhD (*University of California, Los Angeles*). Associate Professor. Microbial genetics, in particular the analysis of light-regulated signal transduction pathways and the regulation of gene expression in photosynthesizing organisms.

Joseph Bentz, PhD (*State University of New York (SUNY) at Buffalo*). Professor. Biophysics, biochemistry and biopharmaceutics, focused on the molecular basis of biological membrane transport and fusion.

John Bethea, PhD (*University of Alabama at Birmingham*) Department Head. Professor. Neuroscience and immunology.

Laura Duwel, PhD (*University of Cincinnati*) Assistant Department Head, Department of Biology. Teaching Professor. Immunology and microbiology.

Felice Elefant, PhD (*Temple University*). Associate Professor. Understanding the roles of two classes of chromatin regulatory proteins termed histone acetyltransferases (HATs) and histone demethylases.

Denise Garcia, PhD (*UCLA*). Assistant Professor. Neuroscience, the role of astrocytes in the central nervous system.

Tali Gidalevitz, PhD (*University of Chicago*). Assistant Professor. Genetic and molecular pathways regulating protein folding homeostasis, and their role in protein conformation diseases, aging, and development.

Mary Katherine Gonder, PhD (*The City University of New York*) Director, Bioko Biodiversity Protection Program Co-Founder, Central African Biodiversity Alliance. Associate Professor. Deciphering spatial patterns of biodiversity across the Gulf of Guinea and Congo Basin region; Conservation measures to mitigate the effects of habitat loss and climate change in western equatorial Africa.

Susan Gurney, PhD (*Westfälische Wilhelms-Universität Münster (Germany)*). Assistant Teaching Professor. Evolutionary genetics (human and equids); stem cell biology; forensic science

Meshagae Hunte-Brown, PhD (*Drexel University*). Associate Teaching Professor. Stable isotopes in aquatic food webs, ecosystem ecology.

Jiu Jiang, MD, PhD (*Shanghai Second Medical University*). Research Associate Professor. T cell immune response to virus infection in aged mice.

Karen Kabnick, PhD (*Massachusetts Institute of Technology*). Assistant Teaching Professor. Principles and techniques in molecular biology.

Joy Little, PhD (*Wake Forest University*). Assistant Teaching Professor. Stem education, cancer cell biology.

Robert Loudon, PhD (*Thomas Jefferson University*). Associate Teaching Professor. Rho GTPases, regulation of actin cytoskeleton, Regulation of G protein-coupled receptors by receptor kinases and arrestins.

Daniel Marena, PhD (*Syracuse University*) Director of the Biology Graduate Program, Co-Director of the Cell Imaging Center. Associate Professor.

Eric Morschhauser, PhD (*University of Pennsylvania*). Assistant Teaching Professor. Systematics, paleobiology, and taphonomy of Mesozoic archosaurs, including the horned dinosaurs of North America and Western China; Biomechanics of terrestrial locomotion; Applications of high resolution CT scanning.

Donna Murasko, PhD (*Penn State Hershey Medical Center*) Dean, College of Arts and Sciences. Professor. The effects of aging on the adaptive immune response to influenza virus and retrovirus latency and reactivation.

Ryan Petrie, PhD (*McGill University*). Assistant Professor.

Nianli Sang, MB, PhD (*M.B., Fudan University Shanghai Medical College; Ph.D., Thomas Jefferson University*) Co-Director of the Cell Imaging Center. Associate Professor. Molecular and cellular biology

of cancer; posttranslational modification, folding and quality control of proteins and their implication in cell physiology and human diseases.

Aleister Saunders, PhD (*University of North Carolina, Chapel Hill*) *Interim Senior Vice Provost for Research, Director of the RNAi Resource Center*. Associate Professor. Identification and characterization of genes and proteins involved in Alzheimer's disease.

Elias T. Spiliotis, PhD (*The Johns Hopkins University*) *Director of the Cell Imaging Center*. Assistant Professor. Cell polarity and cell division: regulation of cytoskeleton-dependent motility.

Jennifer Stanford, PhD (*Harvard University*). Assistant Professor. Approaches to improve undergraduate and graduate student learning in cell and molecular biology, biochemistry and genetics.

Monica M. Togna, PhD (*New Jersey Institute of Technology*). Assistant Teaching Professor. Examination of the structure and function of living organisms from the cellular to the organismal level in order to better understand common physiological processes.

Interdepartmental Faculty

Beth L. Leonberg, MS, MA, RD (*Colorado State University, Rowan University*) *Director, Didactic Program in Dietetics*. Instructor. Pediatric nutrition.

Donna H. Mueller, PhD (*Temple University*) *Registered Dietitian, Nutrition and Foods*. Associate Professor. Clinical nutrition; pediatric nutrition; nutrition in pulmonary diseases, especially cystic fibrosis; nutrition in developmental delay; dental nutrition; dietetic education and professional development.

Jennifer Nasser, PhD (*Rutgers University*). Associate Professor. Dopamine-mediated mechanisms of food intake regulation in humans and its impact on metabolic homeostasis, especially as it applies to obesity, eating disorders and aging.

Michael O'Connor, MD, PhD (*MD, Johns Hopkins University; PhD, Colorado State*). Associate Professor. Biophysical and physiological ecology, thermoregulation of vertebrates, ecological modeling.

Sean O'Donnell, PhD (*University of Wisconsin-Madison*). Professor. Tropical ecology, focusing on geographic variation and elevation effects on ecology and behavior of army ants and ant-bird interactions; neurobiology, focusing on brain plasticity and brain evolution in social insects.

Jennifer Quinlan, PhD (*North Carolina State University*). Associate Professor. Food microbiology; microbiological quality and safety of produce, dairy and meat products in markets in high vs. low socioeconomics areas, *Bacillus* and *Clostridium* spores in food processing.

Jacob Russell, PhD (*University of Arizona*). Assistant Professor. The functional significance and evolutionary histories of symbioses between insects and bacteria.

Vicki Schwartz, MS (*Drexel University*) *Nutrition and Foods*. Assistant Clinical Professor. Advanced nutrition, clinical nutrition, nutrition support.

Emeritus Faculty

Cecilie Goodrich, PhD (*Harvard University*). Professor Emeritus. Neuroscience and systems physiology, postnatal maturation of physiology and behavior in relation to brain immunocytochemistry.

Wayne E. Magee, PhD (*University of Wisconsin*). Professor Emeritus. Biochemistry and microbiology, drug delivery using phospholipid vesicles, membrane-membrane interactions, hybridoma research for monoclonal antibody production, immunotherapy, biochemical virology.

Stanley Segall, PhD (*Massachusetts Institute of Technology*). Professor Emeritus. Flavor evaluation in foods, human organoleptic response, taste and odor, chemistry of sugars in foods, irradiation effects in foods, food science, food safety.

Minor in Bioscience and Society

Designed for non-majors, the minor in bioscience and society is accessible to all students with an interest in biology. The minor includes a list of topical courses from which students can choose freely depending upon interest.

Required Courses *

Select one of the following options:		3.0-4.0
BIO 100	Applied Cells, Genetics & Physiology	
or		
BIO 107 & BIO 108	Cells, Genetics & Physiology and Cells, Genetics and Physiology Laboratory	
Select one of the following options:		3.0-4.0
BIO 101	Applied Biological Diversity, Ecology & Evolution	
or		
BIO 109 & BIO 110	Biological Diversity, Ecology & Evolution and Biological Diversity, Ecology and Evolution Laboratory	
ENVS 212	Evolution	4.0
Select four of the following: **		14.0
BIO 112	Biotechnology for Society	
BIO 116	How Your Body Works-Or Not	
BIO 118	Basics of Cancer	
BIO 264	Ethnobotany	
BIO 284	Biology of Stress	
BIO 312	Genetically Modified Foods	
ENVS 260	Environmental Science and Society	

Total Credits **24.0-26.0**

* A grade of "C" or better must be earned for each course in this minor for the course to meet the requirement.

** Other courses may be substituted depending on yearly course offerings after consultation with an academic advisor in the Department of Biology.

Chemistry

Major: Chemistry

Degree Awarded: Bachelor of Arts (BA) or Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: BA -184.5; BS - 190.5

Classification of Instructional Programs (CIP) code: 40.0501
Standard Occupational Classification (SOC) code: 19-2031

About the Program

Drexel's Department of Chemistry offers both a BA and a BS degree in chemistry. The BA is offered as a 4-year non-co-op program for those interested in following their undergraduate education in chemistry with professional school, such as law or medicine. The BS degree, offered in three formats (a 5-year three co-op, 4-year one co-op and a 4-year non-co-op), is certified by the American Chemical Society. In addition, a minor in chemistry is available for students in other majors who desire a strong physical science background.

Each student plans a course of study and selects electives in consultation with an advisor in the Department of Chemistry (<http://www.drexel.edu/coas/academics/departments-centers/chemistry>). Students who show initiative and laboratory ability are encouraged to participate in undergraduate research by selecting a research problem in collaboration with one of the departmental faculty members. Students in the BS program are required to participate in undergraduate research through the Senior Research courses.

Most graduate courses in chemistry are open to qualified seniors. Prerequisites and descriptions of available graduate courses appear in the graduate catalog.

About the Accelerated Bachelor's/Master's Dual Degree Program in Chemistry

The Bachelor's/Master's (BS/MS) dual degree program is an accelerated program providing the academically qualified student with an opportunity to earn both a BS and an MS degree (two diplomas are awarded) in five years, the time normally required to finish the co-op option BS degree alone.

This is an academically demanding program, but there are several allowances built in to enable the program to be completed in the time allotted. For instance, only 180 rather than 190.5 undergraduate quarter credits are required. The co-op experience may be adjusted; the student may take two rather than three co-op cycles, enabling two additional quarters of on-campus study. If needed, the student may also take evening courses while on co-op.

Eligibility

Exceptional students with a cumulative grade point average of at least 3.0 and who are enrolled in the five-year co-op option program are eligible for the BS/MS program. Students formally apply to the program after they have completed 90 credits but before they have completed 120 credits. Students are strongly encouraged to begin planning for the program as early as their freshman year. Students who have more than 120 credits are not eligible.

Transfer students are eligible to join the BS/MS program, but they must be able to complete the program in the time it would take to complete the BS degree alone. International transfer students must be able to meet the required minimum TOEFL score for the department graduate program (currently 550) in order to be admitted to the BS/MS program.

Application Process

Interested applicants need to formally apply to the program. Applications are available in the Office of Graduate Admissions or in the College of Arts & Sciences advisor's office. Applications must be accompanied by

a Plan of Study prepared in consultation with the undergraduate and graduate advisor in the department and approved by both the Department Head and the Dean. Entry into the program must be officially approved by both the Department Head and Academic Dean.

BS/MS Requirements

Students enrolled in the BS/MS dual degree program must complete 180 undergraduate quarter credits for the BS degree and at least 45 graduate quarter credits for the MS degree. All graduate departmental requirements must be satisfied in full, including producing a thesis, if the thesis-option Master's program is elected. Master's thesis requirements may be completed in the summer term of the final year with prior approval of the department. Students in the BS/MS program must maintain a cumulative GPA of 3.0 in their undergraduate and graduate coursework to remain in the program. Further questions about the BS/MS degree program should be directed to the departmental graduate advisor.

Additional Information

For more information about the major in chemistry, contact:

Daniel King, PhD
Undergraduate Affairs Committee Chair
Department of Chemistry
Drexel University
dk68@drexel.edu

Degree Requirements (BA)

General Education Requirements *

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV S201	Looking Forward: Academics and Careers	1.0
Humanities and Arts electives		6.0
International Studies electives		6.0
Social and Behavioral Studies electives		6.0
Studies in Diversity electives		6.0
Language Requirements courses		8.0
CHEM 121	Majors Chemistry I	5.0
CHEM 122	Majors Chemistry II	5.0
CHEM 123	Majors Chemistry III	5.5
CHEM 230	Quantitative Analysis	4.0
CHEM 231 [WI (p. 68)]	Quantitative Analysis Laboratory	2.0
CHEM 246	Organic Chemistry for Majors I	6.5
CHEM 248	Organic Chemistry for Majors II	6.5
CHEM 249	Organic Chemistry for Majors III	7.0
CHEM 253	Thermodynamics and Kinetics	4.0
CHEM 270	Software Skills for Chemists	3.0
CHEM 357 [WI (p. 68)]	Physical Chemistry Laboratory I	2.5
CHEM 367	Chemical Information Retrieval	3.0
CHEM 421	Inorganic Chemistry I	3.0

Chemistry Electives		
Select two Chemistry Electives **		6.0
Biology Requirements		
BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
Mathematics Requirements		
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
Physics Requirements		
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
Free Electives		
Free electives		36.0
Total Credits		184.5

* Categories of Electives:

- *Humanities and Arts Electives*
Designated courses in art, art history, communication studies, foreign languages (300-level or above), history, literature, music, philosophy, religion, and theatre arts.
- *International Electives*
Designated courses in anthropology, art history, history, literature, music, politics and sociology. Courses with an international focus may be used to fulfill requirements in other categories as well.
- *Social and Behavioral Studies Electives*
Designated courses in anthropology, criminal justice, economics, international relations, history, politics, psychology and sociology.
- *Studies in Diversity Electives*
Africana studies, women's studies or designated cross-listed courses in anthropology, art, art history, history, literature, music, philosophy, politics and sociology.
- *Language Requirement*
Students may satisfy the language course requirements in two ways: (1) taking two terms of sequential study of a foreign language (or placement at the exit level of 103 or above); or (2) taking two terms of a computer language or placement out as determined by the Department of Computer Science.

** Courses with CHEM prefix, although ENVS chemistry courses can also fulfill this requirement.

Sample Plan of Study (BA)

Four-year Non-Co-op

Term 1		Credits
BIO 122	Cells and Genetics	4.5
CHEM 121	Majors Chemistry I	5.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV S101	The Drexel Experience	1.0
Term Credits		17.5
Term 2		
BIO 124	Evolution Organismal Diversity	4.5
CHEM 122	Majors Chemistry II	5.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
CIVC 101	Introduction to Civic Engagement	1.0

Term Credits **17.5**

Term 3

BIO 126	Physiology and Ecology	4.5
CHEM 123	Majors Chemistry III	5.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0

Term Credits **17.0**

Term 4

CHEM 230*	Quantitative Analysis	4.0
CHEM 231 [WI (p. 68)]*	Quantitative Analysis Laboratory	2.0
CHEM 246	Organic Chemistry for Majors I	6.5
Free elective		3.0

Term Credits **15.5**

Term 5

CHEM 248	Organic Chemistry for Majors II	6.5
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0

Term Credits **14.5**

Term 6

CHEM 249	Organic Chemistry for Majors III	7.0
PHYS 102	Fundamentals of Physics II	4.0
Humanities electives		6.0

Term Credits **17.0**

Term 7

CHEM 253	Thermodynamics and Kinetics	4.0
CHEM 367	Chemical Information Retrieval	3.0
CHEM 421	Inorganic Chemistry I	3.0
PHYS 201	Fundamentals of Physics III	4.0
UNIV S201	Looking Forward: Academics and Careers	1.0

Term Credits **15.0**

Term 8

CHEM 270	Software Skills for Chemists	3.0
CHEM 357 [WI (p. 68)]	Physical Chemistry Laboratory I	2.5

International Studies elective	3.0
Diversity Studies elective	3.0
Language course	4.0

Term Credits **15.5**

Term 9

Diversity Studies elective	3.0
Social and Behavioral Sciences elective	3.0
International Studies elective	3.0
Language course	4.0

Term Credits **13.0**

Term 10

Social and Behavioral Sciences elective	3.0
Free electives	12.0
Term Credits	15.0
Term 11	
Chemistry elective	3.0
Free elective	12.0
Term Credits	15.0
Term 12	
Free electives	12.0
Term Credits	12.0
Total Credit: 184.5	

* CHEM 230 and CHEM 231 must be taken concurrently.

Degree Requirements (BS)

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV S201	Looking Forward: Academics and Careers	1.0
Technical electives *		6.0
Liberal Studies electives *		6.0

Chemistry Requirements

CHEM 121	Majors Chemistry I	5.0
CHEM 122	Majors Chemistry II	5.0
CHEM 123	Majors Chemistry III	5.5
CHEM 230	Quantitative Analysis	4.0
CHEM 231 [WI (p. 68)]	Quantitative Analysis Laboratory	2.0
CHEM 246	Organic Chemistry for Majors I	6.5
CHEM 248	Organic Chemistry for Majors II	6.5
CHEM 249	Organic Chemistry for Majors III	7.0
CHEM 253	Thermodynamics and Kinetics	4.0
CHEM 270	Software Skills for Chemists	3.0
CHEM 346	Qualitative Organic Chemistry	5.5
CHEM 355	Physical Chemistry IV	3.0
CHEM 357 [WI (p. 68)]	Physical Chemistry Laboratory I	2.5
CHEM 358	Physical Chemistry Laboratory II	2.5
CHEM 359	Atomic and Molecular Spectroscopy	3.0
CHEM 367	Chemical Information Retrieval	3.0
CHEM 420	Molecular Symmetry and Group Theory Applied Chemistry	3.0
CHEM 421	Inorganic Chemistry I	3.0
CHEM 422	Inorganic Chemistry II	3.0
CHEM 425	Inorganic Chemistry Laboratory	4.0
CHEM 430	Analytical Chemistry I	3.0
CHEM 431 [WI (p. 68)]	Analytical Chemistry II	4.0

CHEM 493	Senior Research Project	9.0
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Biology Requirements

BIO 122	Cells and Genetics	4.5
BIO 214	Principles of Cell Biology	3.0

Biochemistry Requirements **

BIO 311	Biochemistry	4.0
or BIO 404	Structure and Function of Biomolecules	
BIO 306	Biochemistry Laboratory	2.0

Computer/Mathematics Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra	4.0
or MATH 210	Differential Equations	

Physics Requirements

PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0

Free Electives

Free electives	24.0
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Total Credits 190.5

Footnotes

* Technical electives are defined as 200+ level courses from Science, Mathematics, Business, Engineering or Information Studies. Liberal studies electives are defined as courses (at any level) from all other areas.

** The American Chemical Society requires ACS-certified students to take a specified number of biochemistry courses. To fulfill this requirement in the BS curriculum, you should take a combination of one lecture and one lab course from the choice of: BIO 311 (p. 68), BIO 306 (p. 68) or BIO 404 (p. 68) to fulfill the biochemistry requirement. Students may also choose to take the two lecture courses (BIO 404 (p. 68) and BIO 311 (p. 68)) rather than a lecture/laboratory combination.

Sample Plans of Study (BS)

Five-year Co-op

(See below this plan for Four-year Non-Co-op and One-Co-op options)

Term 1		Credits
BIO 122	Cells and Genetics	4.5
CHEM 121	Majors Chemistry I	5.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV S101	The Drexel Experience	1.0
Term Credits		17.5
Term 2		
CHEM 122	Majors Chemistry II	5.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0

MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
CIVC 101	Introduction to Civic Engagement	1.0

Term Credits 17.0

Term 3

CHEM 123	Majors Chemistry III	5.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
PHYS 102	Fundamentals of Physics II	4.0

Term Credits 16.5

Term 4

CHEM 230 [*]	Quantitative Analysis	4.0
CHEM 231 [WI (p. 68)] [*]	Quantitative Analysis Laboratory	2.0
CHEM 246	Organic Chemistry for Majors I	6.5
PHYS 201	Fundamentals of Physics III	4.0

Term Credits 16.5

Term 5

CHEM 248	Organic Chemistry for Majors II	6.5
MATH 200	Multivariate Calculus	4.0
Free elective		3.0

Term Credits 13.5

Term 6

BIO 214	Principles of Cell Biology	3.0
CHEM 249	Organic Chemistry for Majors III	7.0
CHEM 253	Thermodynamics and Kinetics	4.0
MATH 210 or 201	Differential Equations Linear Algebra	4.0

Term Credits 18.0

Term 7

CHEM 270	Software Skills for Chemists	3.0
CHEM 357 [WI (p. 68)]	Physical Chemistry Laboratory I	2.5
Technical elective ^{***}		3.0
Free electives		6.0

Term Credits 14.5

Term 8

CHEM 355	Physical Chemistry IV	3.0
CHEM 367	Chemical Information Retrieval	3.0
CHEM 421	Inorganic Chemistry I	3.0
CHEM 430	Analytical Chemistry I	3.0
UNIV S201	Looking Forward: Academics and Careers	1.0

Term Credits 13.0

Term 9

CHEM 359	Atomic and Molecular Spectroscopy	3.0
CHEM 420	Molecular Symmetry and Group Theory Applied Chemistry	3.0
CHEM 431 [WI (p. 68)]	Analytical Chemistry II	4.0

Technical elective ^{***}	3.0
Free elective	3.0

Term Credits 16.0

Term 10

BIO 311 or 404	Biochemistry Structure and Function of Biomolecules	4.0
CHEM 346	Qualitative Organic Chemistry	5.5
CHEM 493	Senior Research Project	3.0
CHEM 358	Physical Chemistry Laboratory II	2.5

Term Credits 15.0

Term 11

BIO 306	Biochemistry Laboratory	2.0
CHEM 493	Senior Research Project	3.0
Liberal Studies electives		6.0
Free electives		6.0

Term Credits 17.0

Term 12

CHEM 422	Inorganic Chemistry II	3.0
CHEM 425	Inorganic Chemistry Laboratory	4.0
CHEM 493	Senior Research Project	3.0
Free electives		6.0

Term Credits 16.0

Total Credit: 190.5

BS in Chemistry: Four-year Non-Co-op

Term 1	Credits
BIO 122	Cells and Genetics 4.5
CHEM 121	Majors Chemistry I 5.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research 3.0
MATH 121	Calculus I 4.0
UNIV S101	The Drexel Experience 1.0
Term Credits 17.5	

Term 2

CHEM 122	Majors Chemistry II 5.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0
MATH 122	Calculus II 4.0
PHYS 101	Fundamentals of Physics I 4.0
CIVC 101	Introduction to Civic Engagement 1.0
Term Credits 17.0	

Term 3

CHEM 123	Majors Chemistry III 5.5
ENGL 103	Composition and Rhetoric III: Themes and Genres 3.0
MATH 123	Calculus III 4.0
PHYS 102	Fundamentals of Physics II 4.0
Term Credits 16.5	

Term 4

CHEM 230 [*]	Quantitative Analysis 4.0
CHEM 231 [WI (p. 68)] [*]	Quantitative Analysis Laboratory 2.0

CHEM 246	Organic Chemistry for Majors I	6.5
PHYS 201	Fundamentals of Physics III	4.0

Term Credits	16.5
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Term 5

CHEM 248	Organic Chemistry for Majors II	6.5
MATH 200	Multivariate Calculus	4.0
Free elective		6.0

Term Credits	16.5
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Term 6

BIO 214	Principles of Cell Biology	3.0
CHEM 249	Organic Chemistry for Majors III	7.0
MATH 210 or 201	Differential Equations Linear Algebra	4.0
Technical elective ***		3.0

Term Credits	17.0
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Term 7

CHEM 253	Thermodynamics and Kinetics	4.0
CHEM 367	Chemical Information Retrieval	3.0
CHEM 421	Inorganic Chemistry I	3.0
CHEM 430	Analytical Chemistry I	3.0
UNIV S201	Looking Forward: Academics and Careers	1.0

Term Credits	14.0
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Term 8

CHEM 270	Software Skills for Chemists	3.0
CHEM 357 [WI (p. 68)]	Physical Chemistry Laboratory I	2.5
CHEM 420	Molecular Symmetry and Group Theory Applied Chemistry	3.0
CHEM 431 [WI (p. 68)]	Analytical Chemistry II	4.0
Free elective		3.0

Term Credits	15.5
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Term 9

Liberal Studies elective		3.0
Technical elective ***		3.0
Free electives		9.0

Term Credits	15.0
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Term 10

BIO 311 or 404	Biochemistry Structure and Function of Biomolecules	4.0
CHEM 346	Qualitative Organic Chemistry	5.5
CHEM 355	Physical Chemistry IV	3.0
CHEM 493	Senior Research Project	3.0

Term Credits	15.5
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Term 11

BIO 306	Biochemistry Laboratory	2.0
CHEM 359	Atomic and Molecular Spectroscopy	3.0
CHEM 493	Senior Research Project	3.0
Liberal Studies elective		3.0

Free elective		3.0
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Term Credits	14.0
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Term 12

CHEM 358	Physical Chemistry Laboratory II	2.5
CHEM 422	Inorganic Chemistry II	3.0
CHEM 425	Inorganic Chemistry Laboratory	4.0
CHEM 493	Senior Research Project	3.0
Free elective		3.0

Term Credits	15.5
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Total Credit: 190.5**BS in Chemistry: Four-year One Co-op****Term 1** **Credits**

BIO 122	Cells and Genetics	4.5
CHEM 121	Majors Chemistry I	5.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV S101	The Drexel Experience	1.0

Term Credits	17.5
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Term 2

CHEM 122	Majors Chemistry II	5.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
CIVC 101	Introduction to Civic Engagement	1.0

Term Credits	17.0
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Term 3

CHEM 123	Majors Chemistry III	5.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
PHYS 102	Fundamentals of Physics II	4.0

Term Credits	16.5
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Term 4

CHEM 230 [*]	Quantitative Analysis	4.0
CHEM 231 [WI (p. 68)] [*]	Quantitative Analysis Laboratory	2.0
CHEM 246	Organic Chemistry for Majors I	6.5
PHYS 201	Fundamentals of Physics III	4.0

Term Credits	16.5
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Term 5

CHEM 248	Organic Chemistry for Majors II	6.5
MATH 200	Multivariate Calculus	4.0
Electives		6.0

Term Credits	16.5
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Term 6

BIO 214	Principles of Cell Biology	3.0
CHEM 249	Organic Chemistry for Majors III	7.0
MATH 210 or 201	Differential Equations Linear Algebra	4.0

Technical Elective ^{***}		3.0
Term Credits		17.0
Term 7		
Free Electives		9.0
Liberal Studies Elective		3.0
Technical Elective ^{***}		3.0
Term Credits		15.0
Term 8		
CHEM 253	Thermodynamics and Kinetics	4.0
CHEM 367	Chemical Information Retrieval	3.0
CHEM 421	Inorganic Chemistry I	3.0
CHEM 430	Analytical Chemistry I	3.0
UNIV S201	Looking Forward: Academics and Careers	1.0
Term Credits		14.0
Term 9		
CHEM 270	Software Skills for Chemists	3.0
CHEM 357 [WI (p. 68)]	Physical Chemistry Laboratory I	2.5
CHEM 420	Molecular Symmetry and Group Theory Applied Chemistry	3.0
CHEM 431 [WI (p. 68)]	Analytical Chemistry II	4.0
Elective		3.0
Term Credits		15.5
Term 10		
BIO 311 or 404	Biochemistry Structure and Function of Biomolecules	4.0
CHEM 346	Qualitative Organic Chemistry	5.5
CHEM 355	Physical Chemistry IV	3.0
CHEM 493	Senior Research Project	3.0
Term Credits		15.5
Term 11		
BIO 306	Biochemistry Laboratory	2.0
CHEM 359	Atomic and Molecular Spectroscopy	3.0
CHEM 493	Senior Research Project	3.0
Free Elective		3.0
Liberal Studies Elective		3.0
Term Credits		14.0
Term 12		
CHEM 358	Physical Chemistry Laboratory II	2.5
CHEM 422	Inorganic Chemistry II	3.0
CHEM 425	Inorganic Chemistry Laboratory	4.0
CHEM 493	Senior Research Project	3.0
Free Elective		3.0
Term Credits		15.5
Total Credit: 190.5		

* CHEM 230 and CHEM 231 must be taken concurrently.

** *Biochemistry Requirement:* The American Chemical Society requires ACS-certified students to take a specified number of biochemistry courses. To fulfill this requirement in the BS curriculum, you should take a combination of one lecture and one lab course from the choice of: BIO 311 (p. 68), BIO 306 (p. 68) or BIO 404 (p. 68) to fulfill the biochemistry requirement. Students may also choose to take the two lecture courses (BIO 404 (p. 68) and BIO 311 (p. 68)) rather than a lecture/laboratory combination. Note that the courses BIO 122 and BIO 214 are required in order to provide adequate background in biology for taking these upper-level biochemistry courses.

*** Must be at a 200+ level. See Degree Requirements for more information on acceptable classes.

Co-op/Career Opportunities

Opportunities for chemistry majors include working in research and development in corporate and government laboratories in the chemical, pharmaceutical and agricultural (e.g., U.S. Department of Agriculture) sectors. There is a remarkably high concentration of chemical and pharmaceutical companies in the Philadelphia region. Other options include entering medical, dental, law, or other professional schools.

The major in chemistry is sufficiently flexible to allow students to prepare to teach at the secondary level. With proper selection of electives, students can meet teacher certification requirements.

Sample Co-op Opportunities

A five-year co-op degree is offered. When students complete their co-op jobs, they are asked to write an overview of their experiences. These brief quotes are taken from some recent student reports:

Assistant chemist, pharmaceuticals manufacturer: "My position involved the synthesis and characterization of target compounds in the endothelium project. Involved the development of synthetic routes to the prescribed target. This would include the investigation of reactions which were going to be used. . . .the position was very independent. . .great working environment. "

Co-op chemist, petroleum refiner: "Performed synthesis of ligands and metal complexes. Operated FT-IR spectrometer for sample analysis. Submitted samples for analysis by mass spectrometer and NMR. . . .The position allowed me to develop the skills necessary for independent research in organic synthesis. "

Assistant lab technician, pharmaceuticals manufacturer: "I was an assistant technician in a mass spectrometry lab. . . . I was responsible for the development of SDS-gel electrophoresis techniques for gels and gel membranes. . . . I developed the methods independently and my employer encouraged me to be an expert on the technique and explore any method I found that would benefit the lab. "

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Chemistry

The academic minor program in chemistry is designed to expose students to each of the major sub-disciplines of chemistry (analytical, inorganic, organic, and physical). In order to accomplish this students take a total

of at least 27.5 credits of chemistry past the freshman year (100 level courses).

As chemistry is an experimental science at least two laboratory courses must be included in the group of courses taken for the minor. Students should note that their academic major may require certain chemistry courses that can also be used to fulfill the requirements for a minor in chemistry.

Required Courses

CHEM 241	Organic Chemistry I	4.0
CHEM 230	Quantitative Analysis	4.0
CHEM 253	Thermodynamics and Kinetics *	4.0
CHEM 421	Inorganic Chemistry I	3.0
CHEM 244	Organic Chemistry Laboratory I	3.0
Chemistry Electives **		9.5
Total Credits		27.5

* May substitute CHEC 352 Physical Chemistry and Applications II (4 credits) or CHEC 353 Physical Chemistry and Applications III (4 credits) for the CHEM 253 Thermodynamics and Kinetics requirement.

** The 9.5 credits of chemistry electives must include at least one additional laboratory course. These electives are selected from any of the regularly offered chemistry department lecture or laboratory courses 200-level and above according to your specific interests. Note that existing course pre-requisites may affect which courses may be selected. The variable credit courses CHEM 493 Senior Research Project or CHEM 497 Research (Undergraduate) may also be used to fulfill either the lecture or laboratory requirements for the minor.

Additional Information

For more information about the minor in chemistry, contact:

Daniel King, PhD
Undergraduate Affairs Committee Chair
Department of Chemistry
Drexel University
dk68@drexel.edu

Facilities

There are nine undergraduate teaching laboratories in the department: three freshman Chemistry labs, three Organic Chemistry labs, a Physical Chemistry lab, an Analytical Instrumentation Laboratory and a combined Analytical/Inorganic Chemistry lab.

Mass Spectrometry Laboratory

The department maintains a professionally staffed mass spectrometry facility available to all members of the university community. Currently available instrumentation consists of a Waters Autospec M high resolution magnetic-sector mass spectrometer, a Bruker Autoflex III MALDI Time-of-Flight Mass Spectrometer, a Thermo LTQ-FT Fourier Transform Mass Spectrometer, a Sciex API-3000 triple-quadrupole mass spectrometer, and a Varian Saturn 2000 Gas Chromatograph/Ion-trap mass spectrometer system.

Nuclear Magnetic Resonance Laboratory

The professionally staffed Chemistry Department NMR facility is equipped with 300MHz and 500MHz Varian Unity INNOVA NMR systems; both

instruments have multi-nuclear capability. The probe on the 500MHz instrument is a cryogenically cooled triple resonance model (1H {13C/15N}) suitable for protein analysis. A Varian X-band 12" EPR spectrometer is also available.

Analytical Instrumentation Laboratory

The open-access departmental Analytical Instrumentation Laboratory includes two Perkin-Elmer (PE) Spectrum One Fourier-transform infrared absorption spectrometers each with a universal diamond ATR accessory, a PE Lambda-35 UV/visible spectrometer, a PE Lambda-950 UV/visible/NIR spectrometer with a 60-mm-diameter diffuse reflectance integrating sphere, a PE model 343 polarimeter, a PE LS55B luminescence spectrometer, a PE Clarus 500 capillary-column GC with dual FID detectors, a Clarus 500 capillary-column GC/MS system (with electron impact capability), a PE Series 200 Quaternary HPLC development system with UV/visible photodiode array detector, a PE Series 200 binary HPLC system interfaced to a Sciex 2000 triple-quadrupole mass spectrometer, a PE Series 2000 binary Gel Permeation Chromatography system with refractive index detector, and a Varian AA240FS flame atomic absorption spectrometer equipped with a GTA 120 Graphite Furnace Accessory.

Organic Instrumentation Laboratory

The Organic Instrumentation Laboratory (co-located with the organic synthesis teaching laboratories in the Papdakis Integrated Sciences Building) is equipped with two Perkin-Elmer (PE) Spectrum Two Fourier-transform infrared absorption spectrometers each with a universal diamond ATR accessory, a PE Clarus 500 capillary-column GC with one FID and one TCD detector, and an Anasazi EFT-90 FT-NMR system.

Other Departmental Facilities

The department has a VEECO INNOVA N3 Multimode Scanning Probe Microscope and also maintains a computational chemistry laboratory equipped with nine Dell Optiplex 790 computers running Hyperchem v 8.0. Research laboratories for each of the department faculty members are located in Disque and Stratton Halls. Instrumentation available in the research laboratories is described on individual faculty web pages. Full-time professional support includes an electronic instrument specialist (for NMR and MS- Chemistry Department), a glassblower (Chemistry Department), two electronics specialists (College of Arts & Sciences Electronics Shop), and four machinists (Drexel University Machine Shop).

Chemistry Faculty

Anthony W. Addison, PhD (*University of Kent at Canterbury, England*). Professor. Design and synthesis of novel biomimetic and oligonuclear chelates of copper, nickel, iron, ruthenium and vanadium; their interpretation by magnetochemical, electrochemical and spectroscopic methods, including electron spin resonance; CD and ESR spectroscopy and kinetics for elucidation of molecular architecture of derivatives (including NO) of oxygen-binding and electron-transfer heme- and non-heme iron metalloproteins of vertebrate and invertebrate origins; energy-transfer by Ru, Ir and lanthanide-containing molecules and assemblies.

Jason Cross, PhD. Assistant Teaching Professor.

Peter DeCarlo, PhD (*University of Colorado*). Assistant Professor. Outdoor air quality, particulate matter size and composition instrumentation and measurements, source apportionment of ambient particulate matter, climate impacts of particulate matter.

Aaron T. Fafarman, PhD (*Stanford University*). Assistant Professor. Colloidal nanocrystals; solution-processed solar cells; electrical and spectroscopic characterization of nanomaterials.

Fraser Fleming, PhD (*University of British Columbia (Canada)*)
Department Head, Chemistry. Professor. Nitriles, Isonitriles, Stereochemistry, Organometallics

Joe P. Foley, PhD (*University of Florida*) *Associate Department Head*. Professor. Separation science, especially the fundamentals and biomedical/pharmaceutical applications of the following voltage- or pressure-driven separation techniques: capillary electrophoresis (CE), electrokinetic chromatography, supercritical fluid chromatography, and high-performance and two-dimensional liquid chromatography (LC). Within these techniques, we explore novel separation modes (e.g., dual-opposite-injection CE and sequential elution LC), novel surfactant aggregate pseudophases, and chiral separations.

Lee Hoffman, PhD (*Flinders University, Adelaide, South Australia*). Assistant Teaching Professor. Interfacial studies on the self-assembly of natural organic materials, understanding the nature of each component, and development of a mechanism describing this process; Dendrimer/metal nanocomposite design and synthesis hosting metal nanoparticles, utilizing the multivalent dendritic polymer architecture for further exploitation with other molecules such as antibodies and other targeting species.

Monica Ilies, PhD (*Polytechnic University of Bucharest*). Assistant Teaching Professor.

Haifeng Frank Ji, PhD (*Chinese Academy of Sciences*). Professor. Micromechanical sensors for biological and environmental applications; nanomechanical drug screening technology; drug discovery; nanotechnology for energy applications.

Daniel B. King, PhD (*University of Miami*). Associate Professor. Assessment of active learning methods and technology in chemistry courses; incorporation of environmental data into chemistry classroom modules; development of hands-on activities and laboratory experiments.

Daniel A. Kleier, PhD (*University of Notre Dame*). Associate Teaching Professor.

Molly O'Connor, PhD (*Drexel University*). Assistant Teaching Professor. Synthesis and characterization of chiral and achiral metal complexes with novel multidentate ligands.

Kevin G. Owens, PhD (*Indiana University*). Associate Professor. Mass spectrometry research, including the development of sample preparation techniques for quantitative analysis and mass spectrometric imaging using matrix-assisted laser desorption/ionization (MALDI) time-of-flight mass spectrometry (TOFMS) techniques for both biological and synthetic polymer systems, the development of laser spectroscopic techniques for combustion analysis, and the development of correlation analysis and other chemometric techniques for automating the analysis of mass spectral information.

Lynn S. Penn, PhD (*Bryn Mawr College*). Professor. Surface modification for specific applications: chemically derivatize metal and ceramic solid surfaces; designing and executing sequential chemical processes, building complex and layered structures on surfaces, with specific focus on behavior of polymer brushes (investigating the fundamental transport-selective behavior of polymer brushes because of potential in drug

delivery, biomedical devices and as an explanation of some biological processes).

Susan A. Rutkowsky, PhD (*Drexel University*). Assistant Teaching Professor.

Louis Scerbo, PhD (*Oregon State University at Corvallis*). Associate Professor. Membrane structures and function.

Reinhard Schweitzer-Stenner, PhD (*Universität Bremen (Germany)*). Professor. Exploring conformational ensembles of unfolded or partially folded peptides and proteins; determining the parameters governing peptide self-aggregation; structure and function of heme proteins; investigating protein-membrane interactions; use of IR, VCD, Raman, NMR and absorption spectroscopy for structure analysis.

Karl Sohlberg, PhD (*University of Delaware*). Associate Professor. Computational and theoretical materials-related chemistry: (1) complex catalytic materials; (2) mechanical and electrical molecular devices.

Peter A. Wade, PhD (*Purdue University*). Associate Professor. Exploration of a newly discovered [3,3]-sigmatropic rearrangement in which O-allyl nitronic esters are thermally converted to α,β -unsaturated nitro compounds; development and exploitation of a carbon-based hemiacetal mimic; and exploration of cycloaddition reactions involving nitroethylene derivatives and novel nitrile oxides.

Anthony Wambsgans, PhD (*Rice University*). Associate Teaching Professor.

Jun Xi, PhD (*Cornell University*). Associate Teaching Professor. Biomacromolecular interactions both in solution and in confined environment; mechanisms of DNA replication and DNA repair; structure and function of molecular chaperones; drug target identification and new therapeutic development; single molecule enzymology; DNA directed organic synthesis.

Emeritus Faculty

Amar Nath, PhD (*Moscow State University, Moscow USSR*). Professor Emeritus.

Communication

Major: Communication

Degree Awarded: Bachelor of Science (BS) or Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 09.0401; 09.0900; 09.0908; 09.9999

Standard Occupational Classification (SOC) code: 11-2011; 11-2031; 27-3022; 27-3041; 27-3042; 27-3043

About the Program

The Communication department offers a major in communication, with concentrations in public relations, journalism, and technical and science communication.

The department is committed to helping students become broadly educated and professionally competent individuals. Students are exposed to a variety of media and are guided in the development of their interpretive and expressive skills.

All communication majors take a common core of courses that emphasize communication theory and methods. They then specialize in one of three concentrations. Students in the public relations concentration pursue careers in public relations, event planning, media relations, and corporate communication. Those who choose the technical and science communication concentration go on to work in technical writing, science writing, publishing, and software and hardware documentation. Journalism students pursue careers in journalism and news. Many communication graduates also go on to law school, to business school for an MBA, or to graduate school.

Students who elect the public relations concentration have the option of pursuing either a bachelor of arts degree or a bachelor of science degree. Students who elect the technical and science communication concentration must pursue the bachelor of science degree. Students in journalism must complete the requirements for the bachelor of arts degree.

Degree Requirements: Journalism (BA)

Journalism provides students with the skills and theoretical perspective they need to be a journalist in today's swiftly changing media environment. An extension of the program's core curriculum, the concentration hones the student's ability to write, edit, and produce audiovisual content while at the same time exposing the student to new and evolving aspects of the field.

General Requirements

COM 150	Mass Media and Society	3.0
COM 345	Intercultural Communication	3.0
or ANTH 312	Approaches to Intercultural Behavior	
COM 360	International Communication	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Two mathematics courses		6.0-8.0
Two science courses		6.0-8.0
Foreign language courses *		8.0-16.0
Three humanities and fine arts electives		9.0
Two social and behavioral sciences electives		6.0-8.0
One international studies elective		3.0
One studies in diversity elective		3.0

Communication Core Requirements

Theory Sequence

COM 101	Human Communication	3.0
COM 210	Theory and Models of Communication	3.0
COM 400	Seminar in Communication	3.0
SOC 260 [WI (p. 76)]	Classical Social Theory	3.0

Methods Sequence

COM 220	Qualitative Research Methods	3.0
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SOC 250	Research Methods I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0

Additional Core Requirements

COM 230	Techniques of Speaking	3.0
COM 240	New Technologies In Communication	3.0
COM 380	Special Topics in Communication Theory	3.0
COM 491	Senior Project in Communication I	3.0
COM 492	Senior Project in Communication II	3.0
PHIL 305	Communication Ethics	3.0

Journalism Concentration Requirements

COM 260 [WI (p. 76)]	Fundamentals of Journalism	3.0
COM 280	Public Relations Principles and Theory	3.0
COM 300 [WI (p. 76)]	On-line Journalism	3.0
COM 315	Investigative Journalism	3.0
COM 365	Journalists, the Courts, and the Law	3.0
COM 390 [WI (p. 76)]	Global Journalism	3.0
TVPR 220	TV News Writing	3.0
LING 101	Introduction to Linguistics	3.0
or LING 102	Language and Society	

Select one of the following: 3.0-4.0

PSCI 150	International Politics	
BLAW 340	International Business Law	
COM 362	International Negotiations	
SOC 340	Globalization	

Culture and Communication Electives

Communication electives (Any four courses with a COM rubric at the 200-level or higher.) 12.0

Additional Electives

Free Electives	39.0
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Total Credits 182.0-197.0

* At least one foreign language course must be at the 200-level.

Sample Plan of Study

Journalism (BA)

Term 1		Credits
COM 101	Human Communication	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSY 101	General Psychology I	3.0
UNIV H101	The Drexel Experience	1.0
Math elective		3.0-4.0
Foreign language course		4.0
Term Credits		17.0-18.0
Term 2		Credits
COM 150	Mass Media and Society	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101	Introduction to Civic Engagement	1.0
Foreign language course		4.0

Humanities and fine arts elective	3.0	Humanities/Fine arts elective	3.0
Math elective	3.0-4.0		
Term Credits	17.0-18.0	Term Credits	15.0-16.0
Term 3		Term 9	
COM 260 [WI Fundamentals of Journalism (p. 76)]	3.0	SOC 364 Computer-Assisted Data Analysis	3.0
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0	UNIV H201 Looking Forward: Academics and Careers	1.0
Foreign language course/free elective	3.0-4.0	Communication elective *	3.0
Social and behavioral science elective	3.0-4.0	Free electives	6.0
International studies elective	3.0	Term Credits	13.0
Term Credits	15.0-17.0	Term 10	
Term 4		COM 360 International Communication	3.0
COM 210 Theory and Models of Communication	3.0	COM 380 Special Topics in Communication Theory	3.0
COM 240 New Technologies In Communication	3.0	COM 390 [WI Global Journalism (p. 76)]	3.0
LING 102 Language and Society or 101 Introduction to Linguistics	3.0	Communication elective *	3.0
Foreign language course/Free elective	4.0	Free elective	3.0
Free elective	3.0	Term Credits	15.0
Term Credits	16.0	Term 11	
Term 5		COM 400 Seminar in Communication	3.0
COM 220 Qualitative Research Methods	3.0	COM 491 Senior Project in Communication I	3.0
COM 280 Public Relations Principles and Theory	3.0	PHIL 305 Communication Ethics	3.0
COM 300 [WI On-line Journalism (p. 76)]	3.0	Free electives	8.0-9.0
Free elective	3.0-4.0	Term Credits	17.0-18.0
Science elective *	3.0-4.0	Term 12	
Term Credits	15.0-17.0	COM 492 Senior Project in Communication II	3.0
Term 6		Free electives	9.0
COM 230 Techniques of Speaking	3.0	Term Credits	12.0
COM 345 Intercultural Communication or ANTH 312 Approaches to Intercultural Behavior	3.0	Total Credit: 182.0-190.0	
SOC 250 Research Methods I	3.0		
TVPR 220 TV News Writing	3.0		
Science elective *	3.0		
Term Credits	15.0		
Term 7			
COM 315 Investigative Journalism	3.0		
SOC 260 [WI Classical Social Theory (p. 76)]	3.0		
Social and behavioral sciences elective	3.0		
Communication elective *	3.0		
Humanities/Fine arts elective	3.0		
Term Credits	15.0		
Term 8			
COM 365 Journalists, the Courts, and the Law	3.0		
Select one of the following:	3.0-4.0		
BLAW 340 International Business Law			
SOC 340 Globalization			
COM 362 International Negotiations			
PSCI 150 International Politics			
Communication elective *	3.0		
Diversity studies elective	3.0		

* See degree requirements (p. 77).

Degree Requirements: Public Relations (BA)

The concentration in public relations covers a broad range of activities that help an organization and its public communicate with one another. The field includes public relations, media relations, event planning, publication design, employee and customer communication, and government relations.

Skills in this field include written, oral, and visual communication. A public relations specialist might be called on to write articles for an in-house newsletter, to research and write an annual report to shareholders, to publicize a special event, to write a speech for an executive, to plan a press conference, to develop a media plan for an organization, or to script a video for an employee orientation session.

General Requirements

COM 150	Mass Media and Society	3.0
COM 360	International Communication	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0

UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Two mathematics courses		6.0-8.0
Two science courses		6.0-8.0
Foreign language courses (at least one must be at the 200-level.)		6.0-16.0
Three humanities/ fine arts courses		9.0
Two social/behavioral science courses		6.0-8.0
One international studies elective		3.0
Two studies in diversity electives		6.0
Communication Core Requirements		
Theory Sequence		
COM 101	Human Communication	3.0
COM 210	Theory and Models of Communication	3.0
COM 400	Seminar in Communication	3.0
SOC 260 [WI (p. 76)]	Classical Social Theory	3.0
Methods Sequence		
COM 220	Qualitative Research Methods	3.0
SOC 250	Research Methods I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0
Additional Core Requirements		
COM 230	Techniques of Speaking	3.0
COM 240	New Technologies In Communication	3.0
COM 380	Special Topics in Communication Theory	3.0
COM 491	Senior Project in Communication I	3.0
COM 492	Senior Project in Communication II	3.0
PHIL 305	Communication Ethics	3.0
Public Relations Concentration Requirements		
COM 260 [WI (p. 76)]	Fundamentals of Journalism	3.0
COM 280	Public Relations Principles and Theory	3.0
COM 282 [WI (p. 76)]	Public Relations Writing	3.0
COM 284	Public Relations Research, Measurement and Evaluation	3.0
COM 286	Public Relations Strategies and Tactics	3.0
COM 386	Public Relations Campaign Planning	3.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 76)]	Organizational Behavior	4.0
LING 101 or LING 102	Introduction to Linguistics Language and Society	3.0
Select one of the following Visual Communication courses: *		3.0
COM 335	Electronic Publishing	
COM 340	Desktop Publishing	
Communication electives (Any four courses with a COM or LING rubric at the 200-level or higher)		12.0
Additional Electives		
Free electives		36.0
Total Credits		182.0

* Or other courses as appropriate in Communication (COM) or offered by the College of Media Arts and Design.

Sample Plan of Study: Public Relations (BA)

Term 1		Credits
COM 101	Human Communication	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSY 101	General Psychology I	3.0
UNIV H101	The Drexel Experience	1.0
Mathematics course		3.0-4.0
Foreign language course		4.0
Term Credits		17.0-18.0
Term 2		Credits
COM 150	Mass Media and Society	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101	Introduction to Civic Engagement	1.0
Humanities/Fine arts elective		3.0
Foreign language course *		4.0
Mathematics course		3.0-4.0
Term Credits		17.0-18.0
Term 3		Credits
COM 280	Public Relations Principles and Theory	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Free elective/language *		3.0-4.0
International studies elective		3.0
Social and behavioral science elective		3.0-4.0
Term Credits		15.0-17.0
Term 4		Credits
COM 210	Theory and Models of Communication	3.0
COM 230	Techniques of Speaking	3.0
Science elective		3.0-4.0
Free elective/language		6.0-8.0
Term Credits		15.0-18.0
Term 5		Credits
COM 220	Qualitative Research Methods	3.0
COM 282 [WI (p. 76)]	Public Relations Writing	3.0
COM 260 [WI (p. 76)]	Fundamentals of Journalism	3.0
Science elective		3.0-4.0
Free elective/language		3.0-4.0
Term Credits		15.0-17.0
Term 6		Credits
COM 240	New Technologies In Communication	3.0
COM 284	Public Relations Research, Measurement and Evaluation	3.0
SOC 260 [WI (p. 76)]	Classical Social Theory	3.0
Diversity studies elective		3.0

Social and behavioral sciences elective	3.0
Term Credits	15.0
Term 7	
COM 286 Public Relations Strategies and Tactics	3.0
SOC 250 Research Methods I	3.0
Communication elective *	3.0
Diversity studies elective	3.0
Free elective	3.0
Term Credits	15.0
Term 8	
ORGB Organizational Behavior	4.0
300 [WI (p. 76)]	
PHIL 305 Communication Ethics	3.0
SOC 364 Computer-Assisted Data Analysis	3.0
LING 102 Language and Society	3.0
or 101 Introduction to Linguistics	
Communication elective *	3.0
Term Credits	16.0
Term 9	
COM 380 Special Topics in Communication Theory	3.0
COM 386 Public Relations Campaign Planning	3.0
MKTG 301 Introduction to Marketing Management	4.0
Visual communication elective *	3.0
Humanities/Fine arts elective	3.0
UNIV H201 Looking Forward: Academics and Careers	1.0
Term Credits	17.0
Term 10	
COM 400 Seminar in Communication	3.0
COM 360 International Communication	3.0
Communication elective *	3.0
Humanities/Fine arts elective	3.0
Free elective	3.0
Term Credits	15.0
Term 11	
COM 491 Senior Project in Communication I	3.0
Communication elective *	3.0
Free electives	7.0
Term Credits	13.0
Term 12	
COM 492 Senior Project in Communication II	3.0
Free electives	9.0
Term Credits	12.0
Total Credit: 182.0-191.0	

* See degree requirements (p.).

Degree Requirements: Public Relations (BS)

The concentration public relations covers a broad range of activities that help an organization and its publics communicate with one another. The field includes public relations, media relations, event planning, publication

design, employee and customer communication, and government relations.

Skills in this field include written, oral, and visual communication. A public relations specialist might be called on to write articles for an in-house newsletter, to research and write an annual report to shareholders, to publicize a special event, to write a speech for an executive, to plan a press conference, to develop a media plan for an organization, or to script a video for an employee orientation session.

General Requirements

COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Political Science (PSCI) elective		4.0
Economics elective		4.0
History elective		3.0
Two social and behavioral science electives		6.0-8.0
English (ENGL) elective (200-level or above)		3.0
Fine arts elective		3.0
Philosophy elective		3.0
Select one of the following Science Sequences:		8.0

Biology Sequence

BIO 107	Cells, Genetics & Physiology
BIO 108	Cells, Genetics and Physiology Laboratory
BIO 109	Biological Diversity, Ecology & Evolution
BIO 110	Biological Diversity, Ecology and Evolution Laboratory

Chemistry Sequence

CHEM 111	General Chemistry I
CHEM 112	General Chemistry II

Physics Sequence

PHYS 103	General Physics I
PHYS 104	General Physics II

Select one of the following Mathematics Sequences 8.0

Analysis Sequence

MATH 101	Introduction to Analysis I
MATH 102	Introduction to Analysis II

Calculus Sequence

MATH 121	Calculus I
MATH 122	Calculus II

Communication Core Requirements

Theory Sequence

COM 101	Human Communication	3.0
COM 210	Theory and Models of Communication	3.0
COM 400	Seminar in Communication	3.0
SOC 260 [WI (p. 76)]	Classical Social Theory	3.0

Methods Sequence		
COM 220	Qualitative Research Methods	3.0
SOC 250	Research Methods I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0
Additional Core Requirements		
COM 230	Techniques of Speaking	3.0
COM 240	New Technologies In Communication	3.0
COM 380	Special Topics in Communication Theory	3.0
COM 491	Senior Project in Communication I	3.0
COM 492	Senior Project in Communication II	3.0
PHIL 305	Communication Ethics	3.0
Public Relations Concentration Requirements		
COM 260 [WI (p. 76)]	Fundamentals of Journalism	3.0
COM 280	Public Relations Principles and Theory	3.0
COM 282 [WI (p. 76)]	Public Relations Writing	3.0
COM 284	Public Relations Research, Measurement and Evaluation	3.0
COM 286	Public Relations Strategies and Tactics	3.0
COM 386	Public Relations Campaign Planning	3.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 76)]	Organizational Behavior	4.0
LING 101 or LING 102	Introduction to Linguistics Language and Society	3.0
Visual Communication Courses *		
Select one of the following:		3.0
COM 335	Electronic Publishing	
COM 340	Desktop Publishing	
Culture and Communication Electives		
Communication Electives (Any four courses with a COM or LING rubric at the 200-level or higher)		12.0
Additional Electives		
Free Electives		38.0
Total Credits		181.0-183.0

* Or other courses as appropriate in COM or the College of Media Arts and Design.

Sample Plan of Study: Public Relations (BS)

		Credits
Term 1		
COM 101	Human Communication	3.0
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121 or 101	Calculus I Introduction to Analysis I	4.0
PSY 101	General Psychology I	3.0
UNIV H101	The Drexel Experience	1.0
Term Credits		17.0
Term 2		

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122 or 102	Calculus II Introduction to Analysis II	4.0
CIVC 101	Introduction to Civic Engagement	1.0
Fine arts elective		3.0
History elective		3.0
Term Credits		14.0
Term 3		
COM 280	Public Relations Principles and Theory	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Political Science (PSCI) elective		4.0
Free elective		3.0
Social and behavioral science elective		3.0-4.0
Term Credits		16.0-17.0
Term 4		
COM 210	Theory and Models of Communication	3.0
COM 230	Techniques of Speaking	3.0
Science sequence course 1 *		4.0
English (ENGL) course (200-level or above)		3.0
Free elective		3.0
Term Credits		16.0
Term 5		
COM 220	Qualitative Research Methods	3.0
COM 260 [WI (p. 76)]	Fundamentals of Journalism	3.0
COM 282 [WI (p. 76)]	Public Relations Writing	3.0
Science sequence course 2 *		4.0
Free elective		3.0
Term Credits		16.0
Term 6		
COM 284	Public Relations Research, Measurement and Evaluation	3.0
SOC 260 [WI (p. 76)]	Classical Social Theory	3.0
Communication elective *		3.0
Economics (ECON) elective		4.0
Philosophy (PHIL) elective		3.0
Term Credits		16.0
Term 7		
COM 240	New Technologies In Communication	3.0
SOC 250	Research Methods I	3.0
COM 286	Public Relations Strategies and Tactics	3.0
Visual Communication elective		3.0
Free elective		3.0
Term Credits		15.0
Term 8		
ORGB 300 [WI (p. 76)]	Organizational Behavior	4.0
PHIL 305	Communication Ethics	3.0

SOC 364	Computer-Assisted Data Analysis	3.0
LING 102 or 101	Language and Society Introduction to Linguistics	3.0
Social and behavioral science elective		3.0-4.0
Term Credits		16.0-17.0
Term 9		
COM 380	Special Topics in Communication Theory	3.0
COM 386	Public Relations Campaign Planning	3.0
MKTG 301	Introduction to Marketing Management	4.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Communication elective*		3.0
Free elective		3.0
Term Credits		17.0
Term 10		
COM 400	Seminar in Communication	3.0
Communication elective		3.0
Free electives		8.0
Term Credits		14.0
Term 11		
COM 491	Senior Project in Communication I	3.0
Communication elective*		3.0
Free electives		6.0
Term Credits		12.0
Term 12		
COM 492	Senior Project in Communication II	3.0
Free electives		9.0
Term Credits		12.0
Total Credit: 181.0-183.0		

* See degree requirements (p.).

Degree Requirements: Technical & Science Communication (BS)

Students within this track learn to communicate scientific and technical information to various audiences. The program combines courses that develop communication skills with courses that enhance understanding of science and technology.

Students who study technical and science communication find work in a wide range of areas, including technical writing for software or hardware products, proposal and grant writing, and research or writing in the fields of health, pharmaceuticals, medicine or science.

General Requirements

COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
UNIV H101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0

Political Science (PSCI) elective		4.0
Economics elective		4.0
History elective		3.0
Two social and behavioral science electives		6.0
English (ENGL) elective (200-level or above)		3.0
Fine arts elective		3.0
Philosophy elective		3.0
One of the following Science sequences:		8.0
Biology Sequence		
BIO 107	Cells, Genetics & Physiology	
BIO 108	Cells, Genetics and Physiology Laboratory	
BIO 109	Biological Diversity, Ecology & Evolution	
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	
Chemistry Sequence		
CHEM 111	General Chemistry I	
CHEM 112	General Chemistry II	
Physics Sequence		
PHYS 103	General Physics I	
PHYS 104	General Physics II	
One of the following Math sequences:		8.0
Analysis Sequence		
MATH 101	Introduction to Analysis I	
MATH 102	Introduction to Analysis II	
Calculus Sequence		
MATH 121	Calculus I	
MATH 122	Calculus II	
Communication Core Requirements		
Theory Sequence		
COM 101	Human Communication	3.0
COM 210	Theory and Models of Communication	3.0
COM 400	Seminar in Communication	3.0
SOC 260 [WI (p. 76)]	Classical Social Theory	3.0
Methods Sequence		
COM 220	Qualitative Research Methods	3.0
SOC 250	Research Methods I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0
Additional Core Requirements		
COM 230	Techniques of Speaking	3.0
COM 240	New Technologies In Communication	3.0
COM 380	Special Topics in Communication Theory	3.0
COM 491	Senior Project in Communication I	3.0
COM 492	Senior Project in Communication II	3.0
PHIL 305	Communication Ethics	3.0
Technical and Science Concentration Requirements		
COM 280	Public Relations Principles and Theory	3.0
COM 310 [WI (p. 76)]	Technical Communication	3.0
COM 320 [WI (p. 76)]	Science Writing	3.0
COM 335	Electronic Publishing	3.0
COM 340	Desktop Publishing	3.0

COM 350 [WI (p. 76)]	Message Design and Evaluation	3.0
COM 420	Technical Editing	3.0
Select one of the following:		3.0
LING 101	Introduction to Linguistics	
LING 102	Language and Society	
Select one of the following:		3.0
HIST 280	History of Science: Ancient to Medieval	
HIST 281	History of Science: Enlightenment to Modernity	
HIST 285	Technology in Historical Perspective	
Select one of the following:		3.0
ENGL 300 [WI (p. 76)]	Literature & Science	
ENGL 302	Environmental Literature	
PHIL 361	Philosophy of Science	
Select one of the following:		3.0
PSY 330	Cognitive Psychology	
PSY 337	Human-Computer Interaction	
Culture and Communication electives		
Communication Electives (Any four courses with a COM rubric at the 200-level or higher)		12.0
Free electives		37.0
Additional Electives		
Total Credits		181.0

Sample Plan of Study

Technical and Science Communication (BS)

Term 1		Credits
COM 101	Human Communication	3.0
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV H101	The Drexel Experience	1.0
MATH 121 or 101	Calculus I Introduction to Analysis I	4.0
PSY 101	General Psychology I	3.0
Term Credits		17.0
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122 or 102	Calculus II Introduction to Analysis II	4.0
CIVC 101	Introduction to Civic Engagement	1.0
History elective		3.0
Social and behavioral science elective		3.0
Term Credits		14.0
Term 3		
COM 280	Public Relations Principles and Theory	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Political Science (PSCI) elective		4.0
Social and behavioral science elective		3.0

Fine arts elective		3.0
Term Credits		16.0
Term 4		
COM 210	Theory and Models of Communication	3.0
COM 230	Techniques of Speaking	3.0
Select one of the following:		4.0
BIO 107	Cells, Genetics Physiology (must also register for BIO 108 Lab)	
PHYS 103	General Physics I	
CHEM 111	General Chemistry I	
Philosophy (PHIL) elective		3.0
Free elective		3.0
Term Credits		16.0
Term 5		
COM 220	Qualitative Research Methods	3.0
COM 240	New Technologies In Communication	3.0
SOC 260 [WI (p. 76)]	Classical Social Theory	3.0
Select one of the following:		3.0
ENGL 300 [WI (p. 76)]	Literature Science	
ENGL 302	Environmental Literature	
PHIL 361	Philosophy of Science	
Select one of the following:		4.0
BIO 109	Biological Diversity, Ecology Evolution (must also register for BIO 110 Lab)	
CHEM 112	General Chemistry II	
PHYS 104	General Physics II	
Term Credits		16.0
Term 6		
COM 310 [WI (p. 76)]	Technical Communication	3.0
COM 335	Electronic Publishing	3.0
Economics (ECON) elective		4.0
English (ENGL) elective		3.0
Free elective		3.0
Term Credits		16.0
Term 7		
COM 320 [WI (p. 76)]	Science Writing	3.0
COM 340	Desktop Publishing	3.0
Communication elective *		3.0
Free electives		6.0
Term Credits		15.0
Term 8		
COM 420	Technical Editing	3.0
UNIV H201	Looking Forward: Academics and Careers	1.0
SOC 250	Research Methods I	3.0
LING 101 or 102	Introduction to Linguistics Language and Society	3.0
Free elective		6.0
Term Credits		16.0

Term 9

COM 350 [WI Message Design and Evaluation (p. 76)]	3.0
SOC 364 Computer-Assisted Data Analysis	3.0
Select one of the following:	3.0
HIST 280 History of Science: Ancient to Medieval	
HIST 281 History of Science: Enlightenment to Modernity	
HIST 285 Technology in Historical Perspective	
Communication elective	3.0
Free elective	3.0

Term Credits **15.0**

Term 10

COM 380 Special Topics in Communication Theory	3.0
PSY 337 Human-Computer Interaction	3.0
or 330 Cognitive Psychology	
Communication elective *	3.0
Free electives	4.0

Term Credits **13.0**

Term 11

COM 400 Seminar in Communication	3.0
COM 491 Senior Project in Communication I	3.0
PHIL 305 Communication Ethics	3.0
Communication elective *	3.0
Free elective	3.0

Term Credits **15.0**

Term 12

COM 492 Senior Project in Communication II	3.0
Free electives	9.0

Term Credits **12.0**

Total Credit: 181.0

* See degree requirements (p. 82).

Co-op/Career Opportunities

Public Relations

Graduates with a concentration in public relations find employment in a wide variety of fields, including public relations, advertising, special events planning, writing and editing, and public information. In addition, the strong communication and management skills stressed by this concentration enable the graduates to find administrative positions in various business areas with an indirect relationship to public relations such as marketing, sales, human resources consulting, or publishing.

Although graduate study is not necessary for those who pursue careers in public relations, students have used the major as a basis for graduate work in a variety of areas, including communication, business, and law.

Co-op Experiences in Public Relations

Cooperative education opportunities are available with a variety of corporations and nonprofits in such positions as corporate communication specialist, public relations assistant, and newsletter writer. The following are samples of past co-op experiences:

- Advertising and Promotions Assistant, CoreStates Bicycle Championships, Philadelphia.

- Corporate Communications Co-op, Philadelphia Electric Company, Philadelphia.
- Advertising/ Promotions Co-op, U.S. Marketing Division, Mobil Oil Corp., Fairfax, VA.
- Assistant Coordinator, Communications Bureau, United Way of Southeastern Pennsylvania, Philadelphia.

Journalism

Journalism students pursue careers in journalism, creative writing, and news. Given the rapidly changing nature of these fields, graduates may also find work in new types of publishing platforms, such as social media or mobile, or involving audiovisual content creation. Journalism graduates may also choose to pursue graduate study, whether in journalism or another discipline.

Co-op Experiences in Journalism

Journalism students have held co-ops with a number of media, news, and information companies, including the following:

- *Production assistant*, WPVI-TV (Channel 6) Philadelphia
- *Staff writer*, Delaware County Daily Times
- *Promotions department*, WPLY-FM (Y-100)
- *Production assistant*, sports department, FOX-29 (WTFX-TV)

Technical and Science Communication

Students who study technical and science communication are prepared for a variety of career options. Many students become technical writers and editors who produce manuals and reports about high-technology products and services. Students may also go on to write specifications and in-house organs for business, industry, and government. Other students conduct and interpret surveys for business. In addition, this program is excellent preparation for graduate study in a number of fields, such as law and medicine.

Co-op Experiences in Technical and Science Communication

Communication students have worked for corporations and nonprofit organizations. The following are some samples of past co-op experiences:

- *Technical writer*, Unisys Corp. and Hewlett Packard
- *Web page writer*, Hospital of the University of Pennsylvania
- *Pharmaceutical writer*, GlaxoSmithKline
- *Medical writer*, Medcases Corp.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Communication

The minor in communication is a 24.0 credit curriculum designed to familiarize students with communication theory while providing training in print and digital communication. The minor can provide a strong complement for majors that emphasize presentations, interpersonal skills, publicity, and marketing. Students minoring in communication can focus on public relations, journalism, technical and science communication, environmental communication, or nonprofit communication.

Finally, students complete three additional electives from the area that fits their interest.

Please note: No more than three courses that are required for a student's major can count towards fulfilling requirements for the minor.

Core Courses

COM 210	Theory and Models of Communication	3.0
COM 380	Special Topics in Communication Theory	3.0
Select one of the following:		3.0
COM 101	Human Communication	
COM 111	Principles of Communication	

Focus Areas

Select one of the following areas of focus (2 courses):

Journalism

COM 260 [WI (p. 76)]	Fundamentals of Journalism	
Select one of the following:		
COM 300 [WI (p. 76)]	On-line Journalism	
COM 315	Investigative Journalism	
COM 390 [WI (p. 76)]	Global Journalism	

Corporate and Public Relations

COM 280	Public Relations Principles and Theory	
Select one of the following:		
COM 270 [WI (p. 76)]	Business Communication	
COM 282 [WI (p. 76)]	Public Relations Writing	
COM 284	Public Relations Research, Measurement and Evaluation	

Technical and Science Communication

COM 310 [WI (p. 76)]	Technical Communication	
Select one of the following:		
COM 320 [WI (p. 76)]	Science Writing	
COM 375 [WI (p. 76)]	Grant Writing	

Environmental Communication

COM 317 [WI (p. 76)]	Environmental Communication	
Select one of the following:		
COM 316	Campaigns for Health & Environment	
COM 318	Film, Celebrity and the Environmental Movement	

Three Additional Courses

Three Communication (COM) or Linguistics (LING) Electives	9.0
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Total Credits **24.0**

Communication Faculty

Ronald Bishop, III, PhD (*Temple University*). Professor. Investigative reporting, sports journalism, journalism history, journalism sourcing patterns, textual narrative and ideological analysis, cultural history of fame.

Joan W. Blumberg, BA (*Pennsylvania State University*). Instructor. Publishing, electronic publishing, publishing and communications, publishing and mass-media.

Karen Cristiano, PhD (*Temple University*) *Assistant Department Head of Communication*. Associate Teaching Professor. Journalism, medical writing, feature writing, copy editing, mass media and society.

Paul Evangelista, PhD (*Temple University*). Assistant Teaching Professor. Public relations, communication theory, new technologies in communication (classroom and online); business communication; electronic publishing; social media.

Richard Forney Instructor. Broadcast journalism technology and the effects of new technologies on personal and corporate communication skills.

Alexander Friedlander, PhD (*Carnegie Mellon University*) *Associate Dean for Undergraduate Education, College of Arts and Sciences*. Associate Professor. Rhetorical theory and practice, document design, writing and technology.

Julia Hagemann-May, PhD (*Drexel University*). Assistant Teaching Professor. Political communication; international politics and its news coverage; public opinion; transatlantic relations; war, torture and human rights; debate in the public sphere.

Ernest A. Hakanen, PhD (*Temple University*). Professor. Telecommunications policy, adolescent media use, communication theory and history, global media, and semiotics.

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Frank Kelley, PhD (*Temple University*). Associate Teaching Professor. Corporate university systems online, power structure of media enterprises, public relations, event planning.

Jordan McClain, PhD (*Temple University*). Assistant Teaching Professor. Media framing and music journalism; relationship between television and music; American popular culture; celebrity, consumerism, and consumer behavior; branding, brand positioning, and advertising criticism.

Alexander Nikolaev, PhD (*Florida State University*). Associate Professor. Public relations, political communication, organizational communication, mass communication, international communications and negotiations, communications theory.

Devon Powers, PhD (*New York University*) *Director, Communication Undergraduate Programs*. Associate Professor. Popular music, cultural intermediaries, promotional culture, 20th-century history, journalism studies.

David Ridgway, MS (*St. Joseph's University*). Instructor. Deviant behaviors, social problems.

Rosemary Rys, MA. Instructor. Public relations and marketing.

Lawrence Souder, PhD (*Temple University*). Associate Teaching Professor. Science and technical writing, communication ethics, nonprofit communication.

Allan Stegeman, MA (*University of Houston*). Teaching Professor. Communication, technology and mass media, video.

Susan Stein, PhD (*University of Wisconsin*) Director, *Professional MS Programs*. Associate Teaching Professor. Science, environmental, and health communication

Asta Zelenkauskaitė, PhD (*Indiana University*). Assistant Professor. Social media; user-generated content; computer-mediated communication; interactivity; active audience analysis; mobile communication; gender and online identity; prosumer culture; internet of things; quantitative/qualitative research.

Interdepartmental Faculty

Michelle Sahl, PhD, MEd, MBA, MBE (*The University of the Sciences in Philadelphia*). Assistant Teaching Professor. Health management and policy: management and leadership of health services organizations, urban health, and the history of health care systems.

Minor in Computer Crime

Computers have created new opportunities for crime and have affected the requisite capacity to commit criminal acts. The minor in computer crime provides students with an overview of the behavioral, legal, technical, and administrative issues faced by the criminal justice system and security communities in addressing crime involving computers and related networking technologies. The curriculum exposes students to state-of-the-art solutions used within the public and private sectors to respond to and prevent computer crime

Required Courses

CJS 101	Introduction to Criminal Justice	3.0
CJS 200	Criminology	3.0
CJ 276	Introduction to Computer Crime	3.0
CJS 274	Sex, Violence, & Crime on the Internet	3.0
CJS 365	Computer Investigations and the Law	3.0
CJS 377	Intellectual Property Theft in the Digital Age	3.0

Additional Elective Courses

Select two of the following: 6.0

CJS 265	Criminal Investigation	
CJS 266	Crime Prevention Planning	
CJS 267	Introduction to Security Studies	
CJS 273	Surveillance, Technology, and the Law	
CJS 362	Gender, Crime, and Justice	
CJS 375	Criminal Procedure	
CJS T380	Special Topics in Criminology and Justice Studies	

Total Credits **24.0**

Criminal Justice

Major: Criminal Justice

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 45.0401

Standard Occupational Classification (SOC) code: 11-9199

About the Program

Note: Effective Fall 2014, students are no longer being accepted into this program. Please see Criminology and Justice Studies (p. 89).

Students majoring in criminal justice learn about the most recent scientific developments and the latest technologies relevant to criminal justice. Internships and co-ops provide opportunities for students to synthesize academic learning with direct experience in the criminal justice system.

Issues of crime and justice affect every individual at some point in their lives if only as tax-paying citizens and voters. Criminal justice legislation, policy and decision-making and matters of community safety and well-being require well-educated professionals to administer, legislate, communicate, and implement the work of the criminal justice system. Students in Drexel's criminal justice major will be well prepared to assume these roles and responsibilities.

About the Curriculum

On completion of the bachelor's degree, the required courses provide the essential foundation for mid-level employment in the field of criminal justice or for further study in various areas of criminal justice and the law. Students will acquire theoretical and methodological skills as well as courses in written and oral communication so necessary for professional careers in this field. The students majoring in criminal justice will also have a robust foundation in statistics, and computer applications. Additional required courses focus on the areas of forensic sciences, law and political and social sciences.

Program Goals

The goals for the criminal justice program include the following:

- To provide excellent, cutting edge preparation for students planning to enter graduate study of criminal justice, law and law-related programs.
- To prepare students for upper level employment in the criminal justice system at local, state and federal levels.
- To communicate an understanding of crime, criminal behavior and the criminal justice system essential for aware citizens, as voters, taxpayers, planners and decision-makers.

Additional Information

For more information specific to the field of criminal justice, contact:

Robert Kane, PhD

Department Head

Department of Criminology and Justice Studies

robert.j.kane@drexel.edu

For additional information about the BS in Criminal Justice, please visit the Department of Criminology and Justice Studies (<http://www.drexel.edu/coas/academics/departments-centers/criminology-justice-studies>) web page.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on opportunities.

Degree Requirements

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 150	Mass Media and Society	3.0

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	COM 375 [WI (p. 86)]	Grant Writing	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	Theory Sequence		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	SOC 260 [WI (p. 86)]	Classical Social Theory	3.0
PHIL 101	Introduction to Western Philosophy	3.0	SOC 460 [WI (p. 86)]	Contemporary Social Theory	3.0
PSCI 100	Introduction to Political Science	4.0	PSCI 329	Theories of Justice	3.0
PSY 101	General Psychology I	3.0	Methods Sequence		
SOC 101	Introduction to Sociology	3.0	COM 220	Qualitative Research Methods	3.0
UNIV H101	The Drexel Experience	2.0	SOC 250	Research Methods I	3.0
Fine Arts Elective		3.0	SOC 364	Computer-Assisted Data Analysis	3.0
History Elective		3.0	Criminal Justice Specialization Courses		
English Elective (any ENGL course over 200-level)		3.0	Select eight of the following: 24.0-25.0		
Math Sequences		8.0	Forensics		
Select one of the following:			CJ 265	Criminal Investigation	
Analysis Sequence			CJ 369	Forensic Science Survey Course	
MATH 101	Introduction to Analysis I		CJ 378	Science of Forensic Science	
MATH 102	Introduction to Analysis II		CJ 379	Forensic DNA Analysis	
Calculus Sequence			PSY 370	Forensic Psychology	
MATH 121	Calculus I		Cybercrime		
MATH 122	Calculus II		CJ 273	Surveillance, Technology and the Law	
Science Sequence		8.0	CJ 274	Sex, Violence & Crime on the Internet	
Select one of the following:			CJ 377	Intellectual Property Theft in the Digital Age	
Biology Sequence			Crime and Procedures		
BIO 107	Cells, Genetics & Physiology		CJ 266	Crime Prevention Planning	
BIO 108	Cells, Genetics and Physiology Laboratory		CJ 267	Introduction to Security Studies	
BIO 109	Biological Diversity, Ecology & Evolution		CJ 275	Issues in Domestic Violence	
BIO 110	Biological Diversity, Ecology and Evolution Laboratory		CJ 280	Communities and Crime	
Chemistry Sequence			CJ 282	Community Policing	
CHEM 111	General Chemistry I		CJ 289	Terrorism	
CHEM 112	General Chemistry II		CJ 290	Crime and Public Policy	
Criminal Justice Core Requirements			CJ 372	Death Penalty - An American Dilemma	
Justice Sequence			CJ 373	Environmental Crimes	
BLAW 342	Criminal Law	4.0	BLAW 348	White Collar Crime	
CJ 204	Criminology	3.0	PSCI 220	Constitutional Law I	
CJ 206	Criminal Justice	3.0	PSCI 365	Politics, Law, & Justice	
CJ 276	Introduction to Computer Crime	3.0	Other Social Science Electives		
CJ 277	Introduction to Correctional Practices	3.0	Select four of the following: 12.0		
CJ 278	Introduction to Law Enforcement	3.0	SOC 115	Social Problems	
CJ 360	Juvenile Justice	3.0	SOC 120	Sociology of the Family	
CJ 374	Restorative Justice	3.0	SOC 220	Wealth and Power	
CJ 375	Criminal Procedure	3.0	SOC 240	Urban Sociology	
CJ 376	Sentencing: The History, Necessity and Morality of Punishment in America	3.0	SOC 320	Sociology of Deviant Behavior	
CJ 390	CO-OP Integration in Criminology and Justice Studies	0.0-6.0	CJ 380	Special Topics	
CJ 400 [WI (p. 86)]	Capstone in Criminology and Justice Policy	3.0	CJ 399	Independent Study	
PHIL 330	Ethical Issues in Criminal Justice	3.0	SOC 380	Special Topics in Sociology	
Writing/Communication Sequence			PSCI 363	Constitutional Law II	
COM 230	Techniques of Speaking	3.0	PSCI 366	Supreme Court and American Politics	
			Select one of the following: 3.0		
			ANTH 312	Approaches to Intercultural Behavior	
			COM 345	Intercultural Communication	
			SOC 210	Race, Ethnicity and Social Inequality	

Electives			
Free Electives	19.0-25.0		
Total Credits	182.0		

Note: Effective Fall 2014, students are no longer being accepted into this program. Please see Criminology and Justice Studies (p. 89).

Sample Plan of Study

		Credits				
Term 1						
CJ 206	Criminal Justice	3.0	MATH 122	Calculus II	4.0	
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	MATH 102	Introduction to Analysis II	3.0	
SOC 101	Introduction to Sociology	3.0		English (ENGL) Course 200-level or Above	3.0	
CHEM 111 or BIO 107	General Chemistry I Cells, Genetics Physiology	4.0		Other Social Science Elective*	3.0	
UNIV H101	The Drexel Experience	1.0				
	Term Credits	14.0		Term Credits	16.0	
Term 2						
COM 150	Mass Media and Society	3.0		Term 7		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0		CJ 375	Criminal Procedure	3.0
PHIL 101	Introduction to Western Philosophy	3.0		CJ 390	CO-OP Integration in Criminology and Justice Studies	3.0
SOC 115	Social Problems	3.0		COM 375 [WI (p. 86)]	Grant Writing	3.0
CHEM 112 or BIO 109	General Chemistry II Biological Diversity, Ecology Evolution	4.0		UNIV 101	The Drexel Experience	1.0
UNIV H101	The Drexel Experience	1.0			Fine Arts Elective	3.0
	Term Credits	17.0			Free Elective	3.0
Term 3					Term Credits	16.0
ANTH 101	Introduction to Cultural Diversity	3.0		Term 8		
CJ 204	Criminology	3.0		CJ 374	Restorative Justice	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0		PSCI 329	Theories of Justice	3.0
PSCI 100	Introduction to Political Science	4.0		PSY 101	General Psychology I	3.0
SOC 260 [WI (p. 86)]	Classical Social Theory	3.0		SOC 320	Sociology of Deviant Behavior	3.0
	Term Credits	16.0			Other Social Science Elective*	3.0
Term 4					Term Credits	15.0
CJ 277	Introduction to Correctional Practices	3.0		Term 9		
COM 220	Qualitative Research Methods	3.0		SOC 460 [WI (p. 86)]	Contemporary Social Theory	3.0
History Elective		3.0		Select one of the following:	3.0	
Criminal Justice Specialization Courses*		6.0		ANTH 312	Approaches to Intercultural Behavior	
	Term Credits	15.0		SOC 210	Race, Ethnicity and Social Inequality	
Term 5				COM 345	Intercultural Communication	
CJ 278	Introduction to Law Enforcement	3.0			Criminal Justice Specialization Courses*	6.0
CJ 360	Juvenile Justice	3.0			Free Elective	3.0
COM 230	Techniques of Speaking	3.0			Term Credits	15.0
SOC 250	Research Methods I	3.0		Term 10		
MATH 121 or 101	Calculus I Introduction to Analysis I	4.0		BLAW 342	Criminal Law	4.0
	Term Credits	16.0		CJ 376	Sentencing: The History, Necessity and Morality of Punishment in America	3.0
Term 6				PHIL 330	Ethical Issues in Criminal Justice	3.0
CJ 276	Introduction to Computer Crime	3.0			Other Social Science Elective*	3.0
SOC 364	Computer-Assisted Data Analysis	3.0			Term Credits	13.0
				Term 11		
				Free Electives	6.0	
				Criminal Justice Specialization Courses*	9.0	
					Term Credits	15.0
				Term 12		
				CJ 400 [WI (p. 86)]	Capstone in Criminology and Justice Policy	3.0
					Criminal Justice Specialization Course*	3.0
					Free Electives	5.0
					Other Social Science Elective*	3.0
					Term Credits	14.0
				Total Credit:	182.0	

* See degree requirements (p. 86).

Professional Experiences

Students will complete two professional placements. Some placements are paid and others are unpaid. The placements earn students academic credit while providing hands-on learning with criminal justice professionals. The networking aspects of these placements are invaluable for future career development. In addition to the learning experiences, past students have received excellent letters of recommendation for future employment agencies and for graduate and law school admissions.

In recent years, students have been placed in local agencies such as the District Attorney's Office, the Institutional Law Project, the Juvenile Law Center, the Defendants Association of Philadelphia, the Philadelphia and Bucks County Prison Systems and the Pennsylvania Prison Society, Pennsylvania and New Jersey State Police. Several students have interned and later worked full time at the Eastern State Penitentiary Historical Site and Museum. On the state level, interns have worked with the Board of Probation & Parole and other agencies. At the federal level, The US Customs Service had an agreement to accept cooperative education placements after having been screened by Dr. Hall in her Criminal Justice course. Other students have interned at The Drug Enforcement Agency (DEA), Alcohol, Tobacco & Fire Arms (ATF) and students have interned in the Federal Bureau of Investigation (FBI) Honors Internship Program, a highly selective, nationally competitive program.

Minor in Criminal Justice

Students from any major who are interested in the law, legal issues and the forensic sciences may envision a future connection with the criminal justice system. These students could enhance their career possibilities by adding a minor in criminal justice to their major field of study.

The minor consists of four required courses and four criminal justice electives chosen from two categories, for a total of 24.0 credits. Students minoring in criminal justice are assumed to have already taken SOC 101 Introduction to Sociology.

Required Courses

CJS 101	Introduction to Criminal Justice	3.0
CJS 200	Criminology	3.0
SOC 320	Sociology of Deviant Behavior	3.0
CJS 360	Juvenile Justice	3.0

Criminal Justice Elective Courses

Category I

Select one of the following:		3.0
SOC 210	Race, Ethnicity and Social Inequality	
COM 345	Intercultural Communication	
ANTH 312	Approaches to Intercultural Behavior	

Category II

Select three of the following:		9.0
CJS T380	Special Topics in Criminology and Justice Studies	
CJS 362	Gender, Crime, and Justice	
COM 355	Ethnography of Communication	
COM 365	Journalists, the Courts, and the Law	
SOC 115	Social Problems	
SOC 120	Sociology of the Family	
PSY 150	Introduction to Social Psychology	

PSY 240 [WI Abnormal Psychology
(p. 86)]

PSY 370 Forensic Psychology

Total Credits

24.0

Criminology and Justice Studies Faculty

Robert D'Ovidio, PhD (*Temple University*). Associate Professor. The intersection of computer technology, crime, and the criminal justice system; criminological theory; policing; transnational crime.

Ashley Dickinson, PhD (*Indiana University of Pennsylvania*). Assistant Teaching Professor. Corrections; offender rehabilitation; risk management; offender classification; gender and crime.

Julia Hall, PhD (*University of Pennsylvania*). Professor. Criminal justice and juvenile justice reform, including community based alternatives to incarceration, correctional education and programming, reentry and reintegration, restorative justice, and issues relating to special needs offenders, including the el

Jordan Hyatt, PhD, JD (*University of Pennsylvania, Villanova University School of Law*). Assistant Professor. Community corrections; drug treatment; homelessness; probation/parole; re-entry; risk assessment; sentencing.

Lallen Johnson, PhD (*Temple University*). Assistant Professor. Drugs and violence; race, crime and justice; ecology of crime; geographic information systems.

Robert J. Kane, PhD (*Temple University*) *Director, Criminology and Justice Studies Program*. Professor. Police authority and accountability; urban ecology and sociology; violence and public health; police strategies and practices.

Cyndi Rickards, EdD (*Drexel University*) *Senior Assistant Dean for Community Engagement*. Assistant Teaching Professor. On-line pedagogy; service-learning pedagogy; juvenile justice; domestic violence.

Criminology and Justice Studies

About the Program

In what ways did the War on Drugs of the 1980s and 1990s impact urban communities in terms of street-corner dealing, violence, and overall health? What about national incarceration rates, and racial disparities in the adjudication process? How do so-called Three Strikes laws typically influence the decisions of judges at sentencing? How far will the War on Terrorism push the legal boundaries of government surveillance and the monitoring of electronic communications, and what will be the impacts of such forces? Finally, how are "big data" being used (now and in the future) by justice, intelligence, or private organizations to identify social networks, conduct risk assessments, and make decisions about crime policy and resource deployment?

Drexel University's Program of Criminology and Justice Studies offers a rich educational experience that emphasizes justice and criminological theory, and translating concepts into practice. With its three thematic concentrations -- one in Criminology and Justice Policy, one in Justice Informatics, and one in Criminal Justice -- the Program in Criminology and Justice Studies provides all students with foundational knowledge and tools of the discipline, while allowing them to specialize in different areas of interest within the discipline.

Please click the links below to explore the degree concentrations in Criminology and Justice Studies.

Degree Concentrations

- Criminology & Justice Policy (p. 92)
- Justice Informatics (p. 95)
- Criminal Justice

Criminology and Justice Studies Faculty

Robert D'Ovidio, PhD (*Temple University*). Associate Professor. The intersection of computer technology, crime, and the criminal justice system; criminological theory; policing; transnational crime.

Ashley Dickinson, PhD (*Indiana University of Pennsylvania*). Assistant Teaching Professor. Corrections; offender rehabilitation; risk management; offender classification; gender and crime.

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Robert J. Kane, PhD (*Temple University*) Director, *Criminology and Justice Studies Program*. Professor. Police authority and accountability; urban ecology and sociology; violence and public health; police strategies and practices.

Cyndi Rickards, EdD (*Drexel University*) Senior Assistant Dean for *Community Engagement*. Assistant Teaching Professor. On-line pedagogy; service-learning pedagogy; juvenile justice; domestic violence.

Criminology and Justice Studies

Major: *Criminology and Justice Studies*

Degree Awarded: *Bachelor of Science (BS)*

Calendar Type: *Quarter*

Total Credit Hours: *183.0*

Classification of Instructional Programs (CIP) code: *45.0401*

Standard Occupational Classification (SOC) code: *11-9199*

Criminal Justice Concentration

The Criminal Justice concentration is housed in the Program of Criminology and Justice Studies and serves as the "generalist" concentration for the program. Specifically, the Criminal Justice concentration focuses its curriculum primarily on the substance of criminal justice institutions and crime and does not require many of the analytics and computer-based courses that the other two concentrations require. This concentration is primarily intended for students seeking a traditional criminal justice education. Because the Criminal Justice concentration reserves 41 free electives, it is the most flexible of the three concentrations, allowing students, for example, to relatively easily double

major, or to take on a minor while still reserving enough free credit for other courses of interest outside the program.

Despite that the CJ concentration is the least analytically demanding of the three concentrations, it still offers the community-based learning and global perspective of the other two concentrations. Students in all three concentrations are encouraged to participate in at least one faculty-led study abroad program during which students will explore various justice related themes. Recent trips have been *The Legacy of Nazi Policing and Cold War Justice* in Munich and Prague and *The Roots of Common Law Justice* in London. Please see the Study Abroad Program (http://studyabroad.drexel.edu/index.cfm?FuseAction=Programs.ViewProgram&Program_ID=47709) web page to view the location and itinerary of the 2015 study tour. The emphasis on comparative justice and study abroad reside at the leading edges of Drexel's core value of global citizenship.

Criminal Justice Concentration

Degree Requirements

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 101	Introduction to Western Philosophy	3.0
PSCI 100	Introduction to Political Science	4.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
English Elective (any ENGL course over 200-level)		3.0
Fine Arts Elective		3.0
History Elective		3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0

Math Sequences

Select one of the following sequences: 8.0

Analysis Sequence

MATH 101 & MATH 102	Introduction to Analysis I and Introduction to Analysis II
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Calculus Sequence

MATH 121 & MATH 122	Calculus I and Calculus II
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Science Sequence

Select one of the following sequences: 8.0

Biology Sequence

BIO 107 & BIO 108 & BIO 109 & BIO 110	Cells, Genetics & Physiology and Cells, Genetics and Physiology Laboratory and Biological Diversity, Ecology & Evolution and Biological Diversity, Ecology and Evolution Laboratory
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Chemistry Sequence

CHEM 111 & CHEM 112	General Chemistry I and General Chemistry II
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Program in Criminology and Justice Studies Core Requirements

CJS 101	Introduction to Criminal Justice	3.0
CJS 210	Race, Crime, and Justice	3.0
CJS 220	Crime and the City	3.0
CJS 260	Justice in Our Community	3.0
CJS 375	Criminal Procedure	3.0
CJS 376	Sentencing	3.0
PHIL 330	Ethical Issues in Criminal Justice	3.0

Methods and Analytics Sequence

CJS 250	Research Methods & Analytics I	3.0
CJS 300	Research Methods and Analytics II	3.0

Criminal Justice Thematic Concentration

CJS 261	Prison, Society and You	3.0
CJS 266	Crime Prevention Planning	3.0
CJS 276	Introduction to Computer Crime	3.0
CJS 278	Introduction to Law Enforcement	3.0
CJS 289	Terrorism	3.0
CJS 360	Juvenile Justice	3.0
CJS 374	Restorative Justice	3.0

Program Electives

Complete 10 of the following courses: * 30.0

CJS 265	Criminal Investigation	
CJS 273	Surveillance, Technology, and the Law	
CJS 274	Sex, Violence, & Crime on the Internet	
CJS 275	Issues in Domestic Violence	
CJS 280	Communities and Crime	
CJS 301	Methods and Analytics III	
CJS 302	Advanced Criminological Theorizing	
CJS 320	Comparative Justice Systems	
CJS 330	Crime Mapping Using Geographic Information Systems	
CJS 335	Intelligence-Led Decision-Making	
CJS 362	Gender, Crime, and Justice	
CJS 365	Computer Investigations and the Law	
CJS 366	Technology and the Justice System	
CJS 372	Death Penalty - An American Dilemma	
CJS 373	Environmental Crime	
CJS 377	Intellectual Property Theft in the Digital Age	

Free Electives 42.0

Total Credits 176.0

* Review the prerequisites before trying to register.

Criminal Justice Concentration**Sample Plan of Study**

Term 1		Credits
CJS 101	Introduction to Criminal Justice	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
SOC 101	Introduction to Sociology	3.0
UNIV H101	The Drexel Experience	1.0

Science sequence course 4.0

Term Credits 14.0

Term 2

COM 150	Mass Media and Society	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHIL 101	Introduction to Western Philosophy	3.0
CJS 260	Justice in Our Community	3.0
Science sequence course		4.0

Term Credits 16.0

Term 3

ANTH 101	Introduction to Cultural Diversity	3.0
CJS 204		3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSCI 100	Introduction to Political Science	4.0
SOC 260 [WI (p. 90)]	Classical Social Theory	3.0
CIVC 101	Introduction to Civic Engagement	1.0

Term Credits 17.0

Term 4

CJS 210	Race, Crime, and Justice	3.0
CJS 250	Research Methods Analytics I	3.0
IAS 260	Evil Isms (Example of free elective)	3.0
ENVP 346	Environmental Justice (Example of free elective)	3.0
History Elective		3.0

Term Credits 15.0

Term 5

CJS 290		3.0
CJS 300	Research Methods and Analytics II	3.0
MATH 101 or 121	Introduction to Analysis I Calculus I	4.0
HIST 216	Freedom in America (Example of free elective)	3.0
CJS 278	Introduction to Law Enforcement	3.0

Term Credits 16.0

Term 6

CJS 374	Restorative Justice	3.0
CJS 261	Prison, Society and You	3.0
MATH 102 or 122	Introduction to Analysis II Calculus II	4.0
English (ENGL) course 200-level or above		3.0
Free Elective		3.0

Term Credits 16.0

Term 7

CJS 273	Surveillance, Technology, and the Law (Example of CJ Concentration Elective)	3.0
CJS 220	Crime and the City	3.0
CJS 375	Criminal Procedure	3.0
CJS 376	Sentencing	3.0
Fine Arts Elective		3.0

Term Credits 15.0

Term 8

CJS 276	Introduction to Computer Crime	3.0
CJS 360	Juvenile Justice	3.0

CJS 289	Terrorism	3.0
PSY 101	General Psychology I	3.0
Free Elective		3.0
Term Credits		15.0
Term 9		
CJS 390		1.0
CJS 266	Crime Prevention Planning	3.0
CJS 280	Communities and Crime	3.0
CJS 362	Gender, Crime, and Justice	3.0
Free Elective		6.0
Term Credits		16.0
Term 10		
PHIL 330	Ethical Issues in Criminal Justice	3.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CJS 373	Environmental Crime	3.0
Free Elective		6.0
Term Credits		13.0
Term 11		
CJS 265	Criminal Investigation (Example of CJ Concentration Elective)	3.0
CJS 275	Issues in Domestic Violence (Example of CJ Concentration Elective)	3.0
CJS 372	Death Penalty - An American Dilemma (Example of CJ Concentration Elective)	3.0
ANTH 240	Urban Anthropology (Example of Free Elective)	3.0
IAS 320	Building Global Bridges (Example of Free Elective)	3.0
Term Credits		15.0
Term 12		
ENVP 275	Global Climate Change (Example of Free Elective)	3.0
CJS 274	Sex, Violence, Crime on the Internet (Example of CJ Concentration Elective)	3.0
CJS 366	Technology and the Justice System (Example of CJ Concentration Elective)	3.0
CJS 365	Computer Investigations and the Law (Example of CJ Concentration Elective)	3.0
Free Elective		3.0
Term Credits		15.0
Total Credit: 183.0		

Criminal Justice Concentration

Professional Experiences

Students will complete one co-op (i.e., professional placement), typically during the spring and summer quarters of their Junior year. When they return for the start of their senior year, they can immediately begin their (impending) post-graduation job search with their co-op experience still recent on their resume. Some placements are paid (usually in the private sector) and others are unpaid (primarily in the public sector). The placements earn students academic credit while providing professional socialization and learning with crime and justice professionals. The networking aspects of these placements are invaluable for future career development. In addition to the learning experiences, past students have received excellent letters of recommendation for future employment agencies and for graduate and law school admissions.

In recent years, students have been placed in local agencies such as the District Attorney's Office, the Institutional Law Project, the Juvenile Law Center, the Defendants Association of Philadelphia, the Philadelphia and Bucks County Prison Systems and the Pennsylvania Prison Society, Pennsylvania and New Jersey State Police. Several students have done co-ops and later worked full time at the Eastern State Penitentiary Historical Site and Museum. On the state level, co-op students have worked with the Board of Probation & Parole and other agencies. At the federal level, the US Customs Service had an agreement to accept cooperative education placements after having been screened by faculty. The faculty in Criminology and Justice Studies has been working over the past few years to expand its list of research co-ops (primarily for students working toward graduate school) and international co-ops.

Criminology and Justice Studies

Major: Criminology and Justice Studies

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 183.0

Classification of Instructional Programs (CIP) code: 45.0401

Standard Occupational Classification (SOC) code: 11-9199

Criminology and Justice Policy concentration

About the Program

The Criminology & Justice Policy concentration grounds students in criminological theory and crime policy, as well as justice analytics, to help them identify, describe, and respond to current and emerging crime and security problems. A key goal of any rational crime policy is to maximize its benefits — e.g., reducing crime — while limiting its social costs, such as mass-incarceration, racial disparities, and violent backlashes. Through that lens, C&JP students will work with crime and police calls for service data, geo-tagged social media transmissions, and other sources of information to identify and explain crime trends, "hotspots," and "coldspots" across given geographies; and they will put their theory to use as they learn to generate and test research hypotheses related to crime and justice policy outcomes. Moreover, through community-based learning (a core value of the program), C&JP offers students the unique opportunity to experience criminology and justice education from the perspectives of those most affected by the criminal justice system: One required course is taught in an active jail; another is taught in a local community service organization.

Finally, recognizing the global nature of crime and justice issues, C&JP requires one course on international justice systems, two globally-themed courses outside the program; and it encourages all students to participate in at least one faculty-led study abroad program during which students will explore various justice-related themes (examples of recent trips: *The Legacy of Nazi Policing and Cold War Justice in Munich and Prague*; *The Roots of Common Law Justice in London*. Please see the Study Abroad Program (http://studyabroad.drexel.edu/index.cfm?FuseAction=Programs.ViewProgram&Program_ID=47709) web page to view the location and itinerary of the 2015 study tour.). The emphasis on comparative justice and study abroad reside at the leading edge of Drexel's core value of global citizenship.

The Criminology & Justice Policy thematic concentration reserves 31 free electives so that students can earn a minor outside the Program in Criminology and Justice Studies. Students interested in intelligence/

security-related careers should consider minoring in a language. Visit Drexel's Modern Languages Program (<http://www.drexel.edu/coas/academics/departments-centers/global-studies-modern-languages/degrees-programs/modern-languages>) web page for a list of language minors.

Additional Information

For more information about the Criminology & Justice Policy concentration, please contact:

Robert Kane, PhD

Department Head

Department of Criminology and Justice Studies

robert.j.kane@drexel.edu

Criminology and Justice Policy concentration

Degree Requirements

General Degree Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 101	Introduction to Western Philosophy	3.0
PSCI 100	Introduction to Political Science	4.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
English Elective (any ENGL course over 200-level)		3.0
Fine Arts Elective		3.0
History Elective		3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0

Math Sequence

Select one of the following: 8.0

Analysis Sequence

MATH 101 Introduction to Analysis I
& MATH 102 and Introduction to Analysis II

Calculus Sequence

MATH 121 Calculus I
& MATH 122 and Calculus II

Science Sequence

Select one of the following: 8.0

Biology Sequence

BIO 107 Cells, Genetics & Physiology
& BIO 108 and Cells, Genetics and Physiology Laboratory
& BIO 109 and Biological Diversity, Ecology & Evolution
& BIO 110 and Biological Diversity, Ecology and Evolution Laboratory

Chemistry Sequence

CHEM 111 General Chemistry I
& CHEM 112 and General Chemistry II

Program in Criminology and Justice Studies Core Requirements

CJS 101	Introduction to Criminal Justice	3.0
CJS 210	Race, Crime, and Justice	3.0
CJS 220	Crime and the City	3.0
CJS 260	Justice in Our Community	4.0
CJS 375	Criminal Procedure	3.0
CJS 376	Sentencing	3.0
PHIL 330	Ethical Issues in Criminal Justice	3.0

Global Perspectives

Any courses across the university whose descriptions are global and/ or comparative 6.0

Methods and Analytics Sequence

CJS 250	Research Methods & Analytics I	3.0
CJS 300	Research Methods and Analytics II	3.0
CJS 301	Methods and Analytics III	3.0
CJS 320	Comparative Justice Systems	3.0
CJS 330	Crime Mapping Using Geographic Information Systems	3.0
CJS 335	Intelligence-Led Decision-Making	3.0
CJS 401	Program Evaluation	3.0

Criminology and Justice Policy Thematic Concentration

CJS 261	Prison, Society and You	3.0
CJS 302	Advanced Criminological Theorizing	3.0

Select eight of the following: 24.0

CJS 266	Crime Prevention Planning
CJS 267	Introduction to Security Studies
CJS 273	Surveillance, Technology, and the Law
CJS 276	Introduction to Computer Crime
CJS 278	Introduction to Law Enforcement
CJS 280	Communities and Crime
CJS 289	Terrorism
CJS 360	Juvenile Justice
CJS 362	Gender, Crime, and Justice
CJS 372	Death Penalty - An American Dilemma
CJS 373	Environmental Crime
CJS 374	Restorative Justice

Program Electives

Complete 6 credits from the following: 6.0

CJS 265	Criminal Investigation
CJS 275	Issues in Domestic Violence
CJS 365	Computer Investigations and the Law
CJS 369	Forensic Science Survey Course
CJS 378	Science of Forensic Science
CJS 379	Forensic DNA Analysis

Free Electives 30.0

Total Credits 171.0

Criminology and Justice Policy concentration

Sample Plan of Study

Term	Credits
Term 1	
CJS 101 Introduction to Criminal Justice	3.0
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
SOC 101 Introduction to Sociology	3.0
UNIV H101 The Drexel Experience	1.0
Science sequence course	4.0
Term Credits	14.0
Term 2	
COM 150 Mass Media and Society	3.0
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHIL 101 Introduction to Western Philosophy	3.0
CJS 260 Justice in Our Community	4.0
Science sequence course	4.0
Term Credits	17.0
Term 3	
ANTH 101 Introduction to Cultural Diversity	3.0
CJS 204	3.0
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
PSCI 100 Introduction to Political Science	4.0
SOC 260 [WI] Classical Social Theory (p. 92)]	3.0
CIVC 101 Introduction to Civic Engagement	1.0
Term Credits	17.0
Term 4	
History Elective	3.0
Criminology & Jus Pol Specialization Courses*	6.0
CJS 210 Race, Crime, and Justice	3.0
CJS 250 Research Methods Analytics I	3.0
Term Credits	15.0
Term 5	
Free or Program Elective	3.0
CJS 290	3.0
IAS 225 Women and Human Rights Worldwide (Satisfies 3 credits from Global Perspectives Sequence)	3.0
CJS 300 Research Methods and Analytics II	3.0
MATH 101 Introduction to Analysis I	4.0
Term Credits	16.0
Term 6	
English (ENGL) Course 200-level or Above	3.0
Free or Program Elective	3.0
CJS 261 Prison, Society and You	3.0
CJS 301 Methods and Analytics III	3.0
MATH 102 Introduction to Analysis II	4.0
Term Credits	16.0
Term 7	
Free or Program Electives	3.0

Fine Arts Elective	3.0
CJS 375 Criminal Procedure	3.0
CJS 220 Crime and the City	3.0
CJS 376 Sentencing	3.0

Term Credits 15.0

Term	Credits
Term 8	
Free or Program Elective	3.0
CJS 302 Advanced Criminological Theorizing	3.0
CJS 320 Comparative Justice Systems	3.0
PSY 101 General Psychology I	3.0
CJS 330 Crime Mapping Using Geographic Information Systems	3.0

Term Credits 15.0

Term	Credits
Term 9	
Criminology & Jus Pol Specialization Courses*	6.0
ENVP 275 Global Climate Change (Satisfies 3 credits from Global Perspectives Sequence)	3.0
CJS 335 Intelligence-Led Decision-Making	3.0
CJS 390	1.0
Free or Program Elective	3.0

Term Credits 16.0

Term	Credits
Term 10	
Free or Program Electives	6.0
CJS 401 Program Evaluation	3.0
PHIL 330 Ethical Issues in Criminal Justice	3.0
UNIV H201 Looking Forward: Academics and Careers	1.0

Term Credits 13.0

Term	Credits
Term 11	
Free or Program Electives	6.0
Criminology & Jus Pol Specialization Courses*	9.0

Term Credits 15.0

Term	Credits
Term 12	
Criminology & Jus Pol Specialization Courses	3.0
Free or Program Electives	6.0
CJS 400	3.0

Term Credits 12.0

Total Credit: 181.0

Minor in Criminal Justice

Students from any major who are interested in the law, legal issues and the forensic sciences may envision a future connection with the criminal justice system. These students could enhance their career possibilities by adding a minor in criminal justice to their major field of study.

The minor consists of four required courses and four criminal justice electives chosen from two categories, for a total of 24.0 credits. Students minoring in criminal justice are assumed to have already taken SOC 101 Introduction to Sociology .

Required Courses

CJS 101	Introduction to Criminal Justice	3.0
CJS 200	Criminology	3.0
SOC 320	Sociology of Deviant Behavior	3.0

CJS 360	Juvenile Justice	3.0
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Criminal Justice Elective Courses

Category I

Select one of the following:		3.0
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SOC 210	Race, Ethnicity and Social Inequality
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COM 345	Intercultural Communication
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ANTH 312	Approaches to Intercultural Behavior
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Category II

Select three of the following:		9.0
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CJS T380	Special Topics in Criminology and Justice Studies
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CJS 362	Gender, Crime, and Justice
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COM 355	Ethnography of Communication
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COM 365	Journalists, the Courts, and the Law
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SOC 115	Social Problems
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SOC 120	Sociology of the Family
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PSY 150	Introduction to Social Psychology
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PSY 240 [WI (p. 92)]	Abnormal Psychology
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PSY 370	Forensic Psychology
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Total Credits		24.0
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Criminology and Justice Policy concentration

Professional Experiences

Students will complete one co-op (i.e., professional placement), typically during the spring and summer quarters of their Junior year. When they return for the start of their senior year, they can immediately begin their (impending) post-graduation job search with their co-op experience still recent on their resume. Some placements are paid (usually in the private sector) and others are unpaid (primarily in the public sector). The placements earn students academic credit while providing professional socialization and learning with crime and justice professionals. The networking aspects of these placements are invaluable for future career development. In addition to the learning experiences, past students have received excellent letters of recommendation for future employment agencies and for graduate and law school admissions.

In recent years, students have been placed in local agencies such as the District Attorney's Office, the Institutional Law Project, the Juvenile Law Center, the Defendants Association of Philadelphia, the Philadelphia and Bucks County Prison Systems and the Pennsylvania Prison Society, Pennsylvania and New Jersey State Police. Several students have done co-ops and later worked full time at the Eastern State Penitentiary Historical Site and Museum. On the state level, co-op students have worked with the Board of Probation & Parole and other agencies. At the federal level, The US Customs Service had an agreement to accept cooperative education placements after having been screened by faculty. The faculty in Criminology and Justice Studies has been working over the past few years to expand its list of research co-ops (primarily for students working toward graduate school) and international co-ops.

Criminology and Justice Studies

Major: Criminology and Justice Studies

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 45.0401

Standard Occupational Classification (SOC) code: 11-9199

Justice Informatics Concentration

Program Description

With its thematic concentration in Justice Informatics (JI), Drexel University has transformed the traditional criminal justice degree program to produce graduates who possess knowledge and skills that are highly valued by criminal justice agencies in the 21st century. Namely, the program draws from criminology and criminal justice and computing and informatics to produce globally aware and technology proficient graduates who bring an analytical and information-led approach to solving the problems crime creates for society.

Each exposure to the criminal justice system represents a data collection point, which becomes part of a massive and disparate array of data held by the government. Students will learn how to collect, manage, visualize, and analyze large sources of information so that they can bring their expertise into the crime and justice occupational arena and/or graduate school. In addition to learning to work with "big" data in the public justice arena, students will learn how to identify, collect, manage, and use data from the expansive -- and rapidly growing -- private system of justice and security to creative innovative solutions for identifying, solving, and preventing crime.

Graduates of Drexel's Justice Informatics concentration will be ideally suited to meet the demands of the growing job market for crime analysts among criminal justice, defense, and intelligence agencies and in the private-sector security community. Crime analysts have become an essential part of the modern criminal justice agency. They have become vital to, for example, the large police department looking to deploy resources in a manner that matches crime trends, the intelligence agency working to prevent terrorist events, and the financial services firm hoping to identify the fraudulent use of a credit card. JI graduates can also play an integral role on teams that build future information technology solutions for intelligence, defense, and criminal justice agencies from the public and private sectors.

Given the global nature of crime and justice issues, JI requires one course on international justice systems; and it encourages all students to participate in at least one faculty-led study abroad program during which students will explore various justice-related themes (examples of recent trips: *The Legacy of Nazi Policing and Cold War Justice in Munich and Prague*; *The Roots of Common Law Justice in London*. Please click [HERE](http://studyabroad.drexel.edu/index.cfm?FuseAction=Programs.ViewProgram&Program_ID=47709) (http://studyabroad.drexel.edu/index.cfm?FuseAction=Programs.ViewProgram&Program_ID=47709) to view the location and itinerary of the 2015 study tour). The emphasis on comparative justice and study abroad reside at the leading edge of Drexel's core value of global citizenship.

The Justice Informatics thematic concentration reserves 27 free electives so that students can earn a minor outside the Program in Criminology and Justice Studies. Students interested in intelligence/security-related careers should consider minoring in a language. Click [HERE](http://www.drexel.edu/culturecomm/academics/undergraduate/modernlang/languages) (<http://www.drexel.edu/culturecomm/academics/undergraduate/modernlang/languages>) to visit Drexel's Modern Languages Program for a list of language minors.

Additional Information

For more information about the Justice Informatics concentration, please contact:

Robert D'Ovidio, PhD

Associate Professor of Criminology and Justice Studies
College of Arts and Sciences
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Justice Informatics Concentration

Degree Requirements

General Degree Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 101	Introduction to Western Philosophy	3.0
PSCI 100	Introduction to Political Science	4.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
English Elective (any ENGL course over 200-level)		3.0
Fine Arts Elective		3.0
History Elective		3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0

Math Sequences

Select one of the following sequences: 8.0

Analysis Sequence

MATH 101 Introduction to Analysis I
& MATH 102 and Introduction to Analysis II

Calculus Sequence

MATH 121 Calculus I
& MATH 122 and Calculus II

Science Sequences

Select one of the following sequences: 8.0

Biology Sequence

BIO 107 Cells, Genetics & Physiology
& BIO 108 and Cells, Genetics and Physiology Laboratory
& BIO 109 and Biological Diversity, Ecology & Evolution
& BIO 110 and Biological Diversity, Ecology and Evolution Laboratory

Chemistry Sequence

CHEM 111 General Chemistry I
& CHEM 112 and General Chemistry II

Program in Criminology and Justice Study Core Requirements

CJS 101	Introduction to Criminal Justice	3.0
CJS 210	Race, Crime, and Justice	3.0
CJS 220	Crime and the City	3.0
CJS 260	Justice in Our Community	4.0
CJS 375	Criminal Procedure	3.0

CJS 376	Sentencing	3.0
PHIL 330	Ethical Issues in Criminal Justice	3.0

Global Perspectives

Any course across the University whose description is global and/or comparative 3.0

CJS 320	Comparative Justice Systems	3.0
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Methods and Analytics Sequence

CJS 250	Research Methods & Analytics I	3.0
CJS 300	Research Methods and Analytics II	3.0
CJS 301	Methods and Analytics III	3.0
CJS 330	Crime Mapping Using Geographic Information Systems	3.0
CJS 335	Intelligence-Led Decision-Making	3.0
CJS 401	Program Evaluation	3.0

Justice Informatics Thematic Concentration

CJS 267	Introduction to Security Studies	3.0
CJS 273	Surveillance, Technology, and the Law	3.0
CJS 276	Introduction to Computer Crime	3.0
CJS 302	Advanced Criminological Theorizing	3.0
CJS 365	Computer Investigations and the Law	3.0
CJS 366	Technology and the Justice System	3.0
CJS 402	Capstone in Justice Informatics	3.0
INFO 101	Introduction to Information Technology	3.0
INFO 105	Introduction to Informatics	3.0
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0
INFO 240	Introduction to Data Science	3.0
INFO 440	Social Media Trend Spotting	3.0

Free Electives 27.0

Total Credits 174.0

Justice Informatics Concentration

Sample Plan of Study

Term 1		Credits
CJS 101	Introduction to Criminal Justice	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
SOC 101	Introduction to Sociology	3.0
CHEM 111	General Chemistry I	4.0
UNIV H101	The Drexel Experience	1.0
Term Credits		14.0
Term 2		
COM 150	Mass Media and Society	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHIL 101	Introduction to Western Philosophy	3.0
CJS 260	Justice in Our Community	4.0
BIO 109	Biological Diversity, Ecology Evolution	3.0
Term Credits		16.0
Term 3		

ANTH 101	Introduction to Cultural Diversity	3.0
CJS 204		3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSCI 100	Introduction to Political Science	4.0
SOC 260 [WI (p. 95)]	Classical Social Theory	3.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		17.0
Term 4		
INFO 101	Introduction to Information Technology	3.0
CJS 267	Introduction to Security Studies	3.0
CJS 210	Race, Crime, and Justice	3.0
CJS 250	Research Methods Analytics I	3.0
History Elective		3.0
Term Credits		15.0
Term 5		
INFO 105	Introduction to Informatics	3.0
CJS 290		3.0
ENVP 275	Global Climate Change (satisfies 3 credits in the Global Perspectives Sequence)	3.0
CJS 300	Research Methods and Analytics II	3.0
MATH 101	Introduction to Analysis I	4.0
Term Credits		16.0
Term 6		
Free Elective		4.0
English (ENGL) Course 200-level or Above		3.0
CJS 273	Surveillance, Technology, and the Law	3.0
CJS 301	Methods and Analytics III	3.0
MATH 102	Introduction to Analysis II	4.0
Term Credits		17.0
Term 7		
Fine Arts Elective		3.0
CJS 276	Introduction to Computer Crime	3.0
CJS 375	Criminal Procedure	3.0
CJS 220	Crime and the City	3.0
CJS 376	Sentencing	3.0
Term Credits		15.0
Term 8		
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
CJS 302	Advanced Criminological Theorizing	3.0
PSY 101	General Psychology I	3.0
CJS 330	Crime Mapping Using Geographic Information Systems	3.0
Term Credits		15.0
Term 9		
Free Elective		3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0
INFO 215	Social Aspects of Information Systems	3.0
CJS 390		1.0

CJS 320	Comparative Justice Systems	3.0
Term Credits		16.0
Term 10		
Free Elective		3.0
CJS 365	Computer Investigations and the Law	3.0
CJS 366	Technology and the Justice System	3.0
CJS 335	Intelligence-Led Decision-Making	3.0
PHIL 330	Ethical Issues in Criminal Justice	3.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Term Credits		16.0
Term 11		
CJS 377	Intellectual Property Theft in the Digital Age	3.0
INFO 240	Introduction to Data Science	3.0
CJS 401	Program Evaluation	3.0
Free Electives		4.0
Term Credits		13.0
Term 12		
CJS 289	Terrorism	3.0
CJS 360	Juvenile Justice	3.0
INFO 440	Social Media Trend Spotting	3.0
CJS 402	Capstone in Justice Informatics	3.0
Term Credits		12.0
Total Credit: 182.0		

Minor in Criminal Justice

Students from any major who are interested in the law, legal issues and the forensic sciences may envision a future connection with the criminal justice system. These students could enhance their career possibilities by adding a minor in criminal justice to their major field of study.

The minor consists of four required courses and four criminal justice electives chosen from two categories, for a total of 24.0 credits. Students minoring in criminal justice are assumed to have already taken SOC 101 (<https://nextcatalog.drexel.edu/programadmin/47>) Introduction to Sociology.

Required Courses

CJS 101	Introduction to Criminal Justice	3.0
CJS 200	Criminology	3.0
SOC 320	Sociology of Deviant Behavior	3.0
CJS 360	Juvenile Justice	3.0

Criminal Justice Elective Courses

Category I

Select one of the following:		3.0
SOC 210	Race, Ethnicity and Social Inequality	
COM 345	Intercultural Communication	
ANTH 312	Approaches to Intercultural Behavior	

Category II

Select three of the following:		9.0
CJS T380	Special Topics in Criminology and Justice Studies	
CJS 362	Gender, Crime, and Justice	
COM 355	Ethnography of Communication	
COM 365	Journalists, the Courts, and the Law	
SOC 115	Social Problems	

SOC 120	Sociology of the Family	
PSY 150	Introduction to Social Psychology	
PSY 240 [WI (p. 95)]	Abnormal Psychology	
PSY 370	Forensic Psychology	
Total Credits		24.0

Note: Starting in Academic Year 2015, all CJ course codes will transition from CJ to CJS to reflect the new name of the program.

Justice Informatics Concentration Professional Experiences

Students will complete one co-op (i.e., professional placement), typically during the spring and summer quarters of their Junior year. This way, when they return for the start of their senior year, they can immediately begin their (impending) post-graduation job search with their co-op experience still recent on their resume. Some placements are paid (usually in the private sector) and others are unpaid (primarily in the public sector). The placements earn students academic credit while providing professional socialization and learning with crime and justice professionals. The networking aspects of these placements are invaluable for future career development. In addition to the learning experiences, past students have received excellent letters of recommendation for future employment agencies and for graduate and law school admissions.

In recent years, students have been placed in local agencies such as the District Attorney's Office, the Institutional Law Project, the Juvenile Law Center, the Defendants Association of Philadelphia, the Philadelphia and Bucks County Prison Systems and the Pennsylvania Prison Society, Pennsylvania and New Jersey State Police. Several students have co-op'd and later worked full time at the Eastern State Penitentiary Historical Site and Museum. On the state level, co-op students have worked with the Board of Probation & Parole and other agencies. At the federal level, The US Customs Service had an agreement to accept cooperative education placements after having been screened by faculty. The faculty in Criminology and Justice Studies has been working over the past few years to expand its list of research co-ops (primarily for students working toward graduate school) and international co-ops.

Minor in Ecology

The minor in ecology meets the needs of engineering, science, arts, applied arts, information, and business students interested in environmental science. Prior to taking ENVS 230 General Ecology, students are minimally expected to have had one term to a year of both general biology and general chemistry.

Required Courses

ENVS 212	Evolution	4.0
ENVS 230	General Ecology	3.0
ENVS 260	Environmental Science and Society	3.0
ENVS 284	Physiological and Population Ecology	3.0
ENVS 285 [WI (p. 98)]	Population Ecology Laboratory	2.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 287	Community Ecology Laboratory	2.0
ENVS 328	Conservation Biology	3.0

Environmental Science elective	3.0-4.0
Total Credits	26.0-27.0

English

Major: English

Degree Awarded: Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 23.9999

Standard Occupational Classification (SOC) code: 25-1123

About the Program

Specifically designed to engage students in critical thinking and applied writing skills, the English major offers a wide-ranging curriculum on British, American and World literatures and stresses the cultural, historical and political contexts that shape and affect literary production. The Department of English and Philosophy (<http://www.drexel.edu/coas/academics/departments-centers/english-philosophy>) also offers variety of courses on periods and genres; creative writing; and the relationship between literature and the visual arts, science and technology.

Students develop solid techniques in critical inquiry as well as in writing, literary, and reading skills. Implicit in our undertaking is the leadership role of our department in the formulation and discussion of such broad theoretical and practical questions as the following: the connection between oral and written communication skills; analytical, ethical, and critical thinking; questions of value and morality; the relevance and relation of the past to the present; the relations between and among cultures; the role of literary and philosophical texts in our attempts to explain human motives and behavior; and the relations between the sexes.

Degree Requirements

University Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Two Mathematics Courses		6.0
Two Science Courses		6.0

Foreign Language Courses

Any two (2) consecutive foreign language courses (completing level 201)

Humanities and Fine Arts

Select four of the following:		12.0
ARTH 101	History of Art I: Ancient to Medieval	
ARTH 102	History of Art II: High Renaissance to Modern	
ARTH 103	History of Art: Early to Late Modern	
DANC 201 [WI (p. 98)]	Dance Appreciation	
DANC 210	Introduction to Dance	
DANC 220	History of Dance	

DANC 325 [WI Twentieth Century Dance (p. 98)]	
FMST 150	American Classic Cinema
FMST 250	The Documentary Tradition
FMST 355	Contemporary Cinema
FMVD 218	Intermediate Cinematography
MUSC 130	Introduction to Music
MUSC 231 [WI Music History I (p. 98)]	
MUSC 232 [WI Music History II (p. 98)]	
MUSC 236	Rock Music Through the Mid-60s
MUSC 238	Rock Music Since the Mid-60s
PHIL 101	Introduction to Western Philosophy
PHIL 105	Critical Reasoning
PHIL 211	Metaphysics
PHIL 221	Epistemology
PHIL 231	Aesthetics
PHIL 251	Ethics
PHTO 110	Photography
PHTO 115	Photographic Principles
THTR 115	Theatrical Experience
THTR 221 [WI Theatre History I (p. 98)]	
THTR 222 [WI Theatre History II (p. 98)]	

Social and Behavioral Sciences

Select four of the following: 12.0

ANTH 110	Human Past: Anthropology and Prehistoric Archeology
ANTH 210 [WI Worldview: Science, Religion and Magic (p. 98)]	
COM 150	Mass Media and Society
COM 230	Techniques of Speaking
HIST 161	Themes in World Civilization I
HIST 162	Themes in World Civilization II
HIST 163	Themes in World Civilization III
PSCI 100	Introduction to Political Science
PSCI 120	History of Political Thought
PSY 101	General Psychology I
PSY 120	Developmental Psychology
PSY 140	Approaches to Personality
SOC 101	Introduction to Sociology
SOC 115	Social Problems
SOC 120	Sociology of the Family

International Studies

Select two of the following: 6.0

ANTH 212 [WI Topics in World Ethnography (p. 98)]	
ANTH 312	Approaches to Intercultural Behavior
COM 360	International Communication
COM 361	International Public Relations
COM 362	International Negotiations

FMST 160	European Cinema
FMST 245	Non-Western Cinema
HIST 209	The United States & Central America: From Monroe Doctrine to Cold War
HIST 235	The Great War, 1914-1918
HIST 236	World War II
HIST 259	History of Europe in the 20th Century
HIST 270 [WI Introduction to Latin American History (p. 98)]	
MUSC 331	World Musics
PHIL 335	Global Ethical Issues
PSCI 150	International Politics
SOC 340	Globalization

Studies in Diversity

Select two of the following: 6.0

AFAS 101	Introduction to Africana Studies
AFAS 201	Cross Currents in Africana Studies
ANTH 101	Introduction to Cultural Diversity
ANTH 215	Anthropology of Gender
COM 345	Intercultural Communication
ENGL 345	American Ethnic Literature
ENGL 350	Jewish Literature and Civilization
ENGL 355 [WI Women and Literature (p. 98)]	
ENGL 365	Topics in African American Literature
HIST 212	Themes in African-American History
HIST 214	United States Civil Rights Movement
HIST 215	American Slavery
HIST 216	Freedom in America
HIST 218	Race and Film in United States History
HIST 223	Women and Work in America
HIST 224	Women in American History
HIST 249	Modern Jewish History
JUDA 201	Jewish Literature and Civilization
JUDA 202	Jewish Life and Culture in the Middle Ages
JUDA 203	Modern Jewish History
MUSC 333	Afro-American Music USA
SOC 210	Race, Ethnicity and Social Inequality
SOC 330	Development and Underdevelopment in the Global South
WGST 101	Introduction to Women's and Gender Studies
WGST 240	Women and Society in a Global Context

Major Requirements**Foundational and Professional Courses**

ENGL 205 [WI American Literature I (p. 98)]		3.0
ENGL 206 [WI American Literature II (p. 98)]		3.0
ENGL 211 [WI British Literature I (p. 98)]		3.0
ENGL 212	British Literature II	3.0
ENGL 315 [WI Shakespeare (p. 98)]		3.0

ENGL 380	Literary Theory	3.0
ENGL 490	Seminar in English and American Literature	4.0
ENGL 492	Seminar in World Literature	4.0
ENGL 499	Senior Project in Literature	4.0

Select three of the following: 9.0

ENGL 200 [WI]	Classical to Medieval Literature (p. 98)]	
ENGL 201	Renaissance to the Enlightenment	
ENGL 202 [WI]	Romanticism to Modernism (p. 98)]	
ENGL 203 [WI]	Post-Colonial Literature I (p. 98)]	
ENGL 204	Post-Colonial Literature II	
ENGL 207 [WI]	African American Literature (p. 98)]	
ENGL 214	Readings in Fiction	
ENGL 215 [WI]	Readings in Poetry (p. 98)]	
ENGL 216 [WI]	Readings in Drama (p. 98)]	

Select three of the following: 9.0

ENGL 310 [WI]	Period Studies (p. 98)]	
ENGL 320 [WI]	Major Authors (p. 98)]	
ENGL 325	Topics in World Literature	
ENGL 330	The Bible as Literature	
ENGL 335	Mythology	

Select three of the following: 9.0

ENGL 305 [WI]	The Mystery Story (p. 98)]	
ENGL 306	Literature of Baseball	
ENGL 307	Literature of the Holocausts	
ENGL 323	Literature and Other Arts	
ENGL 345	American Ethnic Literature	
ENGL 350	Jewish Literature and Civilization	
ENGL 355 [WI]	Women and Literature (p. 98)]	
ENGL 360 [WI]	Literature and Society (p. 98)]	
ENGL 365	Topics in African American Literature	
ENGL 395 [WI]	Special Studies in Literature (p. 98)]	
PHIL 381 [WI]	Philosophy in Literature (p. 98)]	
ENGL I399	Independent Study in ENGL	

Creative and Professional Writing

Select five of the following: 15.0

WRIT 306	Writing About the Media	
WRIT 310	Literary Editing & Publication	
WRIT 312 [WI]	The Practice of Professional Writing (p. 98)]	
WRIT 400 [WI]	Writing in Cyberspace (p. 98)]	

WRIT 405 Internship in Literary Publishing

COM 260 [WI] Fundamentals of Journalism
(p. 98)]

COM 300 [WI] On-line Journalism
(p. 98)]

COM 310 [WI] Technical Communication
(p. 98)]

COM 315 Investigative Journalism

COM 335 Electronic Publishing

COM 340 Desktop Publishing

WRIT 210 [WI] The Peer Reader in Context
(p. 98)]

WRIT 220 [WI] Creative Nonfiction Writing
(p. 98)]

WRIT 225 [WI] Creative Writing
(p. 98)]

WRIT 301 [WI] Writing Poetry
(p. 98)]

WRIT 302 Writing Fiction

WRIT 303 Writing Humor and Comedy

SCRP 270 [WI] Screenwriting I
(p. 98)]

SCRP 275 [WI] Screenwriting II
(p. 98)]

Science and Technology in the Humanities

Select four of the following: 12.0

ENGL 300 [WI] Literature & Science
(p. 98)]

ENGL 302 Environmental Literature

ENGL 303 Science Fiction

ENGL 370 Topics in Literature and Medicine

HIST 280 History of Science: Ancient to Medieval

HIST 281 History of Science: Enlightenment to Modernity

HIST 285 Technology in Historical Perspective

HIST 292 Technology in American Life

PHIL 311 Computer Ethics

PHIL 315 Engineering Ethics

PHIL 341 Philosophy of the Environment

PHIL 355 Philosophy of Medicine

PHIL 351 Philosophy of Technology

PHIL 361 Philosophy of Science

Electives

Free electives 30.0

Total Credits 182.0

Sample Plan of Study

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV H101	The Drexel Experience	1.0
HIST 161	Themes in World Civilization I	3.0
Math Elective		4.0

Foreign Language Course (1st consecutive course)	4.0	ENGL	African American Literature	3.0
Term Credits	15.0	207 [WI (p. 98)]		
Term 2		ENGL	Readings in Drama	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	216 [WI (p. 98)]		
HIST 162	Themes in World Civilization II	Free Elective		3.0
UNIV H101	The Drexel Experience	Science, Technology and Human Affairs Elective*		3.0
Foreign Language Course (2nd consecutive course, 201-level)	4.0	Term Credits		15.0
Math Elective	4.0	Term 8		
Term Credits	16.0	COM 340	Desktop Publishing	3.0
Term 3		ENGL	Shakespeare	3.0
ANTH 101	Introduction to Cultural Diversity	315 [WI (p. 98)]		
ENGL 103	Composition and Rhetoric III: Themes and Genres	UNIV H201	Looking Forward: Academics and Careers	1.0
MUSC 130	Introduction to Music	WRIT 220 [WI (p. 98)]	Creative Nonfiction Writing	3.0
PHIL 101	Introduction to Western Philosophy	Free Electives		6.0
PSY 101	General Psychology I	Term Credits		16.0
Term Credits	15.0	Term 9		
Term 4		WRIT 310	Literary Editing Publication	3.0
CIVC 101	Introduction to Civic Engagement	English Major Foundational Courses*		6.0
ENGL	American Literature I	Free Electives		6.0
205 [WI (p. 98)]		Term Credits		15.0
ENGL	British Literature I	Term 10		
211 [WI (p. 98)]		ENGL	Literature Science	3.0
PHIL 105	Critical Reasoning	300 [WI (p. 98)]		
Social and Behavioral Sciences Elective	3.0	ENGL 323	Literature and Other Arts	3.0
Lab Science Elective	3.0	ENGL	Literature and Society	3.0
Term Credits	16.0	360 [WI (p. 98)]		
Term 5		Free Electives		6.0
ENGL	American Literature II	Term Credits		15.0
206 [WI (p. 98)]		Term 11		
ENGL 212	British Literature II	ENGL 380	Literary Theory	3.0
International Studies Elective	3.0	HIST 281	History of Science: Enlightenment to Modernity	3.0
Lab Science Elective	3.0	PHIL 361	Philosophy of Science	3.0
Diversity Studies Elective	3.0	ENGL 492	Seminar in World Literature	4.0
Term Credits	15.0	or 490	Seminar in English and American Literature	
Term 6		Free Electives		3.0
COM 260 [WI (p. 98)]	Fundamentals of Journalism	Term Credits		16.0
ENGL	Romanticism to Modernism	Term 12		
202 [WI (p. 98)]		ENGL 499	Senior Project in Literature	4.0
ENGL	Post-Colonial Literature I	WRIT 312 [WI (p. 98)]	The Practice of Professional Writing	3.0
203 [WI (p. 98)]		Free Electives		6.0
SOC 210	Race, Ethnicity and Social Inequality	Term Credits		13.0
WGST 101	Introduction to Women's and Gender Studies	Total Credit: 182.0		
Term Credits	15.0			
Term 7				
COM 300 [WI (p. 98)]	On-line Journalism			
	3.0			

* See degree requirements (p. 98).

Co-op/Career Opportunities

English majors pursue many professional fields in addition to teaching and creative writing. Many go on to law school, politics and government, or business careers. The critical thinking, analytical and writing skills provided by our program are essential for high-level decision-making and problem solving in any professional situation.

Co-op employment is an option for English majors who can explore co-op or internship opportunities at Philadelphia museums, city government and visitors' bureaus, television and radio stations, law firms, and nonprofit organizations.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) for more detailed information on co-op and post-graduate opportunities.

Minor in English

The English minor provides students from other majors with a more intensive background in literature. Coursework in the minor exposes students to literature from a variety of periods, cultures and genres and also provides practice in critical thinking, literary analysis and writing. These courses enrich students' intellectual lives and provide them with skills that are valuable in a variety of professional situations.

Where a course required for the minor is already required for a student's major, the student is directed to choose another English elective. Other substitutions are permissible at the discretion of the Program Director.

Requirements

Select three of the following: 9.0

ENGL 200 [WI Classical to Medieval Literature
(p. 98)]

ENGL 201 Renaissance to the Enlightenment

ENGL 202 [WI Romanticism to Modernism
(p. 98)]

ENGL 203 [WI Post-Colonial Literature I
(p. 98)]

ENGL 204 Post-Colonial Literature II

ENGL 205 [WI American Literature I
(p. 98)]

ENGL 206 [WI American Literature II
(p. 98)]

ENGL 207 [WI African American Literature
(p. 98)]

ENGL 211 [WI British Literature I
(p. 98)]

ENGL 212 British Literature II

ENGL 214 Readings in Fiction

ENGL 215 [WI Readings in Poetry
(p. 98)]

ENGL 216 [WI Readings in Drama
(p. 98)]

Select two of the following: 6.0

WRIT 220 [WI Creative Nonfiction Writing
(p. 98)]

WRIT 225 [WI Creative Writing
(p. 98)]

WRIT 301 [WI Writing Poetry
(p. 98)]

WRIT 302 Writing Fiction

WRIT 303 Writing Humor and Comedy

WRIT 304 [WI Special Topics in Writing
(p. 98)]

WRIT 306 Writing About the Media

WRIT 310 Literary Editing & Publication

WRIT 312 [WI The Practice of Professional Writing
(p. 98)]

WRIT 400 [WI Writing in Cyberspace
(p. 98)]

WRIT 405 Internship in Literary Publishing

Select three of the following: 9.0

ENGL 300 [WI Literature & Science
(p. 98)]

ENGL 302 Environmental Literature

ENGL 303 Science Fiction

ENGL 305 [WI The Mystery Story
(p. 98)]

ENGL 306 Literature of Baseball

ENGL 307 Literature of the Holocausts

ENGL 310 [WI Period Studies
(p. 98)]

ENGL 315 [WI Shakespeare
(p. 98)]

ENGL 320 [WI Major Authors
(p. 98)]

ENGL 325 Topics in World Literature

ENGL 330 The Bible as Literature

ENGL 335 Mythology

ENGL 345 American Ethnic Literature

ENGL 350 Jewish Literature and Civilization

ENGL 355 [WI Women and Literature
(p. 98)]

ENGL 360 [WI Literature and Society
(p. 98)]

ENGL 365 Topics in African American Literature

ENGL 370 Topics in Literature and Medicine

ENGL 380 Literary Theory

Total Credits 24.0

English Faculty

Jan Armon, PhD (*University of Michigan*). Professor. Academic functions of personal writing, composition.

Valarie Arms, PhD (*Temple University*). Professor.

Kenneth Bingham, MA (*Temple University*). Teaching Professor. First-year writing; engineering ethics; literature of baseball.

Valerie Booth, PhD (*Emory University*). Assistant Teaching Professor.

Raymond Brebach, PhD (*University of Illinois*) Director, *Programs in English*. Associate Professor. Modern British fiction; the novel; textual studies.

André Carrington, PhD (*New York University*). Assistant Professor. Cultural politics of race, gender and genre; feminism criticism; critical race theory.

Paula Marantz Cohen, PhD (*Columbia University*) Co-editor, *Journal of Modern Literature*; *Host of the Drexel Interview*. Distinguished Professor. Nineteenth- and early twentieth-century English and American literature; film studies.

Albert DiBartolomeo, MA (*Temple University*) Co-Director, *Drexel Publishing Group*. Teaching Professor. Creative writing; first-year writing; non-fiction.

Dan Driscoll, MA (*Temple University*) Associate Director, *Writing Center*. Associate Teaching Professor. First-year writing.

Anne Erickson, PhD (*Purdue University*). Assistant Teaching Professor. Online educational applications; the short story cycle.

Nomi Eve, MFA (*Brown University*). Assistant Teaching Professor.

Lisa Farley, MEd (*Temple University*). Associate Teaching Professor. English as a Second Language (ESL)

Robert Finegan, MFA (*University of Pittsburgh*). Associate Teaching Professor. First-year writing; technical and creative writing.

Alexis Finger, MS (*Queens College, CUNY*). Associate Teaching Professor. Speech; ESL; oral communication.

Valerie Fox, PhD (*SUNY at Binghamton*) Founding Editor, *Press 1*. Associate Teaching Professor. Twentieth century drama; modern and contemporary American poetry; first-year writing.

Edward Fristrom, PhD (*State University of New York-Albany*). Associate Teaching Professor. Professional writing, creative writing, multimedia, and writing education.

Keunah Han Assistant Teaching Professor.

Cassandra Hirsch, MFA (*Rosemont College*). Assistant Teaching Professor. Fiction.

Gabriella Ibieta, PhD (*City University of New York*). Associate Professor. Comparative literature; Cuban and Latin American fiction.

Rebecca Ingalls, PhD (*University of Michigan*) Director, *First-Year Writing Program*. Associate Professor. Composition and rhetoric.

Henry Israeli, MFA (*University of Iowa*) Associate Director, *Certificate in Writing and Publishing*. Assistant Teaching Professor. Founder and editor of *Saturnalia Books*, a publisher of contemporary poetry.

Kirsten Kaschock, PhD (*University of Georgia*). Assistant Teaching Professor. Editor-in-chief of thINKing DANCE.

Miriam Kotzin, PhD (*New York University*) Founding Editor, *Per Contra*. Professor. American literature; genre studies; creative writing; communications.

Stephen Mandell, PhD (*Temple University*). Professor. First-year writing; technical writing; speech; American literature.

Deirdre McMahon, PhD (*University of Iowa*). Associate Teaching Professor. 19th-century British literature and culture: empire, critical race studies and analyses of material culture.

Kathleen McNamee, MA (*Cambridge University*). Associate Teaching Professor. Nineteenth-century American literature; British Modernism; first-year writing.

Marianallet Mendez-Rivera, PhD (*University of Minnesota*). Assistant Teaching Professor. Use of the mass media to secure, maintain and enhance political power; international technical communication—including issues of translation v. localization.

Harriet Levin Millan, MFA (*University of Iowa*) Director, *Certificate in Writing and Publishing*. Associate Teaching Professor. Poetry

Jill Moses Assistant Teaching Professor.

Christopher Nielson, PhD (*Purdue University*) Assistant Department Head. Teaching Professor. Shakespeare; renaissance drama and literature; dramatic literature; first-year writing.

Karen Nulton, PhD (*Rutgers University*) Director, *Writing Assessment*. Associate Teaching Professor. Writing assessment, writing pedagogy, and writing across the curriculum.

Emilie S. Passow, PhD (*Columbia University*) Director, *Certificate Program in Medical Humanities*. Associate Teaching Professor. Judaic studies; medical humanities; nineteenth-century British literature.

Irvin Peckham, PhD (*University of California at San Diego*) Director, *First Year Writing Program*. Teaching Professor. Social class theory and writing instruction; writing assessment; and the use of personal writing in classroom settings

Margene Peterson, MA (*Rhode Island School of Design*). Instructor. English as a Second Language (ESL); the learning styles and strategies of non-native speakers of English.

Abioseh Porter, PhD (*University of Alberta, Canada*) Department Head, *English and Philosophy*. Professor. Comparative literature; postcolonial literatures; Editor, *JALA, Journal of the African Literature Association*.

Donald Riggs, PhD (*University of North Carolina-Chapel Hill*). Teaching Professor. Cinematic monsters; science fiction and fantasy literature and film; Renaissance literature; creative writing; Freshman writing.

Donna Rondolone, PhD (*University of Pennsylvania*). Associate Teaching Professor. Medieval literature; Arthurian legend; first-year writing.

Gail Rosen, JD (*Temple University*). Associate Teaching Professor. Literature and law; first-year writing.

Doreen Alvarez Saar, PhD (*SUNY Buffalo*) *American Literature Editor, Rocky Mountain Review of Language and Literature*. Professor. Early American literature; Eighteenth century America; race and gender studies.

Sheila Sandapen, PhD (*Indiana University of Pennsylvania*). Assistant Teaching Professor. First-year writing; cultural studies; women's studies; history and film.

Fred A. Siegel, PhD (*New York University*) Assistant Director, *First-Year Writing Program*. Teaching Professor. Popular theater; dramatic literature, creative non-fiction; first-year writing.

Scott Stein, MFA (*University of Miami*). Teaching Professor. Creative writing; first-year writing; founding editor, *When Falls the Coliseum: A Journal of American Culture (Or Lack Thereof)*.

Elizabeth Thorpe, MFA (*Goddard College*). Assistant Teaching Professor. New England literature, illness/healing narratives, and the creative process.

Eva Thury, PhD (*University of Pennsylvania*). Associate Professor. Mythology; classical literature; drama; first-year writing; desktop publishing and software documentation.

Kathleen Volk Miller, MA (*Rutgers University*) *Co-Director, Drexel Publishing Group; Director, Graduate Program in Publishing*. Teaching Professor. Co-Editor, *Painted Bride Quarterly (PBQ)*; creative writing; first-year writing.

Maria Volynsky, EdD (*Temple University*) *Associate Director, First-Year Writing Program*. Assistant Teaching Professor. English as a Second Language (ESL).

Marshall Warfield, MFA (*University of Pittsburgh*). Assistant Teaching Professor. Craft of composition and the craft of poetry.

Scott Warnock, PhD (*Temple University*) *Director, Drexel Writing Center; Director, University Writing Program*. Associate Professor. Rhetoric and composition; medical writing; information technology and literacy.

Robert A. Watts, MA (*Temple University*). Associate Teaching Professor. Creative writing; first-year writing.

Rachel Wenrick, MFA (*Columbia University*). Associate Teaching Professor. First-year writing program.

Vincent Williams, PhD (*Temple University*). Assistant Teaching Professor. First-year writing; the intersection of race, gender, class and urbanism.

Jennifer Yusin, PhD (*Emory University*). Associate Professor. Postcolonial literature; trauma theory; literary theory; psychoanalysis, and memory studies in contemporary literature in English.

Emeritus Faculty

Richard Astro, PhD (*University of Washington*) *Distinguished Professor*. Provost Emeritus. Twentieth-century American literature; literature and sports.

Environmental Science

Major: Environmental Science

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.5 - 186.5

Classification of Instructional Programs (CIP) code: 03.0104

Standard Occupational Classification (SOC) code: 19-2041

About the Program

The environmental science program at Drexel University is committed to educating undergraduates for technical careers and graduate study in the diverse areas of environmental science vital to restoration of a clean and healthy environment in the 21st century. The affiliation between the Academy of Natural Science (<http://www.ansp.org>) and Drexel University offers the opportunity to take a national leadership role in environmental science and environmental policy, and grow the scope, capacity and

reputation of the natural sciences at the University. The philosophy of the Biodiversity, Earth, and Environmental Science Department is "*Experiential Learning Early and Often.*"

Environmental science is a multidisciplinary field designed to examine environmental problems and find solutions. This field requires understanding of a number of disciplines, including biology, physics and chemistry. Solving some of our environmental problems also requires knowledge of environmental policy, ethics, and scientific data analysis.

The program has an integrated curricular approach designed around student laboratory investigations. The goal of this program is to give students not only knowledge about biology, chemistry, and ecology but also the ability to use the tools and skills of a scientist. The program includes extensive use of computers in the laboratory, and students make frequent oral and written presentations based on their laboratory projects.

Field experience electives may include trips to local aquatic and terrestrial habitats such as streams, lakes, the John Heinz National Wildlife Refuge, New Jersey Pine Barrens, Delaware, Barnegat and Chesapeake Bays, and Appalachian Mountains. Students are also encouraged to take advantage of study abroad (<http://www.drexel.edu/studyabroad>) options. These programs often require early planning so it is advisable for interested students to speak to their advisor about opportunities in their first year.

Concentrations are available in:

- Biodiversity and Evolution
- Earth Science
- Ecology & Conservation
- Environmental Science

Additional Information

For more information about the program, visit the Department of Biodiversity, Earth & Environmental Science's (<http://www.drexel.edu/coas/academics/departments-centers/bees>) web page.

Susan Cole

Undergraduate Advisor

Environmental Science

coless@drexel.edu or email bees@drexel.edu

Degree Requirements

The program is designed to prepare students for careers in environmental science, environmental assessment, marine science, applied ecology, biodiversity and conservation and paleontology. The requirements for specific concentrations in biodiversity and evolution; earth science; ecology & conservation; and environmental science follow the list of degree requirements.

Degree Requirements

Humanities and Social Science

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0
COM 310 [WI (p. 104)]	Technical Communication	3.0

PHIL 341	Philosophy of the Environment	3.0
or PHIL 251	Ethics	
UNIV S101	The Drexel Experience	1.0
UNIV S201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Humanities/Social Science electives		6.0
Mathematics and Statistics		18.0
Select one of the following sequences:		
Calculus sequence		
MATH 121	Calculus I	
MATH 122	Calculus II	
MATH 123	Calculus III	
Analysis sequence		
MATH 101	Introduction to Analysis I	
MATH 102	Introduction to Analysis II	
MATH 239	Mathematics for the Life Sciences	
Additional required mathematics courses:		
MATH 410	Scientific Data Analysis I	
MATH 411	Scientific Data Analysis II	
Physical Sciences		
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
CHEM 241	Organic Chemistry I	4.0
Physics sequence		
PHYS 152	Introductory Physics I	4.0
PHYS 153	Introductory Physics II	4.0
PHYS 154	Introductory Physics III	4.0
Biological Sciences		
BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
Geoscience Requirements		
GEO 103	Introduction to Field Methods in Earth Science	2.0
GEO 201 [WI (p. 104)]	Earth Systems Processes	3.0
GEO 301	Advanced Field Methods in Earth Science	2.0
Environmental Science Core Requirements		
ENVS 101	Introduction to Environmental Science	5.0
ENVS 102	Natural History, Research and Collections	2.0
ENVS 201	Practical Identification of Plants and Animals	2.0
ENVS 202	Tree of Life	2.0
ENVS 203	The Watershed Approach	2.0
ENVS 212	Evolution	4.0
ENVS 230	General Ecology	3.0
ENVS 302	Environmental Chemistry Laboratory	2.0
ENVS 308	GIS and Environmental Modeling	3.0
ENVS 441 [WI (p. 104)]	Issues in Global Change I: Seminar	2.0
ENVS 442	Issues in Global Change II: Research	2.0
ENVS 443	Issues in Global Change III: Synthesis	2.0
ENSS 341	Environmental Movements in America	4.0

or ENSS 347 Introduction to Environmental Policy Analysis

Environmental Science Lab Requirements 2.0

Environmental Concentration Requirements 12.0-16.0

See list of concentration requirements below.

Environmental Electives 15.0

Free Electives 24.0

Total Credits **182.5-186.5**

Environmental Science Concentrations

Each concentration has four required courses. In addition, the department maintains a menu of electives specific to each concentration. Check with the department for selecting the appropriate 12.0 - 16.0 credits of Environmental Science electives.

Biodiversity & Evolution Concentration

Required Courses

BIO 244	Genetics I	3.0
ENVS 312	Systematic Biology	3.0
ENVS 438	Biodiversity	3.0
ENVS 470	Advanced Topics in Evolution	3.0

Total Credits **12.0**

Earth Science Concentration

Required Courses

GEO 101	Physical Geology	4.0
GEO 102	History of Life on Earth	4.0
GEO 309	Geochemistry	4.0
GEO 310	Sedimentary Environments	4.0

Total Credits **16.0**

Ecology & Conservation Concentration

Required Courses

ENVS 284	Physiological and Population Ecology	3.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 328	Conservation Biology	3.0
Ecology & Conservation elective		3.0

Total Credits **12.0**

Environmental Science Concentration

Required Courses

GEO 101	Physical Geology	4.0
ENVS 275	Global Climate Change	3.0
ENVS 310	Introduction to Environmental Chemistry	3.0
ENSS 341	Environmental Movements in America	4.0
or ENSS 347	Introduction to Environmental Policy Analysis	

Total Credits **14.0**

Notes about Environmental Science Opportunities:

- Field experience electives include quantitative environmental measurements in local aquatic and terrestrial habitats, such as streams, lakes, the Delaware Bay, the Poconos, and the New Jersey Pine Barrens (for example, Field Botany: NJ Pine Barrens; Ecology of the Pine Barrens; Marine Field Methods).

- Students are required to consult frequently with their academic advisors for curriculum planning. Many of the graduate courses in environmental science are also open to qualified seniors who wish to become familiar with some of the applications in the field. Prerequisites and descriptions of available graduate courses appear in the graduate catalog.
- The Equatorial Guinea: Bioko Island Study Abroad Program offers a unique opportunity for undergraduates and recent graduates to study tropical biodiversity and its conservation, with an emphasis on field work that takes advantage of Bioko Island's pristine rainforests ranging from sea level to over 10,000 feet in altitude, its seven species of rare monkeys and its four species of nesting sea turtles. For more information, please visit the Drexel Study Abroad Office (<https://drexel.studioabroad.com/index.cfm?FuseAction=Abroad.Home>).

Sample Plan of Study

The plan of study below is a generic plan, suited for all four concentrations. Contact the program advisor for additional details.

		Credits
Term 1		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENVS 101	Introduction to Environmental Science	5.0
MATH 101 or 121	Introduction to Analysis I Calculus I	4.0
CHEM 101	General Chemistry I	3.5
UNIV S101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
BIO 124	Evolution Organismal Diversity	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102 or 122	Introduction to Analysis II Calculus II	4.0
CHEM 102	General Chemistry II	4.5
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		17.0
Term 3		
ENVS 102	Natural History, Research and Collections	2.0
GEO 103	Introduction to Field Methods in Earth Science	2.0
CHEM 103	General Chemistry III	5.0
BIO 126	Physiology and Ecology	4.5
MATH 239 or 123	Mathematics for the Life Sciences Calculus III	4.0
Term Credits		17.5
Term 4		
BIO 122	Cells and Genetics	4.5
ENVS 201	Practical Identification of Plants and Animals	2.0
CHEM 241	Organic Chemistry I	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Free Elective		3.0
Term Credits		16.5
Term 5		
ENVS 202	Tree of Life	2.0

ENVS 308	GIS and Environmental Modeling	3.0
GEO 201 [WI (p. 104)]	Earth Systems Processes	3.0
Humanities/Social Science elective		3.0
Free elective		3.0
Term Credits		14.0
Term 6		
ENVS 203	The Watershed Approach	2.0
ENVS 230	General Ecology	3.0
PHYS 152	Introductory Physics I	4.0
ENVS 212	Evolution	4.0
Humanities/Social Science elective		3.0
Term Credits		16.0
Term 7		
PHYS 153	Introductory Physics II	4.0
ENSS 341 or 347	Environmental Movements in America Introduction to Environmental Policy Analysis	4.0
UNIV S201	Looking Forward: Academics and Careers	1.0
ENVS concentration course [*]		3.0-4.0
Free elective		3.0
Term Credits		15.0-16.0
Term 8		
GEO 301	Advanced Field Methods in Earth Science	2.0
PHYS 154	Introductory Physics III	4.0
MATH 410	Scientific Data Analysis I	3.0
ENVS concentration course [*]		3.0-4.0
COM 230	Techniques of Speaking	3.0
Term Credits		15.0-16.0
Term 9		
ENVS 302	Environmental Chemistry Laboratory	2.0
ENVS concentration course [*]		3.0-4.0
MATH 411	Scientific Data Analysis II	3.0
COM 310 [WI (p. 104)]	Technical Communication	3.0
Free elective		3.0
Term Credits		14.0-15.0
Term 10		
ENVS 441 [WI (p. 104)]	Issues in Global Change I: Seminar	2.0
ENVS concentration course [*]		3.0-4.0
Environmental Science (ENVS) elective		3.0
Environmental Science (ENVS) lab elective		2.0
Free elective		3.0
Term Credits		13.0-14.0
Term 11		
ENVS 442	Issues in Global Change II: Research	2.0
Environmental Science (ENVS) electives		6.0
PHIL 341 or 251	Philosophy of the Environment Ethics	3.0
Free elective		3.0
Term Credits		14.0

Term 12

ENVS 443	Issues in Global Change III: Synthesis	2.0
	Environmental Science (ENVS) electives	6.0
	Free electives	6.0
Term Credits		14.0

Total Credit: 182.5-186.5

* See degree requirements (p. 104).

Co-op/Career Opportunities

Environmental scientists pursue careers in environmental assessment, environmental health, ecology, conservation, marine science, and atmospheric science.

Co-op Opportunities

Co-op and research opportunities will be available with the scientists at the Academy of Natural Sciences (<http://www.ansp.org>). In addition, recent co-op experiences have included:

CHPlanning, Center City Philadelphia
Lakes Environmental Assn., Maine
US Environmental Protection Agency, Center City Philadelphia
Criterion Lab Inc, Philadelphia PA Suburbs
Philadelphia Water Department, Philadelphia
Temple University, Philadelphia
Fairway Testing Co., NYC
University of Alaska, Fairbanks, Alaska
Bioko Biodiversity Protection Program, Equatorial Guinea
React Environmental Professional Services Group Inc., Philadelphia
Air Management Services, Philadelphia
Exelon Corporation, Philadelphia

Graduate Opportunities

Graduates in this major typically work for government environmental agencies, in environmental consulting firms, and in environmental departments of various industries. Additional training at the graduate level is an option for many students.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Biodiversity, Earth and Environmental Science Faculty

Walter F. Bien, PhD (*Drexel University*) *Director, Laboratory of Pinelands Research*. Research Professor. Natural resource management, restoration ecology, conservation biology, and New Jersey Pinelands community dynamics.

Elizabeth Burke Watson, PhD (*University of California, Berkeley*). Assistant Professor. The implications of global and regional environmental change, and unraveling the interacting effects of multiple anthropogenic stressors on coastal ecosystems to promote more informed management, conservation, and restoration.

Donald F. Charles, PhD (*Indiana University*) *Senior Scientist and Section Leader, Phycology Section, Academy of Natural Sciences*. Professor. Diatoms as water quality indicators; paleolimnological approaches for inferring change in biology and chemistry of lakes; lake management;

assessment of perturbations in aquatic ecosystems due to municipal and industrial effluents, land-use change, acid deposition, eutrophication and climate change.

Ted Daeschler, PhD (*University of Pennsylvania*) *Associate Curator of Vertebrate Zoology; Vice President for Systematic Biology and the Library: Academy of Natural Sciences*. Associate Professor. Vertebrate fauna of the Late Devonian Period in eastern North America; fossil collecting; systematic work focusing on freshwater vertebrates; nature of early non-marine ecosystems.

Daniel P. Duran, PhD (*Vanderbilt University*). Assistant Teaching Professor. Phylogeography, systematics and taxonomy, population and conservation genetics, ecological niche modeling, focusing on insect systems to better understand fundamental evolutionary processes and maintain biodiversity.

Jon Gelhaus, PhD (*University of Kansas*) *Curator, Department of Entomology: Academy of Natural Sciences*. Professor. Systematic expertise in crane flies (Tipuloidea); phylogenetic reconstruction; historical and ecological biogeography; biodiversity measures and evolution of morphological character systems.

Richard J. Horwitz, PhD (*University of Chicago*) *Senior Scientist; Fisheries Section Leader; Ruth Patrick Chair of Environmental Sciences*. Associate Professor. Reproductive ecology, life history and distribution of freshwater fishes; effects of land use, habitat structure and hydrology on population dynamics and species composition in aquatic systems; ecological modeling and biometry; anthropogenic contaminants in fishes.

Susan S. Kilham, PhD (*Duke University*). Professor. Aquatic ecology: phytoplankton; physiological ecology, especially of diatoms in freshwater and marine systems; large lakes; food webs; biogeochemistry.

Danielle Kreeger, PhD (*Oregon State University*). Research Associate Professor. Trophic interactions in aquatic ecosystems.

Tatyana Livshultz, PhD (*Cornell University*) *Assistant Curator of Botany*. Assistant Professor. Expertise of the milkweed and dogbane family (Apocynaceae); evolution and species diversity of the genus *Dischidia*; differences in floral form and function.

Richard McCourt, PhD (*University of Arizona*) *Associate Curator of Botany, Academy of Natural Sciences of Drexel University; 2010-2012: Program Director, Division of Graduate Education, National Science Foundation*. Professor. Biodiversity, evolution, ecology, and systematic of green algae, specifically charophyte algae.

Jerry V. Mead, PhD (*SUNY ESF*) *Assistant Scientist and Section Leader, Watershed and Systems Ecology Section*. Assistant Research Professor. Spatial modeling of aquatic ecosystems; bioenergetics of aquatic invertebrates and fishes; effects of water level management on aquatic organisms; biophysical economics and watershed planning; stream geomorphology and environmental conditions; economics and bioconservation; energy and fisheries.

Michael O'Connor, MD, PhD (*MD, Johns Hopkins University; PhD, Colorado State*). Associate Professor. Biophysical and physiological ecology, thermoregulation of vertebrates, ecological modeling.

Sean O'Donnell, PhD (*University of Wisconsin-Madison*). Professor. Tropical ecology, focusing on geographic variation and elevation effects on ecology and behavior of army ants and ant-bird interactions;

neurobiology, focusing on brain plasticity and brain evolution in social insects.

Marina Potapova, PhD (*Russian Academy of Sciences*) Assistant Curator. Assistant Professor. Taxonomy, ecology, and biogeography of freshwater diatoms; methods of quantifying morphological characters of diatom frustules based on geometric morphometrics; systematic of monoraphid freshwater diatoms.

Gary Rosenberg, PhD (*Harvard University*) *Pilsbry Chair of Malacology*. Professor. Magnitude and origin of species-level diversity in the Mollusca.

Jacob Russell, PhD (*University of Arizona*). Assistant Professor. The functional significance and evolutionary histories of symbioses between insects and bacteria.

Ron Smith, MS (*Rutgers University*). Instructor. Shorebird Ecology and Conservation; Amphibians of the NJ Pine Barrens; Restoration Ecology; Climate Change – Regional Effects and Education

James R. Spotila, PhD (*University of Arkansas*) *L. D. Betz Chair Professor*. Professor. Physiological and biophysical ecology, thermoregulation of aquatic vertebrates, biology of sea turtles.

Loyc Vanderkluysen, PhD (*University of Hawaii*). Assistant Professor. The cyclicity of volcanic eruptions, volcanic degassing processes, and large igneous provinces.

David J. Velinsky, PhD (*Old Dominion University*) *Department Head, Biodiversity, Earth and Environmental Science*. Professor. Geochemical cycling of organic and inorganic constituents of sediments and waters; Sedimentary diagenesis of major and minor elements; Isotope biogeochemistry of carbon, nitrogen and sulfur in marine and freshwater systems.

Jason Weckstein, PhD (*Louisiana State University*) *Associate Curator of Ornithology*. Associate Professor. Avian phylogenetics, comparative biology and evolutionary history; biodiversity surveys of birds and their parasites and pathogens; coevolutionary history of birds and their parasites.

Emeritus Faculty

John G. Lundberg, PhD (*University of Michigan*). Professor Emeritus. Diversity and diversification of fishes; documenting and interpreting the morphological, molecular, and taxonomic diversity of living and fossil fishes in the interrelated fields of systematic, faunistics and biogeography and paleobiology; exploration and collecting in poorly-known tropical freshwater habitats and regions.

Daniel Otte, PhD (*University of Michigan*) *Senior Curator, Systematics and Evolutionary Biology*. Professor Emeritus. Taxonomy and biogeography of Orthoptera (grasshoppers, crickets, katydids and their relatives).

Environmental Studies

Major: Environmental Science

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 03.0313

Standard Occupational Classification (SOC) code: 19-2041

About the Program

Note: Effective Fall 2014, students are no longer being accepted into this program. Please see the BA in Environmental Studies and Sustainability (p. 112).

The major in environmental studies is a multi-disciplinary program designed to provide students with both a technical grounding in environmental science as well as a strong emphasis in social science in order to prepare students for environmental policy careers

The causes and consequences of environmental problems are extremely complex, involving the connection of natural ecological systems to human systems such as physical infrastructure and the built environment. Equally important to understanding environmental problems are the social, economic and political considerations that govern society's ability to balance its current needs and desires with those of future generations. Indeed, ecological problems and their consequences are an enduring problem of society. Problems such as air and water pollution, exposure to toxic chemicals, sprawling land development, environmentally damaging energy extraction and unsustainable energy use practices, to name a few, all conspire to negatively influence our natural world as well as human health and well being.

The environmental studies major draws on the University's academic strengths in science, technology, social science and communication. Courses and faculty are drawn from a diverse set of academic programs: including the natural sciences, social sciences and the humanities. The program also benefits from Drexel's urban location -- as issues related to urban sustainability policy and planning, including urban redevelopment and land reuse practices, transportation policy, green building, energy efficiency, urban farming and food systems, recycling, and racial and class-based environmental justice and health -- are core topics of the program of study.

The degree is designed to prepare students for a wide set of vocational opportunities with governmental agencies, corporations, and nonprofit organizations that develop, implement and communicate environmental policies. Students are strongly encouraged to gain valuable professional experience through Drexel's cooperative education program.

For more information visit the Department of Biodiversity, Earth & Environmental Science (<http://www.drexel.edu/coas/academics/departments-centers/bees>) web page.

Degree Requirements

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
or ANTH 110	Human Past: Anthropology and Prehistoric Archeology	
BIO 107	Cells, Genetics & Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
BIO 109	Biological Diversity, Ecology & Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
COM 150	Mass Media and Society	3.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSCI 110	American Government I	4.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
UNIV H101	The Drexel Experience	2.0
Two English (ENGL) Electives *		6.0
Philosophy (PHIL) Elective		3.0
Two History (HIST) Electives		6.0
Math Sequences		8.0
Select one of the following sequences:		
MATH 101 & MATH 102	Introduction to Analysis I and Introduction to Analysis II	
MATH 121 & MATH 122	Calculus I and Calculus II	
Environmental Studies Core Requirements		
Theory Sequence Requirements		
COM 210	Theory and Models of Communication	3.0
SOC 260 [WI (p. 108)]	Classical Social Theory	3.0
ANTH 410 or SOC 460	Cultural Theory Contemporary Social Theory	3.0
Methods Sequence Requirements		
COM 220	Qualitative Research Methods	3.0
SOC 250	Research Methods I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0
Natural Science Requirements		
ENVS 230	General Ecology	3.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 328	Conservation Biology	3.0
Natural Science Elective **		3.0
Other Required Courses		
ANTH 360	Culture and the Environment	3.0
COM 316	Campaigns for Health & Environment	3.0
COM 317 [WI (p. 108)]	Environmental Communication	3.0
CJS 373	Environmental Crime	3.0
ENSS 325	Introduction to Urban and Environmental Planning	3.0
ENSS 341	Environmental Movements in America	3.0
ENSS 345	Sociology of the Environment	3.0
ENSS 346	Environmental Justice	3.0
ENSS 347	Introduction to Environmental Policy Analysis	3.0
ENVS 260	Environmental Science and Society	3.0
PSCI 331	Environmental Politics	4.0
SOC 240	Urban Sociology	3.0
Other Environmental Studies Program Electives		
Select ten of the following:		30.0
BIO 118	Basics of Cancer	
BIO 220	Essential Microbiology	
CHEM 111	General Chemistry I	
CHEM 112	General Chemistry II	

CHEM 151	Applied Chemistry	
COM 101	Human Communication	
COM 230	Techniques of Speaking	
COM 260 [WI (p. 108)]	Fundamentals of Journalism	
COM 270 [WI (p. 108)]	Business Communication	
COM 280	Public Relations Principles and Theory	
COM 310 [WI (p. 108)]	Technical Communication	
COM 318	Film, Celebrity and the Environmental Movement	
COM 320 [WI (p. 108)]	Science Writing	
COM 350 [WI (p. 108)]	Message Design and Evaluation	
COM 375 [WI (p. 108)]	Grant Writing	
ENGL 302	Environmental Literature	
ENSS 275	Global Climate Change	
ENSS 480	Special Topics	
ENVS 284	Physiological and Population Ecology	
ENVS 285 [WI (p. 108)]	Population Ecology Laboratory	
ENVS 321	Environmental Health	
ENVS 322	Tropical Ecology	
ENVS 330	Aquatic Ecology	
ENVS 413	Advanced Population Ecology	
ENVS 436	Principles of Toxicology I	
ENVS 437	Principles of Toxicology II	
ENVS 441 [WI (p. 108)]	Issues in Global Change I: Seminar	
HNRS 201	Colloquium I	
PHEV 145	Weather I: Climate and Global Change	
PHIL 335	Global Ethical Issues	
PHIL 341	Philosophy of the Environment	
PSCI 211	American Government II	
PSCI 371	Science, Technology, & Public Policy	
PSCI 372	City in United States Political Development	
PSY 150	Introduction to Social Psychology	
SOC 110	Sociology of the Future	
SOC 115	Social Problems	
SOC 235	Sociology of Health and Illness	
SOC 330	Development and Underdevelopment in the Global South	
SOC 340	Globalization	
SOC 343	The American Experience of the Wilderness	
SOC 344	Social Movements	
SOC 349	Sociology of Disasters	

Free Electives 19.0

Total Credits 182.0

Sample Plan of Study

		Credits
Term 1		
BIO 107	Cells, Genetics Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
MATH 101	Introduction to Analysis I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
SOC 101	Introduction to Sociology	3.0
UNIV H101	The Drexel Experience	2.0
Term Credits		16.0
Term 2		
BIO 109	Biological Diversity, Ecology Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122 or 102	Calculus II Introduction to Analysis II	4.0
Environmental Studies Program Elective*		3.0
Term Credits		14.0
Term 3		
COM 150	Mass Media and Society	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENVS 230	General Ecology	3.0
ANTH 110 or 101	Human Past: Anthropology and Prehistoric Archeology Introduction to Cultural Diversity	3.0
Environmental Studies Program Elective*		3.0
Term Credits		15.0
Term 4		
COM 210	Theory and Models of Communication	3.0
COM 220	Qualitative Research Methods	3.0
ECON 201	Principles of Microeconomics	4.0
ENVS 260	Environmental Science and Society	3.0
SOC 240	Urban Sociology	3.0
Term Credits		16.0
Term 5		
ANTH 360	Culture and the Environment	3.0
ECON 202	Principles of Macroeconomics	4.0
ENSS 345	Sociology of the Environment	3.0
SOC 250	Research Methods I	3.0
SOC 260 [WI (p. 108)]	Classical Social Theory	3.0
Term Credits		16.0
Term 6		
CJS 373	Environmental Crime	3.0
ENVS 286	Community and Ecosystem Ecology	3.0
PSCI 110	American Government I	4.0
PSY 101	General Psychology I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0
Term Credits		16.0
Term 7		

ENSS 346	Environmental Justice	3.0
PSCI 331	Environmental Politics	4.0
ENSS 341	Environmental Movements in America	3.0
Environmental Studies Program Elective*		3.0
Natural Science Elective		3.0
Term Credits		16.0
Term 8		
COM 317 [WI (p. 108)]	Environmental Communication	3.0
English Literature Course 200-level or Above		3.0
Environmental Studies Program Electives*		9.0
Term Credits		15.0
Term 9		
COM 316	Campaigns for Health Environment	3.0
English Literature Course 200-level or Above		3.0
ENSS 325	Introduction to Urban and Environmental Planning	3.0
Environmental Studies Program Elective*		3.0
History (HIST) Elective		3.0
Term Credits		15.0
Term 10		
Free Elective		3.0
ENSS 347	Introduction to Environmental Policy Analysis	3.0
Philosophy (PHIL) Elective		3.0
Environmental Studies Program Electives*		6.0
Term Credits		15.0
Term 11		
SOC 460 [WI (p. 108)] or ANTH 410	Contemporary Social Theory Cultural Theory	3.0
Free Elective		3.0
History (HIST) Elective		3.0
Environmental Studies Program Elective*		3.0
Term Credits		12.0
Term 12		
ENVS 328	Conservation Biology	3.0
Free Electives		13.0
Term Credits		16.0
Total Credit: 182.0		

* See degree requirements (p. 108).

Minor in Environmental Studies

The environmental studies minor is an interdisciplinary minor designed to give students specializing in other fields a background in contemporary environmental issues and the ability to analyze such issues. For students majoring in such fields as business and engineering, the minor in environmental studies will provide them with the tools to make better decisions about products or projects related to environmental economics, politic pollutants, environmental policy, and environmental justice. For students who are liberal arts majors, the minor in environmental studies offers the opportunity to focus on the social- and natural-science aspects

of the environment, and to be prepared for issues they may encounter in their careers.

Required Courses

ANTH 360	Culture and the Environment	3.0
COM 317 [WI (p. 108)]	Environmental Communication	3.0
ENVS 260	Environmental Science and Society	3.0
SOC 240	Urban Sociology	3.0
ENVP 345	Sociology of the Environment	3.0
ENVP 365	Introduction to Environmental Policy Analysis	3.0
Select two of the following:		6.0
COM 316	Campaigns for Health & Environment	
ECON 351	Resource and Environmental Economics	
PSCI 331	Environmental Politics	
ENVP 346	Environmental Justice	
ENVP 360	Environmental Movements in America	
CJ 373	Environmental Crimes	
SOC 470	Social Change & Planning	

Total Credits **24.0**

Biodiversity, Earth and Environmental Science Faculty

Walter F. Bien, PhD (*Drexel University*) *Director, Laboratory of Pinelands Research*. Research Professor. Natural resource management, restoration ecology, conservation biology, and New Jersey Pinelands community dynamics.

Elizabeth Burke Watson, PhD (*University of California, Berkeley*). Assistant Professor. The implications of global and regional environmental change, and unraveling the interacting effects of multiple anthropogenic stressors on coastal ecosystems to promote more informed management, conservation, and restoration.

Donald F. Charles, PhD (*Indiana University*) *Senior Scientist and Section Leader, Phycology Section, Academy of Natural Sciences*. Professor. Diatoms as water quality indicators; paleolimnological approaches for inferring change in biology and chemistry of lakes; lake management; assessment of perturbations in aquatic ecosystems due to municipal and industrial effluents, land-use change, acid deposition, eutrophication and climate change.

Ted Daeschler, PhD (*University of Pennsylvania*) *Associate Curator of Vertebrate Zoology; Vice President for Systematic Biology and the Library; Academy of Natural Sciences*. Associate Professor. Vertebrate fauna of the Late Devonian Period in eastern North America; fossil collecting; systematic work focusing on freshwater vertebrates; nature of early non-marine ecosystems.

Daniel P. Duran, PhD (*Vanderbilt University*). Assistant Teaching Professor. Phylogeography, systematics and taxonomy, population and conservation genetics, ecological niche modeling, focusing on insect systems to better understand fundamental evolutionary processes and maintain biodiversity.

Jon Gelhaus, PhD (*University of Kansas*) *Curator, Department of Entomology; Academy of Natural Sciences*. Professor. Systematic expertise in crane flies (Tipuloidea); phylogenetic reconstruction; historical

and ecological biogeography; biodiversity measures and evolution of morphological character systems.

Richard J. Horwitz, PhD (*University of Chicago*) *Senior Scientist; Fisheries Section Leader; Ruth Patrick Chair of Environmental Sciences*. Associate Professor. Reproductive ecology, life history and distribution of freshwater fishes; effects of land use, habitat structure and hydrology on population dynamics and species composition in aquatic systems; ecological modeling and biometry; anthropogenic contaminants in fishes.

Susan S. Kilham, PhD (*Duke University*). Professor. Aquatic ecology: phytoplankton; physiological ecology, especially of diatoms in freshwater and marine systems; large lakes; food webs; biogeochemistry.

Danielle Kreeger, PhD (*Oregon State University*). Research Associate Professor. Trophic interactions in aquatic ecosystems.

Tatyana Livshultz, PhD (*Cornell University*) *Assistant Curator of Botany*. Assistant Professor. Expertise of the milkweed and dogbane family (Apocynaceae); evolution and species diversity of the genus *Dischidia*; differences in floral form and function.

Richard McCourt, PhD (*University of Arizona*) *Associate Curator of Botany, Academy of Natural Sciences of Drexel University; 2010-2012: Program Director, Division of Graduate Education, National Science Foundation*. Professor. Biodiversity, evolution, ecology, and systematic of green algae, specifically charophyte algae.

Jerry V. Mead, PhD (*SUNY ESF*) *Assistant Scientist and Section Leader, Watershed and Systems Ecology Section*. Assistant Research Professor. Spatial modeling of aquatic ecosystems; bioenergetics of aquatic invertebrates and fishes; effects of water level management on aquatic organisms; biophysical economics and watershed planning; stream geomorphology and environmental conditions; economics and bioconservation; energy and fisheries.

Michael O'Connor, MD, PhD (*MD, Johns Hopkins University; PhD, Colorado State*). Associate Professor. Biophysical and physiological ecology, thermoregulation of vertebrates, ecological modeling.

Sean O'Donnell, PhD (*University of Wisconsin-Madison*). Professor. Tropical ecology, focusing on geographic variation and elevation effects on ecology and behavior of army ants and ant-bird interactions; neurobiology, focusing on brain plasticity and brain evolution in social insects.

Marina Potapova, PhD (*Russian Academy of Sciences*) *Assistant Curator*. Assistant Professor. Taxonomy, ecology, and biogeography of freshwater diatoms; methods of quantifying morphological characters of diatom frustules based on geometric morphometrics; systematic of monoraphid freshwater diatoms.

Gary Rosenberg, PhD (*Harvard University*) *Pilsbry Chair of Malacology*. Professor. Magnitude and origin of species-level diversity in the Mollusca.

Jacob Russell, PhD (*University of Arizona*). Assistant Professor. The functional significance and evolutionary histories of symbioses between insects and bacteria.

Ron Smith, MS (*Rutgers University*). Instructor. Shorebird Ecology and Conservation; Amphibians of the NJ Pine Barrens; Restoration Ecology; Climate Change – Regional Effects and Education

James R. Spotila, PhD (*University of Arkansas*) *L. D. Betz Chair Professor*. Professor. Physiological and biophysical ecology, thermoregulation of aquatic vertebrates, biology of sea turtles.

Loyc Vanderkluisen, PhD (*University of Hawaii*). Assistant Professor. The cyclicity of volcanic eruptions, volcanic degassing processes, and large igneous provinces.

David J. Velinsky, PhD (*Old Dominion University*) *Department Head, Biodiversity, Earth and Environmental Science*. Professor. Geochemical cycling of organic and inorganic constituents of sediments and waters; Sedimentary diagenesis of major and minor elements; Isotope biogeochemistry of carbon, nitrogen and sulfur in marine and freshwater systems.

Jason Weckstein, PhD (*Louisiana State University*) *Associate Curator of Ornithology*. Associate Professor. Avian phylogenetics, comparative biology and evolutionary history; biodiversity surveys of birds and their parasites and pathogens; coevolutionary history of birds and their parasites.

Emeritus Faculty

John G. Lundberg, PhD (*University of Michigan*). Professor Emeritus. Diversity and diversification of fishes; documenting and interpreting the morphological, molecular, and taxonomic diversity of living and fossil fishes in the interrelated fields of systematic, faunistics and biogeography and paleobiology; exploration and collecting in poorly-known tropical freshwater habitats and regions.

Daniel Otte, PhD (*University of Michigan*) *Senior Curator, Systematics and Evolutionary Biology*. Professor Emeritus. Taxonomy and biogeography of Orthoptera (grasshoppers, crickets, katydids and their relatives).

Environmental Studies and Sustainability

Major: Environmental Studies and Sustainability

Degree Awarded: Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 184.0

Classification of Instructional Programs (CIP) code: 03.0313

Standard Occupational Classification (SOC) code: 19-2041

The BA in Environmental Studies and Sustainability is administered in the Department of Biodiversity, Earth and Environmental Science. It is a multidisciplinary degree that takes advantage of existing courses in both the Arts and Sciences to educate graduates who will be able to work in government agencies, corporations and nonprofit organizations who develop, implement or are affected by environmental policies.

Objective

The objective of this major is to educate students so that they will be successful in finding common solutions to environmental challenges that all societies will face in the 21st century. Graduates will be educated with the goal of thinking in terms of cross-cultural ideas and dialogue. In that way they will be encouraged to help people of all cultures understand environmental problems and act in the area of environmental stewardship.

The BA in Environmental Studies and Sustainability will provide our graduates with communication skills, collaboration abilities and team

orientation, a “customer” orientation, creativity and innovative thinking ability, a broad environmental science understanding, analytical ability and critical thinking and problem solving ability, a work orientation with professionalism and a positive attitude, occupation-specific skill and knowledge through co-op, and leadership ability.

Drexel Advantage

There is a distinct advantage to a student in undertaking an environmental studies degree at Drexel. Drexel University was one of the first universities in the nation to establish an undergraduate environmental science degree in the late 1960s. Since that time Drexel is known for its research and scholarship in this area. Over the long history of the program, Drexel has established an extensive network of co-op employers who value Drexel students. Therefore, there is a natural constituency for our students in Environmental Studies and Sustainability as well. Drexel students will take advantage of the co-op program to both get more extensive experience and get paid while doing so.

Degree Requirements

General Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
ENSS 120	Introduction to Environmental Studies	3.0
UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0

Social and Behavioral Sciences

ANTH 101	Introduction to Cultural Diversity	3.0
or ANTH 110	Human Past: Anthropology and Prehistoric Archeology	
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
PSCI 110	American Government I	4.0

Physical and Natural Sciences

BIO 109	Biological Diversity, Ecology & Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
ENVS 101	Introduction to Environmental Science	5.0
ENVS 230	General Ecology	3.0
ENSS 275	Global Climate Change	3.0
or ENVS 289	Global Warming, Biodiversity and Your Future	
ENVS 328	Conservation Biology	3.0
GEO 201 [WI (p. 112)]	Earth Systems Processes	3.0

Humanities and Fine Arts

PHIL 251	Ethics	3.0
PHIL 341	Philosophy of the Environment	3.0
Humanities & Fine Arts Electives		6.0

Diversity Electives

International Studies		6.0
Foreign Language (up to 201)		8.0

ENSS Core Requirements

Economics		
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ENVS 351	Resource and Environmental Economics	4.0
Policy and Planning		
ENVS 308	GIS and Environmental Modeling	4.0
PSCI 331	Environmental Politics	3.0
ENSS 325	Introduction to Urban and Environmental Planning	3.0
ENSS 326	Cities and Sustainability	3.0
ENSS 347	Introduction to Environmental Policy Analysis	3.0
GEO 306	Environmental Geology	4.0
Social Science		
ENVS 260	Environmental Science and Society	3.0
ANTH 360	Culture and the Environment	3.0
SOC 344	Social Movements	3.0
ENSS 341	Environmental Movements in America	3.0
ENSS 345	Sociology of the Environment	3.0
ENSS 346	Environmental Justice	3.0
Theory and Research		
Theory Sequence		
SOC 260 [WI (p. 112)]	Classical Social Theory	3.0
SOC 460 [WI (p. 112)]	Contemporary Social Theory	3.0
Methods Sequence		
SOC 250	Research Methods I	3.0
SOC 364	Computer-Assisted Data Analysis	3.0
COM 220	Qualitative Research Methods	3.0
or SOC 350	Research Methods II	
Senior Sequence		
ENVS 441 [WI (p. 112)]	Issues in Global Change I: Seminar	2.0
ENVS 442	Issues in Global Change II: Research	2.0
ENVS 443	Issues in Global Change III: Synthesis	2.0
Free Electives		24.0
Total Credits		184.0

Sample Plan of Study

Term 1	Credits	
ENSS 120	Introduction to Environmental Studies	3.0
ENVS 101	Introduction to Environmental Science	5.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV S101	The Drexel Experience	1.0
Term Credits	16.0	
Term 2		
BIO 109	Biological Diversity, Ecology Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0

MATH 102	Introduction to Analysis II	4.0
Foreign Language (103 or higher)		4.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		16.0
Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
SOC 101	Introduction to Sociology	3.0
ANTH 101 or 110	Introduction to Cultural Diversity Human Past: Anthropology and Prehistoric Archeology	3.0
Foreign Language (201 or higher)		4.0
Free elective		3.0
Term Credits		16.0
Term 4		
PSY 101	General Psychology I	3.0
ENVS 260	Environmental Science and Society	3.0
ENVS 230	General Ecology	3.0
ENSS 325	Introduction to Urban and Environmental Planning	3.0
Free elective		3.0
Term Credits		15.0
Term 5		
PSCI 110	American Government I	4.0
ENSS 275 or ENVS 289	Global Climate Change Global Warming, Biodiversity and Your Future	3.0
ENVS 308	GIS and Environmental Modeling	4.0
PHIL 341	Philosophy of the Environment	3.0
Term Credits		14.0
Term 6		
ECON 201	Principles of Microeconomics	4.0
SOC 260 [WI (p. 112)]	Classical Social Theory	3.0
Free elective		3.0
ENSS 341	Environmental Movements in America	3.0
ENSS 326	Cities and Sustainability	3.0
Term Credits		16.0
Term 7		
ECON 202	Principles of Macroeconomics	4.0
SOC 250	Research Methods I	3.0
ENSS 347	Introduction to Environmental Policy Analysis	3.0
International elective		3.0
Free elective		3.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Term Credits		17.0
Term 8		
ANTH 360	Culture and the Environment	3.0
COM 220 or SOC 350	Qualitative Research Methods Research Methods II	3.0
ENVS 351	Resource and Environmental Economics	4.0
ENVS 328	Conservation Biology	3.0
Free elective		3.0
Term Credits		16.0
Term 9		
SOC 364	Computer-Assisted Data Analysis	3.0

GEO 201 [WI Earth Systems Processes (p. 112)]	3.0	restoration ecology, conservation biology, and New Jersey Pinelands community dynamics.
PHIL 251 Ethics	3.0	Elizabeth Burke Watson, PhD (<i>University of California, Berkeley</i>). Assistant Professor. The implications of global and regional environmental change, and unraveling the interacting effects of multiple anthropogenic stressors on coastal ecosystems to promote more informed management, conservation, and restoration.
Diversity elective	3.0	
Free elective	3.0	
Term Credits	15.0	
Term 10		
ENVS 441 [WI Issues in Global Change I: Seminar (p. 112)]	2.0	Donald F. Charles, PhD (<i>Indiana University</i>) Senior Scientist and Section Leader, <i>Phycology Section, Academy of Natural Sciences</i> . Professor. Diatoms as water quality indicators; paleolimnological approaches for inferring change in biology and chemistry of lakes; lake management; assessment of perturbations in aquatic ecosystems due to municipal and industrial effluents, land-use change, acid deposition, eutrophication and climate change.
PSCI 331 Environmental Politics	3.0	
SOC 460 [WI Contemporary Social Theory (p. 112)]	3.0	
ENSS 346 Environmental Justice	3.0	
Humanities & Fine Arts elective	3.0	Ted Daeschler, PhD (<i>University of Pennsylvania</i>) Associate Curator of <i>Vertebrate Zoology; Vice President for Systematic Biology and the Library: Academy of Natural Sciences</i> . Associate Professor. Vertebrate fauna of the Late Devonian Period in eastern North America; fossil collecting; systematic work focusing on freshwater vertebrates; nature of early non-marine ecosystems.
Term Credits	14.0	
Term 11		
ENVS 442 Issues in Global Change II: Research	2.0	
GEO 306 Environmental Geology	4.0	
ENSS 345 Sociology of the Environment	3.0	
International elective	3.0	
Free elective	3.0	Daniel P. Duran, PhD (<i>Vanderbilt University</i>). Assistant Teaching Professor. Phylogeography, systematics and taxonomy, population and conservation genetics, ecological niche modeling, focusing on insect systems to better understand fundamental evolutionary processes and maintain biodiversity.
Term Credits	15.0	
Term 12		
ENVS 443 Issues in Global Change III: Synthesis	2.0	
SOC 344 Social Movements	3.0	Jon Gelhaus, PhD (<i>University of Kansas</i>) Curator, <i>Department of Entomology: Academy of Natural Sciences</i> . Professor. Systematic expertise in crane flies (Tipuloidea); phylogenetic reconstruction; historical and ecological biogeography; biodiversity measures and evolution of morphological character systems.
Diversity elective	3.0	
Humanities & Fine Arts elective	3.0	
Free elective	3.0	Richard J. Horwitz, PhD (<i>University of Chicago</i>) Senior Scientist; <i>Fisheries Section Leader; Ruth Patrick Chair of Environmental Sciences</i> . Associate Professor. Reproductive ecology, life history and distribution of freshwater fishes; effects of land use, habitat structure and hydrology on population dynamics and species composition in aquatic systems; ecological modeling and biometry; anthropogenic contaminants in fishes.
Term Credits	14.0	

Total Credit: 184.0

The largest job opportunities exist in the areas of environmental communication, sustainability, environmental policy, community action, water quality, parks, outdoor recreation, ecotourism, natural resources and conservation, policy analyst, naturalist, international environmental specialist, and renewable energy.

This major will educate individuals who seek careers and/or additional academic training in the following fields:

- Sustainability planning and implementation
- Urban, Regional and Community Planning
- Geographic Information Systems
- Environmental Communications
- Environmental Journalism
- Environmental Law
- Park Management and Outdoor Recreation
- Environmental Consulting
- Environmental Policy Analysis

Biodiversity, Earth and Environmental Science Faculty

Walter F. Bien, PhD (*Drexel University*) Director, *Laboratory of Pinelands Research*. Research Professor. Natural resource management,

Jerry V. Mead, PhD (*SUNY ESF*) Assistant Scientist and Section Leader, *Watershed and Systems Ecology Section*. Assistant Research Professor. Spatial modeling of aquatic ecosystems; bioenergetics of aquatic invertebrates and fishes; effects of water level management

on aquatic organisms; biophysical economics and watershed planning; stream geomorphology and environmental conditions; economics and bioconservation; energy and fisheries.

Michael O'Connor, MD, PhD (*MD, Johns Hopkins University; PhD, Colorado State*). Associate Professor. Biophysical and physiological ecology, thermoregulation of vertebrates, ecological modeling.

Sean O'Donnell, PhD (*University of Wisconsin-Madison*). Professor. Tropical ecology, focusing on geographic variation and elevation effects on ecology and behavior of army ants and ant-bird interactions; neurobiology, focusing on brain plasticity and brain evolution in social insects.

Marina Potapova, PhD (*Russian Academy of Sciences*) *Assistant Curator*. Assistant Professor. Taxonomy, ecology, and biogeography of freshwater diatoms; methods of quantifying morphological characters of diatom frustules based on geometric morphometrics; systematic of monoraphid freshwater diatoms.

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Jacob Russell, PhD (*University of Arizona*). Assistant Professor. The functional significance and evolutionary histories of symbioses between insects and bacteria.

Ron Smith, MS (*Rutgers University*). Instructor. Shorebird Ecology and Conservation; Amphibians of the NJ Pine Barrens; Restoration Ecology; Climate Change – Regional Effects and Education

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Loyc Vanderkluysen, PhD (*University of Hawaii*). Assistant Professor. The cyclicity of volcanic eruptions, volcanic degassing processes, and large igneous provinces.

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Daniel Otte, PhD (*University of Michigan*) *Senior Curator, Systematics and Evolutionary Biology*. Professor Emeritus. Taxonomy and

biogeography of Orthoptera (grasshoppers, crickets, katydids and their relatives).

Geoscience

Major: Geoscience

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 185.0 - 189.0

Classification of Instructional Programs (CIP) code: 40.0601

Standard Occupational Classification (SOC) code: 11-9121; 19-2042

About the Program

From energy to climate change to environmental degradation, many of the most pressing societal issues of the coming century will pertain to geoscience. The study of the Earth is central to maintaining clean drinking water, mitigating environmental contamination, providing ores and rare elements necessary for industry, and locating new sources of energy.

The Biodiversity, Earth and Environmental Science (BEES) Department offers a major in geoscience, with three concentration options designed to meet the needs of students wishing to pursue graduate school or immediate employment in the geosciences:

- Applied Geology
- General Geoscience
- Paleontology

The core requirements encompass foundational courses in science, writing, and math, and traditional courses that form the backbone of the geosciences. Building upon these are innovative courses focused on Earth systems processes, key environmental issues, practical field experiences, and advanced geological study.

In addition to nourishing and honing the passions of students studying the Earth, the core curriculum is designed to:

1. Instill key technical skills early-on, as a pathway to high-quality co-op opportunities;
2. Lay the groundwork for our students to pursue advanced graduate study in the geosciences and other disciplines, and;
3. Enable our graduates to translate marketable skills and knowledge into high-quality jobs in industry and government.

Geoscience majors will begin their field experiences during the first term of their freshmen year. Most courses include a laboratory section or a hands-on recitation section ("dry lab"), plus at least three field trips to relevant regional geological sites. These courses, combined with the co-op experience and summer geological field camp, provide students real-world experience in the field.

About the Concentrations

Applied Geology

The applied geology concentration is designed for students wishing to enter the geoscience workforce upon graduation. Possible employment opportunities include jobs in: environmental consulting, geotechnical consulting, geophysical consulting, the petroleum and natural gas industry, the mining industry, federal agencies (e.g., USGS, USDA, NOAA, FEMA, EPA, DOI, and Army Corps of Engineers), and state

and local agencies (e.g., state environmental agencies, state geological surveys, and municipal water departments).

General Geoscience

The general geoscience concentration allows maximum flexibility and is designed for students wishing to pursue other areas of study within the geosciences, students wishing to pursue policy-related careers, and students planning to apply to professional graduate programs, such as those in law or business schools. The policy component of this concentration allows students to explore related societal issues, which may help guide their career aspirations. This concentration also provides transfer students with a pathway to graduate on time.

Students graduating from this concentration will be well prepared to enter graduate school in science or policy, as well as to pursue professional studies. Students seeking immediate employment will be competitive for jobs with, for example, certain NGOs, environmental foundations, consulting companies, and government policy positions related to natural resources and the environment.

Paleontology

The concentration in paleontology prepares students who are interested in pursuing related research in graduate school and students seeking entry-level positions in paleontology. Examples of these jobs include biostratigrapher for petroleum companies, fossil resource manager for the Bureau of Land Management, and related positions with the National Parks Service, USGS, and state geological surveys.

Undergraduates in this concentration benefit from world-class resources already established at the Academy of Natural Sciences. These include the Invertebrate paleontology collection, with over 1 million specimens; the vertebrate fossil collection, with over 22,000 specimens; historically important specimens, such as the Thomas Jefferson fossil collection, the first discovered dinosaur skeleton, and the first discovered tyrannosaur; and the paleobotany collection, with over 5,000 specimens, including a large proportion of type specimens.

Students in the paleontology concentration will have access to numerous fossil sites along the Atlantic Coastal Plain and in the Appalachian Province. Opportunities exist for student research at two well-established sites: Dr. Daeschler's Red Hill site, which produces evolutionarily important forms representing the fish to tetrapod transition; and Dr. Lacovara's Inversand site, which records a mass-death assemblage at the end of the Cretaceous Period.

Additional Information

For additional information about this program, visit the Biodiversity, Earth and Environmental Science (BEES) Department website.

Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0
COM 310 [WI (p. 115)]	Technical Communication	3.0
PHIL 251	Ethics	3.0
or PHIL 341	Philosophy of the Environment	

UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV S201	Looking Forward: Academics and Careers	1.0
	Humanities or Social Science electives	6.0
	Free electives	24.0

Mathematics and Statistics

	Choose one of the following math sequences:	12.0
MATH 101 & MATH 102 & MATH 239	Introduction to Analysis I and Introduction to Analysis II and Mathematics for the Life Sciences	
MATH 121 & MATH 122 & MATH 123	Calculus I and Calculus II and Calculus III	
MATH 410	Scientific Data Analysis I	3.0
MATH 411	Scientific Data Analysis II	3.0

Physical Sciences

CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
	Complete one of the following Physics sequences:	8.0

PHYS 152 & PHYS 153	Introductory Physics I and Introductory Physics II	
PHYS 101 & PHYS 102	Fundamentals of Physics I and Fundamentals of Physics II	

Complete one of the following Biological Sciences sequences: 8.0-9.0

BIO 107 & BIO 108 & BIO 109 & BIO 110	Cells, Genetics & Physiology and Cells, Genetics and Physiology Laboratory and Biological Diversity, Ecology & Evolution and Biological Diversity, Ecology and Evolution Laboratory	
BIO 124 & BIO 126	Evolution & Organismal Diversity and Physiology and Ecology	

Environmental Science

ENVS 101	Introduction to Environmental Science	5.0
ENVS 102	Natural History, Research and Collections	2.0
ENVS 212	Evolution	4.0
ENVS 441 [WI (p. 115)]	Issues in Global Change I: Seminar	2.0
ENVS 442	Issues in Global Change II: Research	2.0
ENVS 443	Issues in Global Change III: Synthesis	2.0

Geoscience Core Courses

GEO 101	Physical Geology	4.0
GEO 102	History of Life on Earth	4.0
GEO 103	Introduction to Field Methods in Earth Science	2.0
GEO 201 [WI (p. 115)]	Earth Systems Processes	3.0
GEO 210	Structural Geology	4.0
GEO 215	Minerology	4.0
GEO 301	Advanced Field Methods in Earth Science	2.0
GEO 310	Sedimentary Environments	4.0
GEO 311	Stratigraphy	4.0
GEO 320	Invertebrate Paleontology	4.0
GEO 401	Igneous and Metamorphic Petrology	4.0
	Geology Field Camp	3.0

GEO Electives *	8.0
Geoscience Concentration Courses	20.0-23.0
Applied Geology Concentration	
ENVS 308 GIS and Environmental Modeling	
GEO 306 Environmental Geology	
GEO 309 Geochemistry	
GEO 412 Geology of Groundwater	
GEO 418 Geophysics	
General Geoscience Concentration	
See the Biodiversity, Earth and Environmental Science (BEES) Department for the General Geoscience Concentration course list.	
Paleontology Concentration	
ENVS 202 Tree of Life	
GEO 365 Field Methods in Paleocology	
GEO 322 Vertebrate Paleontology	
Paleontology elective *	
Choose one of the following:	
BIO 224 Form, Function & Evolution of Vertebrates & BIO 225 and Vertebrate Biology and Evolution Laboratory	
ENVS 254 Invertebrate Morphology and Physiology & ENVS 255 and Invertebrate Morphology and Physiology Lab	

Total Credits 185.0-189.0

* See the Biodiversity, Earth and Environmental Science (BEES) for the GEO Core and Paleo elective list.

Sample Plan of Study

The sample plan of study is a general guideline that can be used for each of the three concentrations, depending on course selections in certain terms.

Term	Credits
Term 1	
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENVS 101 Introduction to Environmental Science	5.0
GEO 101 Physical Geology	4.0
MATH 101 Introduction to Analysis I or 121 Calculus I	4.0
UNIV S101 The Drexel Experience	1.0
Term Credits	17.0
Term 2	
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
GEO 102 History of Life on Earth	4.0
MATH 102 Introduction to Analysis II or 122 Calculus II	4.0
Choose to start CHEM or BIO sequence depending on concentration. Paleo students should take BIO 124 & BIO 126. Students interested in applied or geochemistry should start CHEM.	
CHEM 101 General Chemistry I or BIO 124 Evolution Organismal Diversity	3.5
CIVC 101 Introduction to Civic Engagement	1.0
Term Credits	15.5

Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENVS 102	Natural History, Research and Collections	2.0
GEO 103	Introduction to Field Methods in Earth Science	2.0
MATH 239 or 123	Mathematics for the Life Sciences Calculus III	4.0
CHEM 102 or BIO 126	General Chemistry II Physiology and Ecology	4.5

Term Credits 15.5

Term 4		
ENVS 212	Evolution	4.0
GEO 210	Structural Geology	4.0
CHEM 103 or 101	General Chemistry III General Chemistry I	5.0
	Humanities or Social Science elective	3.0

Term Credits 16.0

Term 5		
GEO 201 [WI (p. 115)]	Earth Systems Processes	3.0
GEO 215	Minerology	4.0
Choose one of the following two options, based on chosen concentration:		4.0-5.0

4-credit GEO concentration course
2-credit GEO concentration (Paleo) course and a 3-credit free elective

BIO 109 or CHEM 102	Biological Diversity, Ecology Evolution General Chemistry II	3.0
BIO 110 or CHEM 102	Biological Diversity, Ecology and Evolution Laboratory General Chemistry II	1.0

Term Credits 15.0-16.0

Term 6		
GEO 310	Sedimentary Environments	4.0
PHYS 152 or 101	Introductory Physics I Fundamentals of Physics I	4.0
BIO 107 or CHEM 103	Cells, Genetics Physiology General Chemistry III	3.0
BIO 108 or CHEM 103	Cells, Genetics and Physiology Laboratory General Chemistry III	1.0
COM 230	Techniques of Speaking	3.0

Term Credits 15.0

Term 7		
COM 310 [WI (p. 115)]	Technical Communication	3.0
GEO 311	Stratigraphy	4.0
PHYS 153 or 102	Introductory Physics II Fundamentals of Physics II	4.0
UNIV S201	Looking Forward: Academics and Careers	1.0
Select one of the following options based on chosen concentration:		3.0-5.0

GEO Concentration (Paleo) course
Free elective

Term Credits 15.0-17.0

Term 8

GEO 301	Advanced Field Methods in Earth Science	2.0
MATH 410	Scientific Data Analysis I	3.0
PHIL 251 or 341	Ethics Philosophy of the Environment	3.0
GEO Concentration elective		4.0
Free elective		3.0

Term Credits **15.0**

Term 9

GEO 320	Invertebrate Paleontology	4.0
MATH 411	Scientific Data Analysis II	3.0
GEO Concentration course		4.0
Free elective		3.0

Term Credits **14.0**

Term 10

Geology Field Camp Summer JR Year		3.0
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Term Credits **3.0**

Term 11

ENVS 441 [WI (p. 115)]	Issues in Global Change I: Seminar	2.0
Humanities or Social Science elective		3.0
GEO Concentration course		4.0
GEO elective		4.0
Free elective		3.0

Term Credits **16.0**

Term 12

ENVS 442	Issues in Global Change II: Research	2.0
GEO Concentration course		4.0
GEO elective		4.0
Free elective		6.0

Term Credits **16.0**

Term 13

ENVS 443	Issues in Global Change III: Synthesis	2.0
GEO 401	Igneous and Metamorphic Petrology	4.0
Free electives		6.0

Term Credits **12.0**

Total Credit: 185.0-188.0

Minor in Geoscience

Geosciences are at the core of numerous problems facing the world today, and impact the lives of communities across the planet. Climate change, natural disasters, access to mineral resources and clean water, and availability of energy all shape government policies and corporate strategies, and are a cause of concern for society at large.

The geoscience minor is designed to give students specializing in other fields the skills to understand and analyze these issues. It is a natural fit for environmental science majors who wish to understand how the physical world can impact biodiversity, ecological processes and environmental impacts. For students majoring in such fields as business and engineering, the minor in geoscience will provide them with the tools to make better decisions about products or projects related to natural hazards and their impact, cost and availability of natural resources, energy policy, space exploration, land use, and environmental justice. For students who are liberal arts majors, the minor in geoscience offers the

opportunity to explore earth science issues that shape the social, cultural, political and scientific debate, and to be prepared for issues they may encounter in their careers.

GEO 101	Physical Geology	4.0
GEO 102	History of Life on Earth	4.0

GEO Electives **16.0**

GEO 103	Introduction to Field Methods in Earth Science	
GEO 201 [WI (p. 115)]	Earth Systems Processes	
GEO 205	Dinosaurs and Their World	
GEO 210	Structural Geology	
GEO 215	Minerology	
GEO 301	Advanced Field Methods in Earth Science	
GEO 306	Environmental Geology	
GEO 309	Geochemistry	
GEO 310	Sedimentary Environments	
GEO 311	Stratigraphy	
GEO 320	Invertebrate Paleontology	
GEO 322	Vertebrate Paleontology	
GEO 324	Paleobotany	
GEO 340	Quaternary Geology	
GEO 342	Geomorphology	
GEO 346	Coastal Geology	
GEO 348	Oceanography	
GEO 365	Field Methods in Paleocology	
GEO 401	Igneous and Metamorphic Petrology	
GEO 412	Geology of Groundwater	
GEO 418	Geophysics	

Total Credits **24.0**

Co-Op/Career Opportunities

Co-Op Opportunities

There are over one hundred environmental, geophysical, and geotechnical firms within the greater Philadelphia region. Plus, there are opportunities with federal, state, and municipal agencies, jobs in central Pennsylvania related to the Marcellus Shale, and research opportunities between Drexel and the Academy of Natural Sciences.

All geoscience majors follow the five-year, three co-op plan of study program. Transfer students may be granted an exception for a two co-op plan of study, so that they may remain on schedule. The summer geological field camp will occur during the third co-op cycle. In this third co-op, geoscience students attend field camp and also partake in an abbreviated co-op work experience.

Career Opportunities

According to the US Bureau of Labor Statistics (BLS), employment for geoscientists through 2020 is expected to grow faster than the average for all occupations. In addition, the geosciences are expected to outpace life, physical, and social sciences in job creation. The employment outlook for geoscientists in Drexel's surrounding area is particularly bright, with a robust environmental consulting industry and exploding demand related to Marcellus Shale drilling.

The geoscience major, with its three concentrations, prepares students who are interested in entering the workforce immediately as well as those who are interested in pursuing related research in graduate schools.

Facilities and Field Sites

Facilities

The geoscience major leverages resources at Drexel University and the Academy of Natural Sciences (<http://www.ansp.org>), such as a mineral collection with 9,000 specimens, over a million fossil specimens, Dinosaur Hall, The Patrick Center for Environmental Research, a state-of-the-art fossil preparation lab, notable research programs, and faculty with expertise in geology, paleontology, and related disciplines.

Summer Geological Field Camp

Summer geological field camp is the quintessential undergraduate experience for geosciences students. It is a long-held tradition in geology departments that students head out West, during the summer before graduation, to apply their knowledge to real-world situations and to acquire field skills that will serve them throughout their careers. This is particularly important for students in eastern schools, where the mountains are small and outcrops are scarce. Field camp also provides networking and bonding opportunity for students. Friends made at field camp often become colleagues for life. At the Geological Society of America meeting, reunions are organized by university *and* by field camp.

The summer geological field camp for geoscience students will occur during the third co-op cycle.

Barnegat Bay Coastal Field Station

The BEES field station on Barnegat Bay in Waretown, NJ provides geoscience students with opportunities to engage in hands-on research in coastal geology, barrier island morphology, oceanography, and sedimentology. The facility includes a lodge, two classrooms/meeting rooms, dining hall, dormitories, and rustic cabins. The field station is located on 194 acres of diverse coastal habitat, including a maritime forest, tidal creek, salt marsh, fresh water pond, brackish impoundment, and bayshore environments. The department's research vessel gives students access to back-bay and near-shore marine environments.

The department holds its introductory field session for incoming freshmen and other events at the field station. The facility may also serve as a base for excursions into the Pine Barrens, a heavily forested area containing a number of interesting deposits related to the last glacial period.

Red Hill Fossil Site

The Red Hill fossil site, in Tioga County, Pennsylvania, exposes Devonian coastal sedimentary rocks that preserve a rich fossil fauna. Of particular importance is a fossil fish species, studied by Dr. Ted Daeschler, representing a critical transition between fish and tetrapods (land animals.) This site offers opportunities for studying vertebrate paleontology, stratigraphy, and sedimentology and provides students with a window into an important moment in the history of life on Earth.

Inversand Fossil Site: Local training ground for Geoscience Majors

The Inversand fossil site is a unique resource for geological education, research, and STEM outreach. The quarry is located in Gloucester County, NJ, only 20 minutes from Drexel's campus, making it possible to conduct field exercises there within a three-hour class period. The geological formations that outcrop in the Inversand Quarry have yielded

many new fossil species. The site has significance beyond vertebrate paleontology, however, and will provide a local laboratory for classes in geochemistry, geophysics, stratigraphy, sedimentology, hydrogeology, and environmental geology. As such, it will provide a valuable training-ground, a short distance from campus, for all Drexel geoscience majors.

Biodiversity, Earth and Environmental Science Faculty

Walter F. Bien, PhD (*Drexel University*) *Director, Laboratory of Pinelands Research*. Research Professor. Natural resource management, restoration ecology, conservation biology, and New Jersey Pinelands community dynamics.

Elizabeth Burke Watson, PhD (*University of California, Berkeley*). Assistant Professor. The implications of global and regional environmental change, and unraveling the interacting effects of multiple anthropogenic stressors on coastal ecosystems to promote more informed management, conservation, and restoration.

Donald F. Charles, PhD (*Indiana University*) *Senior Scientist and Section Leader, Phycology Section, Academy of Natural Sciences*. Professor. Diatoms as water quality indicators; paleolimnological approaches for inferring change in biology and chemistry of lakes; lake management; assessment of perturbations in aquatic ecosystems due to municipal and industrial effluents, land-use change, acid deposition, eutrophication and climate change.

Ted Daeschler, PhD (*University of Pennsylvania*) *Associate Curator of Vertebrate Zoology; Vice President for Systematic Biology and the Library: Academy of Natural Sciences*. Associate Professor. Vertebrate fauna of the Late Devonian Period in eastern North America; fossil collecting; systematic work focusing on freshwater vertebrates; nature of early non-marine ecosystems.

Daniel P. Duran, PhD (*Vanderbilt University*). Assistant Teaching Professor. Phylogeography, systematics and taxonomy, population and conservation genetics, ecological niche modeling, focusing on insect systems to better understand fundamental evolutionary processes and maintain biodiversity.

Jon Gelhaus, PhD (*University of Kansas*) *Curator, Department of Entomology: Academy of Natural Sciences*. Professor. Systematic expertise in crane flies (Tipuloidea); phylogenetic reconstruction; historical and ecological biogeography; biodiversity measures and evolution of morphological character systems.

Richard J. Horwitz, PhD (*University of Chicago*) *Senior Scientist; Fisheries Section Leader; Ruth Patrick Chair of Environmental Sciences*. Associate Professor. Reproductive ecology, life history and distribution of freshwater fishes; effects of land use, habitat structure and hydrology on population dynamics and species composition in aquatic systems; ecological modeling and biometry; anthropogenic contaminants in fishes.

Susan S. Kilham, PhD (*Duke University*). Professor. Aquatic ecology: phytoplankton; physiological ecology, especially of diatoms in freshwater and marine systems; large lakes; food webs; biogeochemistry.

Danielle Kreeger, PhD (*Oregon State University*). Research Associate Professor. Trophic interactions in aquatic ecosystems.

Tatyana Livshultz, PhD (*Cornell University*) *Assistant Curator of Botany*. Assistant Professor. Expertise of the milkweed and dogbane family

(Apocynaceae); evolution and species diversity of the genus *Dischidia*; differences in floral form and function.

Richard McCourt, PhD (*University of Arizona*) Associate Curator of Botany, *Academy of Natural Sciences of Drexel University; 2010-2012: Program Director, Division of Graduate Education, National Science Foundation*. Professor. Biodiversity, evolution, ecology, and systematic of green algae, specifically charophyte algae.

Jerry V. Mead, PhD (*SUNY ESF*) Assistant Scientist and Section Leader, *Watershed and Systems Ecology Section*. Assistant Research Professor. Spatial modeling of aquatic ecosystems; bioenergetics of aquatic invertebrates and fishes; effects of water level management on aquatic organisms; biophysical economics and watershed planning; stream geomorphology and environmental conditions; economics and bioconservation; energy and fisheries.

Michael O'Connor, MD, PhD (*MD, Johns Hopkins University; PhD, Colorado State*). Associate Professor. Biophysical and physiological ecology, thermoregulation of vertebrates, ecological modeling.

Sean O'Donnell, PhD (*University of Wisconsin-Madison*). Professor. Tropical ecology, focusing on geographic variation and elevation effects on ecology and behavior of army ants and ant-bird interactions; neurobiology, focusing on brain plasticity and brain evolution in social insects.

Marina Potapova, PhD (*Russian Academy of Sciences*) Assistant Curator. Assistant Professor. Taxonomy, ecology, and biogeography of freshwater diatoms; methods of quantifying morphological characters of diatom frustules based on geometric morphometrics; systematic of monoraphid freshwater diatoms.

Gary Rosenberg, PhD (*Harvard University*) *Pilsbry Chair of Malacology*. Professor. Magnitude and origin of species-level diversity in the Mollusca.

Jacob Russell, PhD (*University of Arizona*). Assistant Professor. The functional significance and evolutionary histories of symbioses between insects and bacteria.

Ron Smith, MS (*Rutgers University*). Instructor. Shorebird Ecology and Conservation; Amphibians of the NJ Pine Barrens; Restoration Ecology; Climate Change – Regional Effects and Education

James R. Spotila, PhD (*University of Arkansas*) *L. D. Betz Chair Professor*. Professor. Physiological and biophysical ecology, thermoregulation of aquatic vertebrates, biology of sea turtles.

Loyc Vanderkluisen, PhD (*University of Hawaii*). Assistant Professor. The cyclicity of volcanic eruptions, volcanic degassing processes, and large igneous provinces.

David J. Velinsky, PhD (*Old Dominion University*) *Department Head, Biodiversity, Earth and Environmental Science*. Professor. Geochemical cycling of organic and inorganic constituents of sediments and waters; Sedimentary diagenesis of major and minor elements; Isotope biogeochemistry of carbon, nitrogen and sulfur in marine and freshwater systems.

Jason Weckstein, PhD (*Louisiana State University*) *Associate Curator of Ornithology*. Associate Professor. Avian phylogenetics, comparative biology and evolutionary history; biodiversity surveys of birds and their parasites and pathogens; coevolutionary history of birds and their parasites.

Emeritus Faculty

John G. Lundberg, PhD (*University of Michigan*). Professor Emeritus. Diversity and diversification of fishes; documenting and interpreting the morphological, molecular, and taxonomic diversity of living and fossil fishes in the interrelated fields of systematic, faunistics and biogeography and paleobiology; exploration and collecting in poorly-known tropical freshwater habitats and regions.

Daniel Otte, PhD (*University of Michigan*) *Senior Curator, Systematics and Evolutionary Biology*. Professor Emeritus. Taxonomy and biogeography of Orthoptera (grasshoppers, crickets, katydids and their relatives).

Minor in Greek Studies

Note: Effective August 2014, students will no longer be accepted into this minor.

The minor in Greek studies is designed to be interdisciplinary, with concentration on Mediterranean issues, focusing on and starting from the island of Crete. The minor consists of a minimum of 24.0 credits, 17.0 of which are elective courses chosen with a focus on Greek studies. Because the scope of the minor embraces Hellenism from antiquity to today, students may select their electives depending on the aspect of Greek studies they desire to focus on (for example, mythology, philosophy, performance).

Required Courses

ANTH 212 [WI (p. 120)]	Topics in World Ethnography (When Offered as Anthropology of the Mediterranean)	3.0
or GREC 212	Introduction to Greek Folklore	
Select one of the following:		4.0
GREC 101	Modern Elementary Greek I	
GREC 102	Modern Elementary Greek II	
GREC 103	Modern Elementary Greek III	
GREC 201	Intermediate Modern Greek I	

Greek Studies Electives

Select 17.0 credits from the following:

ANTH 212 [WI (p. 120)]	Topics in World Ethnography (When offered as Anthropology of the Mediterranean.) *	
ANTH 380	Special Topics in Anthropology (When offered as Archaeology of the Eastern Mediterranean.)	
ARTH 101	History of Art I: Ancient to Medieval	
ENGL 200 [WI (p. 120)]	Classical to Medieval Literature	
ENGL 323	Literature and Other Arts (When offered as Iphigenia to Arta)	
ENGL 325	Topics in World Literature (When offered as Greek Literature/Poetry)	
ENGL 335	Mythology	
GREC 101	Modern Elementary Greek I *	
GREC 102	Modern Elementary Greek II *	
GREC 103	Modern Elementary Greek III *	
GREC 201	Intermediate Modern Greek I *	
GREC 212	Introduction to Greek Folklore *	
GREC 225	Introduction to Greek Music & Dance	

GREC 380	Special Topics in Greek Studies
HIST 280	History of Science: Ancient to Medieval
INTB 338	Regional Studies in Economic Policies and International Business (When offered as Mediterranean Economy)
MUSC 380	Special Topics in Music (When offered as Mediterranean Ensemble)
PHIL 212	Ancient Philosophy
PHIL 421 [WI (p. 120)]	Seminar in Ancient Philosophy
Drexel in Crete Study Abroad Program Course Offerings	
IAS 360	Special Topics in World Civilization
ANTH 380	Special Topics in Anthropology (When offered as Crete Through the Looking Glass) **
GREC 280	Communicate in Greek: Philoxenia
GREC 313	Greek History, Economy & Society

Total Credits **7.0**

* Students may only select this course as a Greek Studies elective if it was not already chosen as fulfilling one of the required course options.

** ANTH 340, Crete through a Looking Glass, fulfills this requirement.

Study Abroad in Crete

The Drexel in Crete Program is open to Drexel students scheduled for class during the summer term. This 12-credit program consists of four 3-credit courses. Visit the Drexel in Crete Study Abroad Program (https://studyabroad.drexel.edu/index.cfm?FuseAction=Programs.ViewProgram&Program_ID=10030&Type=O&sType=O) website for additional information.

Additional Information

For more information about the Minor in Greek Studies, contact the program director:

Maria Chnarakí, PhD

Program Director

Department of Culture & Communication

College of Arts and Sciences, Drexel University

mh439@drexel.edu

grkstud@drexel.edu

215.895.6143

History

Major: History

Degree Awarded: Bachelor of Arts (BA) or Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 54.0101

Standard Occupational Classification (SOC) code: 19-3093

Note: Effective Fall 2015, students are no longer being accepted into the Bachelor of Science (BS) program.

About the Program

The history program reflects the strengths of Drexel University, including an extensive offering of courses in the history of science and technology and an expanding array in global history. Required courses emphasize

depth in research and an introduction to historical interpretations specific to time and place. But the program also gives students the flexibility to shape curriculum that meets their needs. Our history graduates go to graduate school in history, to professional schools in law, medicine, and business, and to work in business, government agencies, and non-profit organizations.

We apply Drexel's experiential, research-intensive approach to the discipline of history. Using the extensive historical resources of Philadelphia and the digital world, students will develop a more profound understanding of history and the ways it is made. We encourage students to enrich their education through co-op, study abroad, and summer research projects.

Degree Offered

The **Bachelor of Arts (BA)** provides a flexible course of study, which includes foreign language, and allows for options in the fulfillment of humanities, social science, math, and science requirements.

In addition to the minor in history, the department also offers minors in politics (p. 155), as well as a minor in science, technology and human society (p. 159).

Additional Information

For more information about this program, please visit the Department of History (<http://drexel.edu/coas/academics/departments-centers/history>) website or contact:

Melissa Mansfield

Department Administrator

History Department

mmm462@drexel.edu

Degree Requirements (BA)

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV H101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Any Two Math courses		6.0-8.0
Any Two Science courses *		6.0-8.0

Foundation Requirements

Two Studies in Diversity electives		6.0
Two Consecutive Foreign Language courses (must complete level 201)		8.0
Four Humanities/Fine Arts electives		12.0
Four Social Science electives		12.0
Two International Studies electives		6.0

Core History Requirements

HIST 101	Introductory Seminar in History I **	
HIST 102	Introductory Seminar in History II **	
HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	

HIST 203	United States History since 1900	
HIST 296	Research Methods in History I **	
HIST 301	The Study of History **	
HIST 490 [WI (p. 121)]	Senior Seminar I **	
HIST 491 [WI (p. 121)]	Senior Seminar II **	
PSCI 110	American Government I	
PSCI 120	History of Political Thought	
PSCI 140 or PSCI 150	Introduction to Comparative Political Analysis or International Politics	
Any 200 level European History Course		3.0
Any History of Latin America, Africa or Asia		3.0
History electives ***		33.0
Free electives		30.0

Total Credits **182.0-185.0**

* Any Biology (BIO), Chemistry (CHEM), Nutrition (NFS), Physics (PHYS), Geoscience (GEO), Environmental Science (ENVS), or Physics-Environmental Science (PHEV).

** These courses must be taken in sequence.

*** Only 200-level and above HIST courses will fulfill this requirement.

Sample Plan of Study (BA)

Term		Credits
Term 1		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HIST 101	Introductory Seminar in History I	4.0
PSCI 110	American Government I	4.0
UNIV H101	The Drexel Experience	1.0
Foreign language course		4.0
Term Credits		16.0
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
HIST 102	Introductory Seminar in History II	4.0
Foreign language course		4.0
Mathematics course		3.0-4.0
Humanities/fine arts elective		3.0
Term Credits		17.0-18.0
Term 3		
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSCI 140 or 150	Introduction to Comparative Political Analysis or International Politics	4.0
History elective *		3.0
Mathematics course		3.0-4.0
Term Credits		14.0-15.0
Term 4		
HIST 201	United States History to 1815	3.0
HIST 296	Research Methods in History I	4.0

Science elective **	3.0-4.0
Humanities/fine arts elective	3.0
History of Latin America, Africa, or Asia	3.0

Term Credits **16.0-17.0**

Term 5		
HIST 202	United States History, 1815-1900	3.0
Diversity studies elective		3.0
Humanities/fine arts elective		3.0
Social and behavioral science elective		3.0
Science elective **		3.0-4.0

Term Credits **15.0-16.0**

Term 6		
HIST 203	United States History since 1900	3.0
PSCI 120	History of Political Thought	4.0
International studies elective		3.0
Diversity studies elective		3.0
Free elective		3.0

Term Credits **16.0**

Term 7		
History elective *		3.0
Humanities/fine arts elective		3.0
International studies elective		3.0
Social and behavioral sciences elective		3.0
Free elective		3.0

Term Credits **15.0**

Term 8		
HIST 301	The Study of History	4.0
UNIV H201	Looking Forward: Academics and Careers	1.0
History of Europe course *		3.0
History electives *		6.0

Term Credits **14.0**

Term 9		
History electives *		6.0
Social and behavioral sciences elective		3.0
Free electives		6.0

Term Credits **15.0**

Term 10		
HIST 490 [WI (p. 121)]	Senior Seminar I	4.0
History electives *		6.0
Social and behavioral sciences elective		3.0
Free elective		3.0

Term Credits **16.0**

Term 11		
HIST 491 [WI (p. 121)]	Senior Seminar II	4.0
History electives *		3.0
Free electives		6.0

Term Credits **13.0**

Term 12	
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History electives [*]	6.0
Free electives	9.0
Term Credits	15.0

Total Credit: 182.0-186.0

* Must be 200-level or above.

** Any Biology (BIO), Chemistry (CHEM), Nutrition (NFS), Physics (PHYS), Geoscience (GEO), Environmental Science (ENVS), or Physics-Environmental Science (PHEV).

Degree Requirements (BS)

Note: Effective Fall 2015, students are no longer being accepted into the Bachelor of Science (BS) program.

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV H101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Any 8-credit Math sequence		8.0
Any 8-credit Science sequence		8.0

Sample Math Sequences^{*}

MATH 101	Introduction to Analysis I
& MATH 102	and Introduction to Analysis II
MATH 121	Calculus I
& MATH 122	and Calculus II

Sample Science Sequences^{*}

Biology sequence sample:

BIO 107	Cells, Genetics & Physiology
BIO 108	Cells, Genetics and Physiology Laboratory
BIO 109	Biological Diversity, Ecology & Evolution
BIO 110	Biological Diversity, Ecology and Evolution Laboratory

Chemistry Sequence Samples:

CHEM 111	General Chemistry I
& CHEM 112	and General Chemistry II
PHYS 103	General Physics I
& PHYS 104	and General Physics II

Literature

Nonwestern Literature Requirement

Select one of the following:	3.0
ENGL 203 [WI Post-Colonial Literature I (p. 121)]	
ENGL 204 Post-Colonial Literature II	

Western Literature Requirement

Select one of the following:	3.0
ENGL 200 [WI Classical to Medieval Literature (p. 121)]	
ENGL 201 Renaissance to the Enlightenment	

ENGL 202 [WI Romanticism to Modernism (p. 121)]

ENGL 205 [WI American Literature I (p. 121)]

ENGL 206 [WI American Literature II (p. 121)]

ENGL 207 [WI African American Literature (p. 121)]

ENGL 211 [WI British Literature I (p. 121)]

ENGL 212 British Literature II

Additional General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
or ANTH 110	Human Past: Anthropology and Prehistoric Archeology	
COM 150	Mass Media and Society	3.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
MUSC 130	Introduction to Music	3.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
PHIL 105	Critical Reasoning	3.0
Any 4-credit Statistics Course		4.0

Core History Requirements

HIST 161	Themes in World Civilization I	3.0
HIST 162	Themes in World Civilization II	3.0
HIST 163	Themes in World Civilization III	3.0
HIST 201	United States History to 1815	3.0
HIST 202	United States History, 1815-1900	3.0
HIST 203	United States History since 1900	3.0
HIST 296	Research Methods in History I ^{**}	3.0
HIST 301	The Study of History ^{**}	3.0
HIST 490 [WI (p. 121)]	Senior Seminar I ^{**}	3.0
HIST 491 [WI (p. 121)]	Senior Seminar II ^{**}	3.0
PSCI 110	American Government I	4.0
PSCI 120	History of Political Thought	4.0
PSCI 140	Introduction to Comparative Political Analysis	4.0
or PSCI 150	International Politics	
Any 200-level European History course		3.0
Any History of Latin America, Africa, or Asia course		3.0

History Electives^{***}

Free Electives 40.0

Total Credits 182.0

* Additional math and science sequence options are available. Students should check with the the Department.

** These courses must be taken in sequence.

*** Only 200-level and above HIST courses will fulfill this this requirement.

Sample Plan of Study (BS)

Note: Effective Fall 2015, students are no longer being accepted into the Bachelor of Science (BS) program.

Term	Credits
Term 1	
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HIST 161 Themes in World Civilization I	3.0
MATH 101 Introduction to Analysis I	4.0
PSCI 110 American Government I	4.0
UNIV H101 The Drexel Experience	1.0
Term Credits	15.0
Term 2	
COM 150 Mass Media and Society	3.0
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
HIST 162 Themes in World Civilization II	3.0
MATH 102 Introduction to Analysis II	4.0
PHIL 105 Critical Reasoning	3.0
Term Credits	16.0
Term 3	
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
HIST 163 Themes in World Civilization III	3.0
MUSC 130 Introduction to Music	3.0
PSCI 120 History of Political Thought	4.0
PSY 101 General Psychology I	3.0
CIVC 101 Introduction to Civic Engagement	1.0
Term Credits	17.0
Term 4	
HIST 201 United States History to 1815	3.0
HIST 296 Research Methods in History I	3.0
Western Literature Survey course*	3.0
History of Latin America, Africa, or Asia	3.0
Science sequence course 1*	4.0
Term Credits	16.0
Term 5	
HIST 202 United States History, 1815-1900	3.0
ENGL 203 [WI] Post-Colonial Literature I or 204 Post-Colonial Literature II	3.0
PSCI 140 Introduction to Comparative Political Analysis or 150 International Politics	4.0
SOC 101 Introduction to Sociology	3.0
Science sequence course 2*	4.0
Term Credits	17.0
Term 6	
ECON 201 Principles of Microeconomics	4.0
HIST 203 United States History since 1900	3.0
ANTH 110 Human Past: Anthropology and Prehistoric or 101 Archeology Introduction to Cultural Diversity	3.0

Free electives	4.0
Term Credits	14.0
Term 7	
ECON 202 Principles of Macroeconomics	4.0
Statistics elective	4.0
Free electives	6.0
Term Credits	14.0
Term 8	
HIST 301 The Study of History	3.0
History of Europe course (200-level or higher)	3.0
History electives (200-level and above HIST courses)	6.0
UNIV H201 Looking Forward: Academics and Careers	1.0
Free elective	3.0
Term Credits	16.0
Term 9	
History electives (200-level and above HIST courses)	6.0
Free electives	9.0
Term Credits	15.0
Term 10	
HIST 490 [WI] Senior Seminar I (p. 121)]	3.0
Free electives	6.0
History electives (200-level and above HIST courses)	6.0
Term Credits	15.0
Term 11	
HIST 491 [WI] Senior Seminar II (p. 121)]	3.0
History electives (200-level and above HIST courses)	6.0
Free electives	6.0
Term Credits	15.0
Term 12	
History electives (200-level and above HIST courses)	6.0
Free electives	6.0
Term Credits	12.0
Total Credit: 182.0	

* See degree requirements (p. 123).

Co-Op/Career Opportunities

Co-Op Experiences

History majors have a wide variety of co-op experiences from which to choose. Business and public utilities offer many possibilities, and local, state, and federal governments; museums and archives; and law firms present many additional interesting co-op placements. Pre-law students, for example, are especially eager to see the inside of a law office, whether the co-op job they receive is clerical or a more challenging paralegal assignment. These practical experiences in the "real" world can reinforce the lessons of the classroom, sharpen skills, and establish important contacts. Sample co-op positions include:

- Law clerk/paralegal, Joe Davidson, Attorney-at-Law, Philadelphia
- Research analyst, Legislative Office for Research Liaison, Harrisburg, PA

- Legislative intern, Corporate Public Affairs Division, Philadelphia Electric Company
- Assistant lobbyist, Government Relations Office, Drexel University
- Education intern, Philadelphia Museum of Art
- Researcher, Philadelphia Chamber of Commerce
- Assistant, Office of the Governor, Harrisburg, PA

Career Opportunities

The flexible programs allow students to shape a curriculum that meets their needs, whether they are preparing for the business world, graduate school in history or political science, the Department's MS in Science, Technology, and Society program (<http://catalog.drexel.edu/graduate/collegeofartsandsciences/sciencetechnologyandsociety>), an MBA or other business program, or law school.

Accelerated/Dual Degrees

About the Programs

Two accelerated/dual degrees are available:

- BS/BA in History and MS in Science, Technology & Society program
- BS/BA in History and the MS(LIS) program

Drexel University permits undergraduate students in 5-year programs to apply for graduate programs while completing their undergraduate programs, allowing students to complete their master's degrees in a shorter amount of time.

The accelerated-degree program provides an opportunity to simultaneously earn both a BA or BS degree and an MS degree in Science, Technology & Society (two diplomas are awarded) in the time normally required to finish a bachelor's degree alone.

Students entering the program must:

- have and maintain a minimum of 3.0 grade point average throughout the program
- have no fewer than 90.0 earned credits
- have no more than 120.0 registered credits
- complete only 2 co-ops if in a BS/MS program.

The Department of History and Politics would especially like to encourage its own majors to consider the accelerated Science, Technology & Society (<http://catalog.drexel.edu/graduate/collegeofartsandsciences/sciencetechnologyandsociety>) program.

Additional Information

For more information about the accelerated BA-BS/MS program, contact:

STS Program Director
3025 MacAlister Hall
215.895.2463

Recommended Plan of Study

Students should work closely with faculty advisors in the Science, Technology & Society program to schedule an individualized plan of study for their accelerated degree completion.

The following is a sample plan of study for a student starting in pre-junior year, with 108.0 credit hours completed (based on a 5-year program in which the last co-op was dropped):

Dual Bachelor's Degree & MSTS Degree

222.0 minimum credits (quarter)

Term		Credits
Term 7	Undergraduate courses	13.0
	Two Science, Technology & Society courses	6.0
	Term Credits	19.0
Term 8	Undergraduate courses	13.0
	Two Science, Technology & Society courses	6.0
	Term Credits	19.0
Term 9	Undergraduate courses	10.0
	Two Science, Technology & Society courses	6.0
	One graduate elective*	3.0
	Term Credits	19.0
Term 10	HIST 696 Seminar in Science, Technology, and Society	3.0
	Undergraduate courses	10.0
	Two Science, Technology & Society courses	6.0
	Term Credits	19.0
Term 11	HIST 697 Practicum: Science and Technology in Action	3.0
	Undergraduate courses	13.0
	One graduate elective*	3.0
	Term Credits	19.0
Term 12	HIST 698 Master's Thesis	6.0
	Undergraduate courses	10.0
	One graduate elective	3.0
	Term Credits	19.0
Total Credit: 114.0		

* Graduate electives may be taken as graduate-level courses in History-Politics, or from other departments or colleges within the University.

BS/BA in History and the MS(LIS) Accelerated Degree

This program pairs the undergraduate History major with the school's MS in Library and Information Science in an accelerated time-frame. Students have the opportunity to earn both the undergraduate and graduate degrees in five years. For students completing this program, the undergraduate background in history provides a natural fit with areas of library specialization, such as archival studies.

About the Program

Applicants will be provisionally admitted into the program as incoming freshmen. Participants have the option of choosing either a one or a two co-op history program. The non-co-op option is not available for students choosing this accelerated degree option.

Students complete 180.0 credits toward the BA in History or the BS in History degree, with five fewer free elective credits than the non-accelerated program. Students complete 45.0 credits for the MS in Library

and Information Science degree (<http://www.drexel.edu/catalog/masters/mslis.htm>), starting to complete some graduate requirements during the last years of the BS or BA portion of their program.

While completing the BS or BA portion of the program, students must complete one of the following undergraduate information science courses:

INFO 101	Introduction to Information Technology	3.0
INFO 105	Introduction to Informatics	3.0
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 215	Social Aspects of Information Systems	3.0

When BS/BA students have accumulated 90.0 credits, but have not yet registered for 120.0 credits, they can apply to formally enter the graduate program. The student must have at least a 3.2 GPA, and they must maintain this 3.2 GPA for the graduate portion of the program.

Advising/Plan of Study

Students should work closely with faculty advisors to schedule and maintain a plan of study throughout the accelerated program.

Additional Information

For more information on the undergraduate history portion of the program, contact:

Melissa Mansfield, Department Administrator
History & Politics
MacAlister Hall 3025
mmm462@drexel.edu

For more information on the graduate portion of the program, contact:

Lynne Hickle
Program Coordinator
College of Computing and Informatics
leh25@drexel.edu

Minor in History

Students select one of the following sequences: 9.0

Sequence A		
HIST 161	Themes in World Civilization I	
HIST 162	Themes in World Civilization II	
HIST 163	Themes in World Civilization III	
Sequence B		
HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	
History Elective		
Additional 200-level or higher HIST courses		15.0
Total Credits		24.0

History Faculty

Debjeni Bhattacharyya, PhD (*Emory University*). Assistant Professor. Modern South Asian history; urban environmental history; history of economic thought; and post-colonial theory.

Scott G. Knowles, PhD (*Johns Hopkins University*) Associate Dean and Director, Center for Interdisciplinary Inquiry, Pennoni Honors College. Associate Professor. Urban history, history of technology, modern history.

Sharon Ku, PhD (*University of Cambridge, UK*). Assistant Research Professor. History and sociology of science; nanotechnology; scientific standardization.

Jonson Miller, PhD (*Virginia Tech*). Assistant Teaching Professor. Science and technology, American history, military history.

Tiago Saraiva, PhD (*Universidad Autónoma de Madrid*). Assistant Professor. Science and fascism, environment in contemporary history, global circulation of science, industrialized organisms and food, model organisms and genetics research.

Jonathan Seitz, PhD (*University of Wisconsin*) Director of Undergraduate Studies. Associate Teaching Professor. History of religion, science, medicine, witchcraft, early modern Europe, Italy.

Amy Slaton, PhD (*University of Pennsylvania*). Professor. History of science and technology; race, labor.

Kathryn Steen, PhD (*University of Delaware*). Associate Professor. History of technology, history of industry and business, and comparative history.

Donald F. Stevens, PhD (*University of Chicago*). Associate Professor. Modern Latin American history.

Katherine Travaline, PhD (*Drexel University*). Assistant Teaching Professor. Environmental policy; green infrastructure, deliberative democracy; interpretive policy analysis.

Alden Young, PhD (*Princeton University*) Director of the Program in *Africana Studies*. Assistant Professor. African history; economic history and the history of Arab and African interactions.

Robert Zaller, PhD (*Washington University*). Professor. English history and early modern European history.

Interdepartmental Faculty

Lloyd Ackert, PhD (*Johns Hopkins University*). Associate Teaching Professor. History of science and technology; ecology; Russian science.

Michael Yudell, MPH, MPhil, PhD (*Columbia University, City University of New York*) Department of Community Health and Prevention. Associate Professor. Public health genomics; bioethics; history of public health; and addiction.

Emeritus Faculty

Eric Dorn Brose, PhD (*Ohio State University*). Professor Emeritus. German and European history.

Minor in Human Factors and Ergonomics

Note: Effective Fall 2015, students will no longer be accepted into this minor.

This minor is intended to meet the needs of the students who have an interest in any type of design and who recognize the importance of taking account of human characteristics, both strengths and weaknesses, in the

design of artifacts intended for human use (e.g., equipment, computer software, consumer products, and even entire work environments).

The minor should also be of particular interest to students who have an interest in doing graduate work in human factors, ergonomics, industrial design, etc.

Entry into the minor requires that general psychology (or an equivalent introductory course) be taken as a prerequisite. Students who have completed PSY 101 and who are interested in a minor in Psychology are expected to meet with a Psychology Department faculty member to discuss the selection of appropriate courses. No more than three courses that are required for a student's major can count towards fulfilling requirements for the minor.

Required Prerequisite

General Psychology course (PSY 101 or equivalent)

Required Courses

PSY 212	Physiological Psychology	3.0
PSY 213	Sensation and Perception	3.0
PSY 250 [WI (p. 126)]	Industrial Psychology	3.0
PSY 330	Cognitive Psychology	3.0
PSY 332	Human Factors and Cognitive Engineering	3.0
PSY 337	Human-Computer Interaction	3.0
PSY 360 [WI (p. 126)]	Experimental Psychology	3.0
BMES 330	Biological Rhythm in Pharmacology and Toxicology	3.0

Select one course from the following:

BMES 350	Med & Bio Effects Of Light
BMES 411	Chronoengineering I: Biological Rhythms in Health and Performance
BMES 412	Chronoengineering II: Sleep Functions in Health and Performance
PSY 150	Introduction to Social Psychology
PSY 230	Psychology of Learning
PSY 310	Drugs & Human Behavior
PSY 340	Psychological Testing and Assessment
PSY 350	Advanced Social Psychology

Total Credits 24.0

International Area Studies

Major: International Area Studies

Degree Awarded: Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 30.2001

Standard Occupational Classification (SOC) code: 19-3094

About the Program

International area studies is a language-based, interdisciplinary major designed to prepare students for careers in a global environment.

The Department of Global Studies and Modern Languages (<http://drexel.edu/coas/academics/departments-centers/global-studies-modern-languages/academics/ias>) offers a BA in international area studies and minors in international area studies and in eight languages: Arabic,

Chinese, French, German, Italian, Japanese, Russian, and Spanish. Courses in a ninth language—Korean—are currently offered at the introductory level, and the Modern Language program plans to develop advanced-level Korean courses in the near future.

International area studies (IAS) at Drexel University is an interdisciplinary, intercultural, and interactive major, linking language study with other academic disciplines such as politics, history, economics, sociology, anthropology, literature and philosophy. It provides critical direction in study, research and professional experience necessary to understanding current global trends in politics, sociology and economics. IAS also offers an innovative framework for the preparation of responsible citizens who are aware of larger world issues and local concerns and are able to draw on both the arts and sciences in considering these changes.

The four thematic concentrations—justice and human rights; global science, sustainability and health; international business and economics; and literature, culture and arts—provide dynamic frameworks for studying about international technology transfers, humanitarian crises, border crossings, and global culture.

Students majoring in the program study one or more languages, and may qualify for the University's advanced-level Certification of Proficiency in their target language or languages. French, German, Italian and Spanish are the Western languages available; non-Western languages include Arabic, Chinese, Japanese, and Russian. The major enrolls a number of students from abroad as well as students who lived or studied in Europe, Latin America, or Asia during high school.

IAS programs give international area studies students the option of study programs in Brussels, Bonn, Berlin, Madrid, Paris, and London. The programs feature academic internships with national legislatures, the European Parliament, international law firms, nongovernmental service agencies, and multinational corporations. IAS Abroad programs are also available in China, Japan, Russia, and Costa Rica.

Additional Information

For additional information about the program, contact:

Dr. Joel Oestreich

Director of International Area Studies

Associate Professor of Political Science

215.895.6794

Jeo25@drexel.edu

Degree Requirements

Students select one of the following four concentrations, each having unique degree requirements:

- Global Science, Sustainability Technology and Health Society
- International Business and Economics
- Justice and Human Rights
- Literature, Culture and the Arts

Global Science, Sustainability and Health (GSSH)

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	BIO 312	Genetically Modified Foods	
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	CJS 373	Environmental Crime	
ENGL 204	Post-Colonial Literature II	3.0	COM 316	Campaigns for Health & Environment	
ENVS 260	Environmental Science and Society	3.0	COM 317 [WI (p. 127)]	Environmental Communication	
LING 102	Language and Society	3.0	COM 320 [WI (p. 127)]	Science Writing	
PHIL 105	Critical Reasoning	3.0	COM 375 [WI (p. 127)]	Grant Writing	
PSCI 150	International Politics	4.0	ECON 301	Microeconomics	
UNIV H101	The Drexel Experience	1.0	ECON 321	Macroeconomics	
UNIV H201	Looking Forward: Academics and Careers	1.0	ECON 351	Resource and Environmental Economics	
Two mathematics courses		6.0-8.0	ENGL 300 [WI (p. 127)]	Literature & Science	
One additional science course		3.0-4.0	ENGL 302	Environmental Literature	
One ethics course		3.0	ENGL 370	Topics in Literature and Medicine	
IAS Core Curriculum Requirements			ENVS 169	Environmental Science	
IAS 190	Global Research Methods	3.0	ENVS 275	Global Climate Change	
IAS 359	Culture and Values	3.0	or ENVP 275	Global Climate Change	
IAS 360	Special Topics in World Civilization	3.0	ENVS 289	Global Warming, Biodiversity and Your Future	
WMST 240	Women and Society in a Global Context		ENVS 321	Environmental Health	
Language Requirements			ENVS 328	Conservation Biology	
			HIST 280	History of Science: Ancient to Medieval	
At least 4 language courses at the 300-level are required for graduation, with a minimum of 21 credits in at least one language.			HIST 281	History of Science: Enlightenment to Modernity	
Area-specific Courses			HIST 282	History of Science: Medieval to Enlightenment	
			HSAD 312	Development of World Health Care	
Students select two region-specific courses approved by IAS.			HSAD 316	Health Care across Cultures	
Courses must focus on the same region, but can be in any discipline.			IAS 320	Building Global Bridges	
Global Science, Sustainability and Health Concentration Requirements			IAS 360	Special Topics in World Civilization ***	
ANTH 360	Culture and the Environment	3.0	IAS 390	Special Topics in International Area Studies ***	
or SOC 345	Sociology of the Environment		NFS 345	Foods and Nutrition of World Cultures	
CULA 427	The Kitchen Garden: Fall	3.0	NFS 446	Perspectives in World Nutrition	
PBHL 301	Epidemiology in Public Health	3.0	PBHL 302	Introduction to the History of Public Health	
PBHL 303	Overview of Issues in Global Health	3.0	PBHL 304	Introduction to Health & Human Rights	
PHIL 335	Global Ethical Issues	3.0	PBHL 305	Women and Children: Health & Society	
SOC 235	Sociology of Health and Illness	3.0	PHIL 321	Biomedical Ethics	
SOC 346	Environmental Justice	3.0	PHIL 341	Philosophy of the Environment	
Choose one of the following History courses			PHIL 351	Philosophy of Technology	
			PHIL 355	Philosophy of Medicine	
HIST 280	History of Science: Ancient to Medieval		PHIL 361	Philosophy of Science	
HIST 281	History of Science: Enlightenment to Modernity		PSCI 331	Environmental Politics	
HIST 282	History of Science: Medieval to Enlightenment		PSCI 351	International Organizations: The United Nations	
Chose one of the following English classes			PSCI 352	Ethics and International Relations	
			PSCI 353	International Human Rights	
ENGL 300 [WI (p. 127)]	Literature & Science	3.0	PSY 352	Environmental Psychology	
ENGL 302	Environmental Literature		SOC 315	HIV/AIDS and Africa	
ENGL 370	Topics in Literature and Medicine		SOC 330	Development and Underdevelopment in the Global South	
Global Science, Sustainability and Health Distribution Options			SOC 340	Globalization	
Select eleven of the following:			SOC 435	Seminar - Organization of American States ***	
ANTH 210 [WI (p. 127)]	Worldview: Science, Religion and Magic		WGST 275	Women's Health and Human Rights	3.0
ANTH 310	Societies In Transition: The Impact of Modernization and the Third World				
ANTH 360	Culture and the Environment				
BIO 109	Biological Diversity, Ecology & Evolution				
BIO 264	Ethnobotany				

Electives	33.0-12	SOC 260 [WI (p. 127)]	Classical Social Theory	3.0
Total Credits	183.0			

* Special topics courses with an international or relevant theme will be considered for course credit upon request and review.

** As appropriate to the major.

*** Repeatable for credit.

International Business and Economics

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGL 204	Post-Colonial Literature II	3.0
LING 102	Language and Society	3.0
PHIL 105	Critical Reasoning	3.0
PSCI 150	International Politics	4.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Two mathematics courses		6.0-8.0
Two science courses		6.0-8.0
One ethics course		3.0

IAS Core Curriculum Requirements

IAS 359	Culture and Values	3.0
IAS 360	Special Topics in World Civilization	3.0
IAS 190	Global Research Methods	3.0
WGST 240	Women and Society in a Global Context	3.0

Language Requirements

At least 4 language courses at the 300-level are required for graduation, with a minimum of 21 credits in at least one language. 21.0-36.0

Area-specific Courses

Students select two region specific courses approved by IAS. 6.0
Courses must focus on the same region, but can be in any discipline.

International Business and Economics Concentration Requirements

ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	3.0
or SOC 330	Development and Underdevelopment in the Global South	
BLAW 340	International Business Law	4.0
ECON 342	Economic Development	4.0
ENGL 308 [WI (p. 127)]	The Literature of Business	3.0
INTB 332	Multinational Corporations	4.0
INTB 334	International Trade	4.0
INTB 338	Regional Studies in Economic Policies and International Business	4.0
PHIL 301	Business Ethics	3.0

International Business and Economics Distribution Options

Select eleven of the following:	33.0-44.0
ANTH 312	Approaches to Intercultural Behavior
COM 270 [WI (p. 127)]	Business Communication
COM 345	Intercultural Communication
COM 360	International Communication
COM 361	International Public Relations
COM 362	International Negotiations
COM 375 [WI (p. 127)]	Grant Writing
ECON 301	Microeconomics
ECON 321	Macroeconomics
ECON 326 [WI (p. 127)]	Economic Ideas
ECON 351	Resource and Environmental Economics
ENGL 325	Topics in World Literature
ENGL 360 [WI (p. 127)]	Literature and Society
FIN 301	Introduction to Finance
FIN 346	Global Financial Management
IAS 320	Building Global Bridges
IAS 360	Special Topics in World Civilization ***
IAS 390	Special Topics in International Area Studies ***
INTB 336	International Money and Finance
INTB 338	Regional Studies in Economic Policies and International Business
MKTG 301	Introduction to Marketing Management
MKTG 322	Advertising & Integrated Marketing Communications
MKTG 351	Marketing for Non-Profit Organizations
MKTG 357	Global Marketing
PSCI 255	International Political Economics
PSCI 340	Politics of Developing Nations
PSCI 351	International Organizations: The United Nations
PSCI 352	Ethics and International Relations
PSCI 357	The European Union in World Politics
SOC 220	Wealth and Power
SOC 310	Topics in Political Sociology
SOC 340	Globalization
SOC 435	Seminar - Organization of American States **
STAT 201	Introduction to Business Statistics
STAT 202	Business Statistics II

Electives 28-0

Total Credits 183.0-185.0

* Special topics courses with an international or relevant theme will be considered for course credit upon request and review.

** Repeatable for credit.

Justice and Human Rights

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGL 204	Post-Colonial Literature II	3.0
LING 102	Language and Society	3.0
PHIL 105	Critical Reasoning	3.0
PSCI 150	International Politics	4.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Two mathematics courses		6.0-8.0
Two science courses		6.0-8.0
One ethics course		3.0

IAS Core Curriculum Requirements

IAS 359	Culture and Values	3.0
IAS 360	Special Topics in World Civilization	3.0
IAS 190	Global Research Methods	3.0
WGST 240	Women and Society in a Global Context	3.0

Language Requirements

At least 4 language courses at the 300-level are required for graduation, with a minimum of 21 credits in at least one language. 21.0-36.0

Area-specific Courses

Students select two region specific courses approved by IAS. 6.0
Courses must focus on the same region, but can be in any discipline.

Justice and Human Rights Concentration Requirements

ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	3.0
or SOC 330	Development and Underdevelopment in the Global South	
ENGL 360 [WI (p. 127)]	Literature and Society	3.0
PHIL 335	Global Ethical Issues	3.0
PSCI 120	History of Political Thought	4.0
PSCI 329	Theories of Justice	3.0
PSCI 352	Ethics and International Relations	3.0
PSCI 353	International Human Rights	4.0
SOC 260 [WI (p. 127)]	Classical Social Theory	3.0

Select one of the following: 3.0

PSCI 351	International Organizations: The United Nations	
PSCI 357	The European Union in World Politics	
SOC 435	Seminar - Organization of American States	

Justice and Human Rights Distribution Options **

Select eleven of the following: 33.0-38.0

AFAS T280	Special Topics in Africana Studies	
ANTH 312	Approaches to Intercultural Behavior	

or COM 345	Intercultural Communication	
ANTH 250	Anthropology of Immigration	
CJS 289	Terrorism	
COM 360	International Communication	
COM 362	International Negotiations	
COM 375 [WI (p. 127)]	Grant Writing	
CULA 427	The Kitchen Garden: Fall	
ECON 301	Microeconomics	
ECON 321	Macroeconomics	
ECON 342	Economic Development	
ECON 351	Resource and Environmental Economics	
ENGL 325	Topics in World Literature	
IAS 320	Building Global Bridges	
IAS 360	Special Topics in World Civilization ***	
IAS 390	Special Topics in International Area Studies ***	
PHIL 241	Social & Political Philosophy	
PHIL 341	Philosophy of the Environment	
PHIL 385	Philosophy of Law	
PHIL 391	Philosophy of Religion	
PBHL 303	Overview of Issues in Global Health	
PBHL 304	Introduction to Health & Human Rights	
PSCI 240	Comparative Government	
PSCI 255	International Political Economics	
PSCI 250	American Foreign Policy	
PSCI 340	Politics of Developing Nations	
PSCI 351	International Organizations: The United Nations	
PSCI 357	The European Union in World Politics	
PSCI 365	Politics, Law, & Justice	
PSCI 367	International Law	
SOC 210	Race, Ethnicity and Social Inequality	
SOC 220	Wealth and Power	
SOC 310	Topics in Political Sociology	
SOC 315	HIV/AIDS and Africa	
SOC 340	Globalization	
SOC 344	Social Movements	
SOC 346	Environmental Justice	
SOC 435	Seminar - Organization of American States ****	
WGST T280	Special Topics in Women's and Gender Studies	

Electives 32.0-8.0

Total Credits 184.0

* Justice and Human rights related topics.

** Special topics courses with an international or relevant theme will be considered for course credit upon request and review.

*** Repeatable for credit.

**** Justice and Human rights related topics.

Literature, Culture and the Arts

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
CIVC 101	Introduction to Civic Engagement	1.0

ECON 201	Principles of Microeconomics	4.0	COM 342	English Worldwide	
ECON 202	Principles of Macroeconomics	4.0	COM 355	Ethnography of Communication	
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	COM 360	International Communication	
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	COM 375 [WI (p. 127)]	Grant Writing	
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	COM 390 [WI (p. 127)]	Global Journalism	
ENGL 204	Post-Colonial Literature II	3.0	CULA 405 [WI (p. 127)]	Culture and Gastronomy I	
LING 102	Language and Society	3.0	ENGL 200 [WI (p. 127)]	Classical to Medieval Literature	
PHIL 105	Critical Reasoning	3.0	ENGL 201	Renaissance to the Enlightenment	
PSCI 150	International Politics	4.0	ENGL 203 [WI (p. 127)]	Post-Colonial Literature I	
UNIV H101	The Drexel Experience	1.0	ENGL 300 [WI (p. 127)]	Literature & Science	
UNIV H201	Looking Forward: Academics and Careers	1.0	ENGL 323	Literature and Other Arts *	
Two mathematics courses		6.0-8.0	ENGL 325	Topics in World Literature	
Two science courses		6.0-8.0	ENGL 335	Mythology	
One ethics course		3.0	ENGL 355 [WI (p. 127)]	Women and Literature	
IAS Core Curriculum Requirements			FMST 265	Special Topics in Cinema Studies **	
IAS 359	Culture and Values	3.0	IAS 320	Building Global Bridges	
IAS 360	Special Topics in World Civilization	3.0	IAS 360	Special Topics in World Civilization ***	
IAS 190	Global Research Methods	3.0	IAS 390	Special Topics in International Area Studies ***	
WGST 240	Women and Society in a Global Context	3.0	MUSC 130	Introduction to Music	
Language Requirements			NFS 446	Perspectives in World Nutrition	
At least 4 language courses at the 300-level are required for graduation, with a minimum of 21 credits in at least one language.		21.0-36.0	PHIL 211	Metaphysics	
Area-specific Courses			PHIL 241	Social & Political Philosophy	
Students select two region specific courses approved by IAS. Courses must focus on the same region, but can be in any discipline.		6.0	PHIL 335	Global Ethical Issues	
Literature, Culture and the Arts Requirements			PHIL 391	Philosophy of Religion	
ANTH 212 [WI (p. 127)]	Topics in World Ethnography	3.0	PSCI 120	History of Political Thought	
ANTH 312	Approaches to Intercultural Behavior	3.0	PSCI 323	Comparative Political Thought	
or COM 345	Intercultural Communication		SOC 210	Race, Ethnicity and Social Inequality	
ENGL 325	Topics in World Literature	3.0	SOC 340	Globalization	
ENGL 360 [WI (p. 127)]	Literature and Society *	3.0	WRIT 310	Literary Editing & Publication	
MUSC 331	World Musics	3.0	Electives		39.0-20.0
PHIL 231	Aesthetics	3.0	Total Credits		186.0
Select one of the following:					
ARTH 101	History of Art I: Ancient to Medieval				
ARTH 102	History of Art II: High Renaissance to Modern				
ARTH 103	History of Art: Early to Late Modern				
Language Minor thesis course					
		3.0			
Literature Culture and the Arts Distribution Options **					
Select eleven of the following:		33.0			
ANTH 210 [WI (p. 127)]	Worldview: Science, Religion and Magic				
ANTH 220	Aging In Cross-Cultural Perspective				
ANTH 250	Anthropology of Immigration				
ANTH 310	Societies In Transition: The Impact of Modernization and the Third World				
ANTH 410	Cultural Theory				
ARCH 141	Architecture and Society I				
COM 210	Theory and Models of Communication				

Sample Plans of Study

(For concentrations in Global Science, Sustainability and Health, or Justice and Human Rights, please see your advisor.)

International Business and Economics

Term 1		Credits
ANTH 101	Introduction to Cultural Diversity	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV H101	The Drexel Experience	1.0
PHIL 105	Critical Reasoning	3.0

Language course	4.0
Term Credits	18.0
Term 2	
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
LING 102 Language and Society	3.0
MATH 102 Introduction to Analysis II	4.0
ECON 201 Principles of Microeconomics	4.0
Language course	4.0
Term Credits	18.0
Term 3	
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
ECON 202 Principles of Macroeconomics	4.0
IAS 190 Global Research Methods	3.0
PSCI 150 International Politics	4.0
Language course	4.0
CIVC 101 Introduction to Civic Engagement	1.0
Term Credits	19.0
Term 4	
ENGL 204 Post-Colonial Literature II	3.0
WGST 240 Women and Society in a Global Context	3.0
Language course	4.0
Science elective*	3.0
One concentration distribution course	4.0
Term Credits	17.0
Term 5	
Area-Specific history course	3.0
Language course	3.0
Two concentration distribution courses*	6.0
Science elective*	4.0
Term Credits	16.0
Term 6	
INTB 334 International Trade	4.0
SOC 260 [WI Classical Social Theory (p. 127)]	3.0
Ethics elective	3.0
Area-Specific history course	3.0
Term Credits	13.0
Term 7	
ECON 342 Economic Development	4.0
IAS 360 Special Topics in World Civilization	3.0
PHIL 301 Business Ethics	3.0
SOC 330 Development and Underdevelopment in the Global or ANTH 310 South Societies In Transition: The Impact of Modernization and the Third World	3.0
Language course	3.0
Term Credits	16.0
Term 8	
BLAW 340 International Business Law	4.0
INTB 332 Multinational Corporations	4.0
One concentration distribution course*	3.0

Language course	3.0
Term Credits	14.0
Term 9	
INTB 338 Regional Studies in Economic Policies and International Business	4.0
ENGL 308 [WI The Literature of Business (p. 127)]	3.0
Language course	3.0
Two concentration distribution courses*	6.0
Term Credits	16.0
Term 10	
Language course	3.0
Two concentration distribution courses*	6.0
Free elective	3.0
UNIV H201 Looking Forward: Academics and Careers	1.0
Term Credits	13.0
Term 11	
IAS 359 Culture and Values	3.0
Language course	3.0
Concentration distribution course*	3.0
Free elective	3.0
Term Credits	12.0
Term 12	
Two concentration distribution courses*	6.0
Language course	3.0
Free elective	3.0
Term Credits	12.0
Total Credit: 184.0	

Literature, Culture and the Arts

		Credits
Term 1		
ANTH 101 Introduction to Cultural Diversity		3.0
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research		3.0
MATH 101 Introduction to Analysis I		4.0
UNIV H101 The Drexel Experience		2.0
Language course		4.0
Term Credits		16.0
Term 2		
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing		3.0
LING 102 Language and Society		3.0
MATH 102 Introduction to Analysis II		4.0
PHIL 105 Critical Reasoning		3.0
UNIV H101 The Drexel Experience		1.0
Language course		4.0
Term Credits		18.0
Term 3		
ECON 201 Principles of Microeconomics		4.0
ENGL 103 Composition and Rhetoric III: Themes and Genres		3.0
IAS 190 Global Research Methods		3.0

PSCI 150	International Politics	4.0
Language course		4.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		19.0

Term 4

ANTH 212 [WI] (p. 127)]	Topics in World Ethnography	3.0
ECON 202	Principles of Macroeconomics	4.0
Ethics elective		3.0
Science elective *		3.0
Language course		4.0
Term Credits		17.0

Term 5

MUSC 331	World Musics	3.0
Literature, Culture & Arts distribution course *		3.0
Area-specific course *		3.0
Science elective *		4.0
Language course		4.0
Term Credits		17.0

Term 6

ENGL 360 [WI] (p. 127)]	Literature and Society	3.0
PHIL 231	Aesthetics	3.0
Select one of the following:		3.0
ARTH 101	History of Art I: Ancient to Medieval	
ARTH 102	History of Art II: High Renaissance to Modern	
ARTH 103	History of Art: Early to Late Modern	
Language course		4.0
Literature, Culture & Arts distribution course *		3.0
Term Credits		16.0

Term 7

COM 345	Intercultural Communication	3.0
or ANTH 312	Approaches to Intercultural Behavior	
Two Literature, Culture & Arts distribution courses *		6.0
Area-specific course *		3.0
Language course		3.0
Term Credits		15.0

Term 8

ENGL 204	Post-Colonial Literature II	3.0
ENGL 360 [WI] (p. 127)]	Literature and Society	3.0
Language course		3.0
Two Literature, Culture & Arts distribution courses *		6.0
Free elective		
Term Credits		15.0

Term 9

IAS 360	Special Topics in World Civilization	3.0
ENGL 325	Topics in World Literature	3.0

PHIL 335	Global Ethical Issues	3.0
Language course		3.0
Literature, Culture & Arts distribution course *		3.0
Term Credits		15.0

Term 10

UNIV H201	Looking Forward: Academics and Careers	1.0
WGST 240	Women and Society in a Global Context	3.0
Language course		3.0
Literature, Culture & Arts distribution course *		3.0
Free elective		3.0
Term Credits		13.0

Term 11

IAS 359	Culture and Values	3.0
Language course		3.0
Literature, Culture & Arts distribution course *		3.0
Free elective		3.0
Term Credits		12.0

Term 12

Two Literature, Culture & Arts distribution courses *		6.0
Language course		3.0
Free elective		3.0
Term Credits		12.0

Total Credit: 185.0

* See degree requirements (p. 127).

Co-op/Career Opportunities

Opportunities

Career placements include entry-level international marketing and communications positions with national and multinational business concerns in the United States and abroad. Other placements are with public and private international service organizations, advertising, and investment concerns, the Peace Corps, and local and national governmental agencies.

Graduate admissions are in international relations, government, international law, public policy, the humanities, and MBA programs. Recent graduates have pursued advanced study at Yale, Harvard, Georgetown, Johns Hopkins, Cornell, Columbia, American University, the University of California, the Monterey Institute, the University of Pennsylvania, Drexel University, and the Woodrow Wilson School at Princeton University. International graduate admissions include the London School of Economics, the University of London, and Cambridge University in Britain; the Free University of Bonn and the University of Mannheim in Germany; the College of Europe in Belgium; and Ben Gurion University in Israel.

This degree is designed to provide preparation for entry-level careers in government, public relations, international advertising, and service agencies. The BA is also recommended for graduate study in fields such as law, international relations, public policy, political science, sociology, history, and economics.

Co-op Experiences

Students in the major generally take cooperative education positions with international service organizations, law firms, investment concerns, and multinational corporations, both in the United States and abroad. In addition, students may elect independent study or study-internships abroad as partial fulfillment of cooperative education requirements.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in International Area Studies

The international area studies minor provides a cross-cultural, interdisciplinary frame of reference for students in other disciplines who are interested in careers in the international sector.

Language study through level 201 is a prerequisite for the minor.

Core Requirements

IAS 360	Special Topics in World Civilization	3.0
WGST 240	Women and Society in a Global Context	3.0
Students select one region specific HIS or PSCI courses approved by 3.0 IAS. *		

International Area Studies (IAS) Electives

Select five of the following: 15.0

AFAS T280	Special Topics in Africana Studies	
ANTH 212 [WI (p. 127)]	Topics in World Ethnography	
ANTH 220	Aging In Cross-Cultural Perspective	
ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	
ANTH 312	Approaches to Intercultural Behavior	
ANTH 410	Cultural Theory	
BIO 264	Ethnobotany	
BLAW 340	International Business Law	
COM 342	English Worldwide	
COM 345	Intercultural Communication	
COM 355	Ethnography of Communication	
COM 360	International Communication	
COM 361	International Public Relations	
COM 390 [WI (p. 127)]	Global Journalism	
ECON 342	Economic Development	
ENGL 203 [WI (p. 127)]	Post-Colonial Literature I	
ENGL 204	Post-Colonial Literature II	
ENGL 323	Literature and Other Arts **	
ENGL 325	Topics in World Literature	
ENGL 360 [WI (p. 127)]	Literature and Society **	
HIST 290	Technology and the World Community	
IAS 320	Building Global Bridges	
IAS 390	Special Topics in International Area Studies ***	
INTB 332	Multinational Corporations	
INTB 334	International Trade	

INTB 336	International Money and Finance
MUSC 331	World Musics
NFS 345	Foods and Nutrition of World Cultures
NFS 446	Perspectives in World Nutrition
PHIL 335	Global Ethical Issues
PSCI 120	History of Political Thought
PSCI 240	Comparative Government
PSCI 255	International Political Economics
PSCI 323	Comparative Political Thought
PSCI 340	Politics of Developing Nations
PSCI 351	International Organizations: The United Nations
PSCI 352	Ethics and International Relations
PSCI 353	International Human Rights
PSCI 357	The European Union in World Politics
PSCI 367	International Law
SOC 220	Wealth and Power
SOC 330	Development and Underdevelopment in the Global South
SOC 344	Social Movements
SOC 346	Environmental Justice
SOC 435	Seminar - Organization of American States
WGST T280	Special Topics in Women's and Gender Studies

Total Credits **24.0**

* Typically an region-specific history course is determined by what language the student is studying.

** These courses must have an international focus.

*** Special topics courses with an international or relevant theme will be considered for course credit upon request and review.

The programs in modern languages offer a language minor in Chinese, French, German, Italian, Japanese, Russian, and Spanish.

Global Studies and Modern Languages Faculty

Yaba Blay, PhD (*Temple University*). Assistant Teaching Professor. Skin bleaching; the politics of Black embodiment (skin color/hair); black identity; African cultural aesthetics and aesthetic practices; global black popular culture.

Daniela De Pau, PhD (*University of Illinois at Urbana-Champaign*). Assistant Teaching Professor. Italian cinema, relationship between literature, cinema and other arts, traveling literature, women writers, the tradition of the Comic and the tradition of the Fantastic, autobiography, politics of immigration, cultural identity in contemporary Italy.

Brenda Dyer, MA (*University of Pennsylvania*). Associate Teaching Professor. Language acquisition pedagogy, teaching writing, seventeenth and eighteenth century French literature, women writers, translation.

Mary Ebeling, PhD (*University of Surrey*). Associate Professor. Science and technology studies; emerging technologies and biocapital; media and democratic cultures; radical social movements; sociology of markets; political sociology; and ethnographic methodologies.

David Fryer, PhD (*Brown University*). Gender theory; psychoanalysis; ethics; queer theory; genderqueer theory; Phenomenology; Africana thought; secular Jewish thought.

Joanna Lyskowicz, MA (*UAM Poznan, Poland*). Instructor. Comparative linguistics, translation, business Spanish, medical Spanish, modern Spanish literature, XXth cent. Spanish poetry, magical realism in Latin American literature.

Maria delaluz Matus-Mendoza, PhD (*Temple University*) *Language Program Coordinator*. Associate Professor. Spanish Linguistic variation in the US; the relationship between language variation and mobility (social and geographical) among the Mexican communities in Mexico and in the United States; second language acquisition; language variation in media.

Rogelio Minana, PhD (*Penn State*) *Department Head, Global Studies and Modern Languages*. Professor. The role of classic cultural icons, particularly Don Quixote, in 21st century political and social justice discourse; the interplay between the traditional humanities, youth organizations, and digital storytelling.

Anne-Marie Obajtek-Kirkwood, PhD (*University of Pennsylvania*). Associate Professor. French and francophone 20th and 21st century literature, culture and film. Representations of the Occupation (WWII); war; minorities in France; autobiography; feminist issues.

Joel E. Oestreich, PhD (*Brown University*) *Director of International Area Studies*. Associate Professor. International organizations, international finance, development, and human rights.

Marilyn Gaye Piety, PhD (*McGill University*). Associate Professor. History of philosophy, philosophy of religion, critical reasoning, Kierkegaard.

Simone Schlichting-Artur, EdD (*University of Pennsylvania*) *Senior Assistant Dean of Global Initiatives*. Teaching Professor. International business communication (Germany and the U.S.), public health policy and languages, German post-war history through film and literature, development of writing assessment tools for German minor.

Natsumi Shor, MA. Assistant Teaching Professor. Business and professional Japanese; Japanese film and culture; interrelation between Japanese language to the nation's culture and thought.

Interdepartmental Faculty

Anne C. Cecil, MA (*University of the Arts*) *Program Director, Design & Merchandising*. Teaching Professor. Web designer, product designer, merchandising and artist.

George Cicciariello-Maher, PhD (*University of California, Berkeley*). Assistant Professor. Colonialism, social movements, political theory.

Rose Corrigan, PhD (*Rutgers University*). Associate Professor. Women, public law, American politics and policy.

Christian Hunold, PhD (*University of Pittsburgh*). Associate Professor. Environmental policy; comparative politics; political theory.

Gabriella Ibieta, PhD (*City University of New York*). Associate Professor. Comparative literature; Cuban and Latin American fiction.

Emmanuel F. Koku, PhD (*University of Toronto*). Associate Professor. Social network analysis; qualitative/quantitative research; medical sociology; social epidemiology; social demography; sociology of

development; communication and information technology; community and urban sociology.

Christopher A. Laincz, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Usha Menon, PhD (*University of Chicago*). Associate Professor. Self, identity & personhood, emotional functioning, Hindu morality, gender relations in Hindu society, adult development, popular Hinduism, post-colonial feminism, Hindu religious nationalism and Islamic radicalism.

Julie Mostov, PhD (*New York University*) *Vice Provost for Global Initiatives*. Professor. Modern political thought, democratic theory, nationalism, gender studies, South Eastern Europe and the Balkans.

Emilie S. Passow, PhD (*Columbia University*) *Director, Certificate Program in Medical Humanities*. Associate Teaching Professor. Judaic studies; medical humanities; nineteenth-century British literature.

Rakhmiel Peltz, PhD (*Columbia University, Linguistics; University of Pennsylvania, Biological Sciences*) *Director of Judaic Studies Program*. Professor. Sociolinguistics, ethnography of communication, social history of Yiddish language and culture, Yiddish culture of Eastern Europe, language planning, language and ethnic identity, language and group memory, aging and ethnicity, history of urban neighbors.

Abioseh Porter, PhD (*University of Alberta, Canada*) *Department Head, English and Philosophy*. Professor. Comparative literature; postcolonial literatures; Editor, *JALA, Journal of the African Literature Association*.

Robert Powell, PhD (*Temple University*). Assistant Teaching Professor. Early and Middle Bronze Age Crete; archaeoastronomy; early state formation; archaeology and anthropology of frontiers; mass communication.

Rachel R. Reynolds, PhD (*University of Illinois at Chicago*). Associate Professor. Sociolinguistics, ethnography of communication, intercultural communication, globalization and the rhetoric of community, political economy of immigration, race and ethnicity, new African immigrants in the United States, Igbo studies.

Wesley Shumar, PhD (*Temple University*) *Department Head, Anthropology*. Professor. Ethnography of cyberspace, online learning communities, political economy of higher education, globalization, activity theory, semiotics, critical realism, psychoanalysis, identity and the self.

Judith Storniolo, PhD (*University of Pennsylvania*). Teaching Professor. Historical and comparative linguistics, Mesoamerican languages and culture, applied anthropology, public policy, oral traditions and narratives, ideology and ritual, Mesoamerican ethnohistory; and pre-Columbian literature.

Alden Young, PhD (*Princeton University*) *Director of the Program in Africana Studies*. Assistant Professor. African history; economic history and the history of Arab and African interactions.

Jennifer Yusin, PhD (*Emory University*). Associate Professor. Postcolonial literature; trauma theory; literary theory; psychoanalysis, and memory studies in contemporary literature in English.

The Louis Stein Minor in Judaic Studies

The Louis Stein Minor in Judaic Studies, housed within the College of Arts and Sciences, is designed to give students the opportunity to explore and understand the history, culture, politics, and religion of the Jewish people. Through interdisciplinary coursework and directed field study, students investigate the Jewish experience from both a contemporary and a historical perspective.

The Louis Stein Minor in Judaic Studies requires 24.0 credits: 9.0 from required courses, and 15.0 from electives. Students can apply a maximum of 6.0 credits toward the minor from field study under the supervision of the academic advisor.

Required Courses

JUDA 201	Jewish Literature and Civilization *	3.0
JUDA 202	Jewish Life and Culture in the Middle Ages **	3.0
JUDA 203	Modern Jewish History †	3.0
Minor electives		15.0
Total Credits		24.0

* Offered concurrently with ENGL 350 Jewish Literature and Civilization.

** Offered concurrently with HIST 253 Jewish Life and Culture in the Middle Ages.

† Offered concurrently with HIST 249 Modern Jewish History.

Courses offered as electives have included:

- JUDA 211 American Jewish Experience
- JUDA 212 [WI (p. 136)] Contemporary Jewish Life
- JUDA 213 Jewish Cultural Tapestry
- JUDA 214 Language and Cultural Diversity in the USA
- JUDA 215 Reconstructing History After Genocide
- JUDA 216 Yiddish Literature and Culture
- JUDA 280 Special Topics in Judaic Studies
- JUDA 298 Field Work in Judaic Studies
- JUDA I299 Independent Study in Judaic Studies
- ANTH 120 Biblical Archeology of Israel and Jordan
- ANTH 380 Special Topics in Anthropology (When offered as Archeology of the Middle East)
- HBRW 101 Introduction to Hebrew I
- HBRW 102 Introduction to Hebrew II
- HBRW 103 Introduction to Hebrew III
- HBRW 201 Intermediate Hebrew IV
- HBRW 202 Intermediate Hebrew V
- HBRW 203 Intermediate Hebrew VI
- ENGL 395 [WI (p. 136)] Special Studies in Literature (When offered as Jewish Women in Literature and History)
- ENGL 323 Literature and Other Arts (When offered as Holocaust Testimonies)
- ENGL 345 American Ethnic Literature (When offered as Jewish American Writers)
- ENGL 325 Topics as World Literature (When offered as Israeli Literature & Culture, or as Yiddish Literature & Culture)

- LANG 180 Special Topics in Languages (When offered as Yiddish Language I)
- LANG 180 Special Topics in Languages (When offered as Yiddish Language II)

For more information about the Louis Stein Minor in Judaic Studies, please contact:

Kathleen Carll
Associate Director
Judaic Studies Program
215-895-6388
judaicstudies@drexel.edu

Professor Rakhmiel Peltz
Director of Judaic Studies
215-895-1499
rakhmiel.peltz@drexel.edu

The Judaic Studies Program offices are located in Room 331 of Hagerty Library.

Mathematics

Major: Mathematics

Degree Awarded: Bachelor of Arts (BA) or Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 27.0101

Standard Occupational Classification (SOC) code: 15-2021; 15-2041

About the Program

The mathematics major at Drexel provides a supportive learning environment in which students obtain a firm grounding in the core areas of mathematics and apply this knowledge to problems encountered in a technological society. The Department of Mathematics (<http://drexel.edu/coas/academics/departments-centers/mathematics>) offers students the option of either a BA or a BS degree.

The Mathematics Department takes pride in offering a balanced and flexible curriculum. Three very different kinds of skills are emphasized in the mathematics major:

• Abstract Reasoning

All students majoring in mathematics take courses that emphasize abstract reasoning. Students read and write proofs, and graduate well prepared to enter a PhD program in mathematics.

• Computing

All students majoring in mathematics take a series of computing courses. This emphasis on computing is one of the distinctive features of the mathematics program at Drexel, and provides students with a competitive advantage in the job market.

• Mathematical Modeling

All students majoring in mathematics take multidisciplinary courses that focus on the interplay between mathematics and an area of application.

Students often use electives to focus on an area of personal interest. The Department of Mathematics encourages students to minor in a subject where mathematics is applied. The Department provides an

advisor to assist students in selecting electives and planning career paths.

Degree Requirements (BA)

General Education Requirements

UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV S201	Looking Forward: Academics and Careers	1.0
COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
One of the following Computer Science sequences:		9.0
Option I		
CS 140	Introduction to Multimedia Programming	
CS 143	Computer Programming Fundamentals	
CS 171	Computer Programming I	
Option II		
CS 140	Introduction to Multimedia Programming	
CS 171	Computer Programming I	
CS 172	Computer Programming II	
Humanities and fine arts electives		6.0
International studies electives		6.0
Science electives		6.0
Social and behavioral sciences electives		6.0
Studies in diversity electives		6.0
Free Electives		67.0

Core Mathematics Requirements

MATH 121	Calculus I *	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra	4.0
MATH 210	Differential Equations	4.0
MATH 220 [WI (p. 136)]	Introduction to Mathematical Reasoning	3.0
MATH 331 or MATH 401	Abstract Algebra I or Elements of Modern Analysis I	3.0-4.0

Math Major Electives ** 30.0

Select a minimum of 30 credits from the following:

MATH 205	Survey of Geometry
MATH 221	Discrete Mathematics
MATH 235	Math Competition Problem Solving Seminar
MATH 238	History of Mathematics
MATH 250	Mathematics of Investment and Credit
MATH 285	Differential Equations II
MATH 300	Numerical Analysis I
MATH 301	Numerical Analysis II
MATH 305	Introduction to Optimization Theory
MATH 311	Probability and Statistics I

MATH 312	Probability and Statistics II
MATH 316	Mathematical Applications of Symbolic Software
MATH 318 [WI (p. 136)]	Mathematical Applications of Statistical Software
MATH 319	Techniques of Data Analysis
MATH 320	Actuarial Mathematics
MATH 321	Vector Calculus
MATH 322	Complex Variables
MATH 323	Partial Differential Equations
MATH 332	Abstract Algebra II
MATH 387	Linear Algebra II
MATH 401 or MATH 331	Elements of Modern Analysis I or Abstract Algebra I
MATH 402	Elements of Modern Analysis II
MATH 422	Introduction to Topology
MATH 449	Mathematical Finance
MATH 450	Introduction to Graph Theory
MATH 475	Cryptography
MATH 483	Discrete Event Simulation
MATH 489	Tensor Calculus

Total Credits 181.0-182.0

* Math majors must pass MATH 121 with a grade of B or higher.

** If a student takes both of MATH 331 and MATH 401, then one of these can count as a Mathematics Elective. Up to 3 mathematics-related courses from other departments may be substituted for Mathematics Electives with departmental permission. MATH special topics courses may be substituted for Mathematics Electives with departmental permission.

Categories of Electives

- *Humanities and arts electives*
Designated courses in art, art history, communication studies, foreign languages (300-level or above), history, literature, music, philosophy, religion, and theatre arts.
- *International electives*
Designated courses in anthropology, art history, history, literature, music, politics and sociology. Courses with an international focus may be used to fulfill requirements in other categories as well.
- *Science electives*
Students select two courses from chemistry, biology or physics. both courses may be in the same subject or they may be in different subject areas.
- *Social and behavioral sciences electives*
Designated courses in anthropology, economics, criminal justice, international relations, history, politics, psychology and sociology.
- *Studies in diversity electives*
Designated courses in Africana studies, anthropology, communication, English, history, Judaic studies, linguistics, music, sociology and women's studies.

Sample Plan of Study (BA)

5-year co-op sequence

		Credits
Term 1		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121*	Calculus I	4.0
UNIV S101	The Drexel Experience	1.0
	Computer Science (CS) sequence course	3.0
	Science elective	3.0-4.0

Term Credits **14.0-15.0**

Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
	Computer Science (CS) sequence course	3.0
	Science elective	3.0-4.0
CIVC 101	Introduction to Civic Engagement	1.0

Term Credits **14.0-15.0**

Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
MATH 220 [WI (p. 136)]	Introduction to Mathematical Reasoning	3.0
	Computer Science (CS) sequence course	3.0
	Social and behavioral science elective	3.0

Term Credits **16.0**

Term 4		
COM 230	Techniques of Speaking	3.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra	4.0
	Diversity studies elective	3.0
	International studies elective	3.0

Term Credits **17.0**

Term 5		
	Mathematics (MATH) courses**	6.0
	Humanities/Fine arts elective	3.0
	Free electives	6.0

Term Credits **15.0**

Term 6		
MATH 210	Differential Equations	4.0
	Mathematics (MATH) course**	3.0
	Social and behavioral science elective	3.0
	Humanities/Fine arts elective	3.0
	Free elective	3.0

Term Credits **16.0**

Term 7		
	Mathematics (MATH) course**	3.0
	Diversity studies elective	3.0
	Free electives	9.0

Term Credits **15.0**

Term 8		
MATH 401 or 331	Elements of Modern Analysis I Abstract Algebra I	3.0-4.0
	Mathematics (MATH) course**	3.0
	International studies elective	3.0
	Free electives	6.0

Term Credits **15.0-16.0**

Term 9		
	Mathematics (MATH) courses**	4.0
	Free electives	10.0
UNIV S201	Looking Forward: Academics and Careers	1.0

Term Credits **15.0**

Term 10		
	Mathematics (MATH) course**	4.0
	Free electives	12.0

Term Credits **16.0**

Term 11		
	Mathematics (MATH) course**	3.0
	Free electives	11.0

Term Credits **14.0**

Term 12		
	Mathematics (MATH) course**	4.0
	Free electives	10.0

Term Credits **14.0**

Total Credit: 181.0-184.0

* See degree requirements (p. 137).

** Select from MATH 205, MATH 221, MATH 235, MATH 238, MATH 250, MATH 285, MATH 300, MATH 301, MATH 305, MATH 311, MATH 312, MATH 316, MATH 318 [WI (p. 136)], MATH 319, MATH 320, MATH 321, MATH 322, MATH 323, MATH 332, MATH 387, MATH 402, MATH 422, MATH 449, MATH 450, MATH 475, MATH 483, MATH 489. If a student takes both of MATH 331 and MATH 401, then one of these can count as a Mathematics Elective. Up to 3 mathematics-related courses from other departments may be substituted for Mathematics Electives with departmental permission. MATH special topics courses may be substituted for Mathematics Electives with departmental permission.

Degree Requirements (BS)

General Education Requirements

UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV S201	Looking Forward: Academics and Careers	1.0
COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
One of the following Computer Science sequences:		9.0
Option I		

CS 140	Introduction to Multimedia Programming	
CS 143	Computer Programming Fundamentals	
CS 171	Computer Programming I	
Option II		
CS 140	Introduction to Multimedia Programming	
CS 171	Computer Programming I	
CS 172	Computer Programming II	
Any Biology (BIO) course		3.0-4.0
Any Chemistry (CHEM) course		3.0-4.0
Any Physics (PHYS) course		3.0-4.0
Humanities electives		6.0
Social sciences electives		15.0
International studies or studies in diversity electives		6.0
Free electives		41.0
Mathematics Requirements		
MATH 121	Calculus I *	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra	4.0
MATH 210	Differential Equations	4.0
MATH 220 [WI (p. 136)]	Introduction to Mathematical Reasoning	3.0
MATH 331	Abstract Algebra I	4.0
MATH 332	Abstract Algebra II	3.0
MATH 401	Elements of Modern Analysis I	3.0
MATH 402	Elements of Modern Analysis II	3.0
Math Major Electives **		40.0
Select a minimum of 40 credits from the following:		
MATH 221	Discrete Mathematics	
MATH 235	Math Competition Problem Solving Seminar	
MATH 250	Mathematics of Investment and Credit	
MATH 285	Differential Equations II	
MATH 300	Numerical Analysis I	
MATH 301	Numerical Analysis II	
MATH 305	Introduction to Optimization Theory	
MATH 311	Probability and Statistics I	
MATH 312	Probability and Statistics II	
MATH 316	Mathematical Applications of Symbolic Software	
MATH 318 [WI (p. 136)]	Mathematical Applications of Statistical Software	
MATH 319	Techniques of Data Analysis	
MATH 320	Actuarial Mathematics	
MATH 321	Vector Calculus	
MATH 322	Complex Variables	
MATH 323	Partial Differential Equations	
MATH 387	Linear Algebra II	
MATH 422	Introduction to Topology	
MATH 449	Mathematical Finance	
MATH 450	Introduction to Graph Theory	
MATH 475	Cryptography	
MATH 483	Discrete Event Simulation	

MATH 489 Tensor Calculus

Total Credits **181.0-184.0**

* Math majors must pass MATH 121 with a grade of B or higher.

** MATH special topics courses may be substituted for Math Major Electives with departmental permission.

Sample Plan of Study (BS)

This is a recommended plan, illustrating the five-year co-op sequence. Additional recommended plans of study for other co-op options are available from the department.

First Year

Term 1		Credits
UNIV S101	The Drexel Experience	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
Computer Science (CS) course sequence *		3.0
Any Biology (BIO) course		3.0
Term Credits		14.0

Term 2

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
Computer Science (CS) sequence course *		3.0
Any Chemistry (CHEM) course		3.0
Term Credits		14.0

Term 3

ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
Computer Science (CS) sequence course *		3.0
Any Physics (PHYS) course		3.0-4.0
Term Credits		17.0-18.0

Second Year

Term 4

COM 230	Techniques of Speaking	3.0
MATH 201	Linear Algebra	4.0
MATH 220 [WI (p. 136)]	Introduction to Mathematical Reasoning	3.0
Social Science Electives		6.0
Term Credits		16.0

Term 5

Social Science Elective		3.0
MATH 210	Differential Equations	4.0
Mathematics (MATH) elective **		3.0

International Studies or Studies in Diversity Elective	3.0
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Term Credits	13.0
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Third Year**Term 6**

MATH 331 Abstract Algebra I	4.0
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Mathematics (MATH) elective **	4.0
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Social Science Elective	3.0
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Humanities elective	3.0
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Term Credits	14.0
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Term 7

MATH 332 Abstract Algebra II	3.0
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Mathematics (MATH) elective **	4.0
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Humanities elective	3.0
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International Studies or Studies in Diversity Elective	3.0
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Free elective	3.0
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Term Credits	16.0
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Fourth Year**Term 8**

MATH 401 Elements of Modern Analysis I	3.0
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Mathematics (MATH) elective **	3.0
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Social science elective	3.0
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Free electives	6.0
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Term Credits	15.0
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Term 9

UNIV S201 Looking Forward: Academics and Careers	1.0
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MATH 402 Elements of Modern Analysis II	3.0
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Mathematics (MATH) electives **	7.0
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Free electives	6.0
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Term Credits	17.0
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Fifth Year**Term 10**

Mathematics (MATH) electives **	8.0
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Free electives	7.0-8.0
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Term Credits	15.0-16.0
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Term 11

Mathematics (MATH) electives **	7.0
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Free electives	8.0
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Term Credits	15.0
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Term 12

Mathematics (MATH) electives **	6.0
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Free electives	9.0-10.0
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Term Credits	15.0-16.0
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Total Credit: 181.0-184.0

* See degree requirements (p. 137).

** Select from MATH 221, MATH 235, MATH 250, MATH 285, MATH 300, MATH 301, MATH 305, MATH 311, MATH 312, MATH 316, MATH 318 [WI (p. 136)], MATH 319, MATH 320, MATH 321, MATH 322, MATH 323, MATH 387, MATH 422, MATH 449, MATH 450, MATH 475, MATH 483, MATH 489. MATH special topics courses may be substituted for Mathematics Electives with departmental permission.

Co-op/Career Opportunities

Mathematicians are employed in a variety of capacities in business, industry, and government. Students can combine courses in economics or finance and mathematics to prepare for careers in the actuarial field, banks, stock exchanges, or finance departments of large corporations or other financial institutions. Students interested in science careers may focus on probability and statistics in order to work for industries like pharmaceutical manufacturers. Many others combine math studies with computer science courses to prepare for careers in information systems or engineering.

Teacher certification is also a career option available through a joint program in mathematics and teacher education.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) for more detailed information on co-op and post-graduate opportunities.

Dual Degree Bachelor's Programs

Since applied mathematics plays an important role in many different disciplines, mathematics majors often choose to pursue specialization in a second field of study. Students may choose a dual major that involves completing the requirements of two separate majors or they can opt for a minor, which involves completing the major in one field and a smaller set of courses in another.

Dual majors are common in mathematics/computer science and mathematics/physics. Students interested in a dual major should consult with their advisor or contact the assistant department head. Dual majors in other fields are also possible, but early planning and discussions with advisors is essential.

Minor in Mathematics

The minor in mathematics consists of five required courses and elective courses from the specified group of courses listed below resulting in a minimum of 38.0 credits.

Required Courses

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra *	3.0-4.0

or MATH 261 Linear Algebra

Mathematics Minor Electives **

Select from the following:

18.0-19.0

MATH 210 Differential Equations *

or MATH 262 Differential Equations

MATH 220 [WI Introduction to Mathematical Reasoning
(p. 136)]

MATH 221 Discrete Mathematics

MATH 235 Math Competition Problem Solving Seminar

MATH 250 Mathematics of Investment and Credit

MATH 285 Differential Equations II

MATH 291 Complex and Vector Analysis for Engineers ***

MATH 300 Numerical Analysis I

MATH 301 Numerical Analysis II

MATH 305 Introduction to Optimization Theory

MATH 311 Probability and Statistics I

MATH 312 Probability and Statistics II

MATH 316 Mathematical Applications of Symbolic Software

MATH 318 [WI Mathematical Applications of Statistical Software
(p. 136)]

MATH 319 Techniques of Data Analysis

MATH 320 Actuarial Mathematics

MATH 321 Vector Calculus

MATH 322 Complex Variables

MATH 323 Partial Differential Equations

MATH 331 Abstract Algebra I

MATH 332 Abstract Algebra II

MATH 387 Linear Algebra II

MATH 401 Elements of Modern Analysis I

MATH 402 Elements of Modern Analysis II

MATH 410 Scientific Data Analysis I

MATH 411 Scientific Data Analysis II

MATH 422 Introduction to Topology

MATH 449 Mathematical Finance

MATH 450 Introduction to Graph Theory

MATH 475 Cryptography

MATH 483 Discrete Event Simulation

MATH 489 Tensor Calculus

Total Credits

38.0

* Students count only one of these two courses for their minor.

** A request form is available for any other mathematics courses upon the written approval prior to the beginning of the quarter in which the course is to be offered. Students should contact the Mathematics undergraduate academic advisor at advisor@math.drexel.edu.

*** Students who take MATH 291 cannot also count MATH 321 or MATH 322 toward their minor.

Mathematics Faculty

David M. Ambrose, PhD (*Duke University*) Associate Department Head, *Mathematics*. Associate Professor. Applied analysis and computing for systems of nonlinear partial differential equations, especially free-surface problems in fluid dynamics.

Jason Aran, MS (*Drexel University*). Assistant Teaching Professor.

Jonah D. Blasiak, PhD (*University of California at Berkeley*). Associate Professor. Algebraic combinatorics, representation theory, and complexity theory.

Robert P. Boyer, PhD (*University of Pennsylvania*) Associate Head of the *Mathematics Department*. Professor. Functional analysis, C*-algebras and the theory of group representations.

Patrick Clarke, PhD (*University of Miami*). Assistant Professor. Homological mirror symmetry, Landau-Ginzburg models, algebraic geometry, symplectic geometry.

Daryl Falco, MS (*Drexel University*). Assistant Teaching Professor. Discrete mathematics and automata theory.

Raymond Favocci, MS (*Drexel University*). Assistant Teaching Professor.

Carlo Fazioli, PhD (*University of Illinois at Chicago*). Assistant Teaching Professor. Computational Fluid Dynamics, Free Boundary Problems.

Pavel Grinfeld, PhD (*Massachusetts Institute of Technology*). Associate Professor. Intersection of physics, engineering, applied mathematics and computational science.

Anatolii Grinshpan, PhD (*University of California at Berkeley*). Assistant Teaching Professor. Function theory and operator theory, harmonic analysis, matrix theory.

Yixin Guo, PhD (*University of Pittsburgh*). Associate Professor. Biomathematics, dynamical systems, ordinary and partial differential equations and math education.

R. Andrew Hicks, PhD (*University of Pennsylvania*). Professor. Geometry; optics; computer vision.

Pawel Hitczenko, PhD (*Warsaw University*). Professor. Probability theory and its applications to analysis, combinatorics, wavelets, and the analysis of algorithms.

Robert Immordino, MS (*Drexel University*). Assistant Teaching Professor.

Ryan Kaliszewski, PhD (*The University of North Carolina at Chapel Hill*). Visiting Assistant Professor. Algebraic Combinatorics and Algebraic Geometry--specifically positivity results for generating polynomials.

Dmitry Kaliuzhnyi-Verbovetskyi, PhD (*Kharkov University*). Associate Professor. Operator theory, systems theory, complex analysis, C*-algebras and harmonic analysis.

Hwan Yong Lee, PhD (*University of Utah*). Assistant Teaching Professor. Electromagnetic wave propagation in composite media, optimization and inverse problem.

Huilan Li, PhD (*York University*). Assistant Teaching Professor. Algebraic combinatorics.

Georgi S. Medvedev, PhD (*Boston University*). Associate Professor. Ordinary and partial differential equations, mathematical neuroscience.

Taufik Meklachi, PhD (*University of Houston*). Visiting Assistant Professor. Inverse Problems

Jennifer Morse, PhD (*University of California, San Diego*) Undergraduate Advisor. Professor. Algebraic combinatorics.

Shari Moskow, PhD (*Rutgers University*) *Department Head*. Professor. Partial differential equations and numerical analysis, including homogenization theory, numerical methods for problems with rough coefficients, and inverse problems.

Marna A. Mozeff, MS (*Drexel University*). Associate Teaching Professor.

Oksana P. Odintsova, PhD (*Omsk State University*). Associate Teaching Professor. Math education; geometrical modeling.

Dimitrios Papadopoulos, MS (*Drexel University*). Instructor.

Ronald K. Perline, PhD (*University of California at Berkeley*). Associate Professor. Applied mathematics, numerical analysis, symbolic computation, differential geometry, mathematical physics.

Marci A. Perlstadt, PhD (*University of California at Berkeley*). Associate Professor. Applied mathematics, computed tomography, numerical analysis of function reconstruction, signal processing, combinatorics.

Adam C. Rickert, MS (*Drexel University*). Associate Teaching Professor.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Eric Schmutz, PhD (*University of Pennsylvania*). Professor. Probabilistic combinatorics, asymptotic enumeration.

Li Sheng, PhD (*Rutgers University*). Associate Professor. Discrete optimization, combinatorics, operations research, graph theory and its application in molecular biology, social sciences and communication networks, biostatistics.

Gideon Simpson, PhD (*Columbia University*). Assistant Professor. Partial differential equations, scientific computing and applied mathematics.

Justin R. Smith, PhD (*Courant Institute, New York University*). Professor. Homotopy theory, operad theory, quantum mechanics, quantum computing.

Xiaoming Song, PhD (*University of Kansas*). Assistant Professor. Stochastic Calculus, Large Deviation Theory, Theoretical Statistics, Data Network Modeling and Numerical Analysis.

Jeanne M. Steuber, MS (*Boston University*). Assistant Teaching Professor.

Kenneth P. Swartz, PhD (*Harvard University*). Assistant Teaching Professor. Applied statistics, data analysis, calculus, discrete mathematics, biostatistics.

Vaishalee T. Wadke, MS (*Columbia University*). Instructor.

Richard D. White, MS (*Penn State University*). Assistant Teaching Professor.

Hugo J. Woerdeman, PhD (*Vrije Universiteit, Amsterdam*). Professor. Matrix and operator theory, systems theory, signal and image processing, and harmonic analysis.

J. Douglas Wright, PhD (*Boston University*) *Graduate Advisor*. Associate Professor. Partial differential equations, specifically nonlinear waves and their interactions.

Dennis G. Yang, PhD (*Cornell University*). Assistant Teaching Professor. Dynamical systems, neurodynamics.

Thomas (Pok-Yin) Yu, PhD (*Stanford University*). Professor. Multiscale mathematics, wavelets, applied harmonic analysis, subdivision algorithms, nonlinear analysis, applied differential geometry and data analysis.

Emeritus Faculty

Loren N. Argabright, PhD (*University of Washington*). Professor Emeritus. Functional analysis, wavelets, abstract harmonic analysis, the theory of group representations.

Robert C. Busby, PhD (*University of Pennsylvania*). Professor Emeritus. Functional analysis, C*-algebras and group representations, computer science.

Ewaugh Finney Fields, EdD (*Temple University*) *Dean Emeritus*. Professor Emeritus. Mathematics education, curriculum and instruction, minority engineering education.

William M.Y. Goh, PhD (*Ohio State University*). Associate Professor Emeritus. Number theory, approximation theory and special functions, combinatorics, asymptotic analysis.

Bernard Kolman, PhD (*University of Pennsylvania*). Professor Emeritus. Lie algebras; theory, applications, and computational techniques; operations research.

Charles J. Mode, PhD (*University of California at Davis*). Professor Emeritus. Probability and statistics, biostatistics, epidemiology, mathematical demography, data analysis, computer-intensive methods.

Chris Rorres, PhD (*Courant Institute, New York University*). Professor Emeritus. Applied mathematics, scattering theory, mathematical modeling in biological sciences, solar-collection systems.

Jet Wimp, PhD (*University of Edinburgh*). Professor Emeritus. Applied mathematics, special factors, approximation theory, numerical techniques, asymptotic analysis.

Minors in Modern Languages

24.0 quarter credits of language study above the 103 level.

Minors in Arabic, Chinese, French, German, Italian, Japanese, Korean, Russian, and Spanish are offered. All beginner and intermediate courses are oral-intensive, with additional hours required with online coursework. Advanced courses focus on writing skills and do not always require lab work.

Enrollments are limited to 12 to 18 students in the first two years of study; third and fourth-year courses use a seminar format, with a usual enrollment of four to eight students. Language study is open to all undergraduate students in the University, and validation of minimal language competence is required for co-operative education placement abroad in countries where English is not the national language. Study for two or three consecutive terms at or above 201 is the minimum requirement for the BA degree, as a total of 8.0 credits must be completed, but additional language course work is required by most departments offering this degree.

Students are placed in language courses in accordance with language placement testing administered during freshman orientation and at the beginning of each quarter. Students who do not take advantage of this option must comply with the department's enrollment guidelines.

Course Descriptions

- Arabic (p. 578)
- Chinese (p. 578)
- French (p. 579)
- German (p. 580)
- Greek (p. 580)
- Hebrew (p. 580)
- Italian (p. 580)
- Japanese (p. 580)
- Korean (p. 580)
- Russian (p. 581)
- Spanish (p. 581)

Certification of Proficiency

Drexel offers an advanced-level Certification of Proficiency for students who have successfully completed 24.0 credits of coursework and passed the series of written Proficiency examinations and an extensive FSI/ACTFL oral examination with at least an FSI "2" or ACTFL "Advanced" rating. Certification is listed on the student transcript. The different Proficiency exams can be taken once the student has satisfactorily passed the Achievement Test. They are also the prerequisite before starting a minor thesis.

Western languages

- 24 credits of language study above the 103 level
- Certification of Proficiency
- Minor thesis in the target language (1.0-4.0 credits possible)
- Oral defense of the minor thesis

Advanced Conversation and Composition

201-203

Stylistics, Advanced Stylistics

311 WI

312 WI

411

Literature, Advanced Studies in Literature

332

333

Business and the Professions

351

Advanced Topics in Business and Professions: European Union

451

Advanced Studies in Civilization

371

471 WI

Special Topics: Business and Civilization (may be repeated for credit.)

399 WI

499 WI

Non-western languages

- 24 credits of language study above the 103 level
- Minor thesis in the target language (1.0-4.0 credits possible)
- Oral defense of the minor thesis

Course options (subject to placement level)

Advanced reading, writing, and speaking. Levels IV-VI

201-203

Stylistics, Levels VII-IX

301-303

Advanced Independent Study

399 WI

Introduction to Stylistics, Literature

411 WI

431 WI

Introduction to Business

451

FREN 451	Special Studies in Advanced Business and Professional French	4.0
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RUSS 499	Special Topics in Russian	12.0
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Additional Information

For more information about all language minors, contact the Program Director:

Dr. Simone Schlichting-Artur

215.895.2443

schlichs@drexel.edu

Philosophy

Major: Philosophy

Degree Awarded: Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 182.0 - 188.0

Classification of Instructional Programs (CIP) code: 38.0101

Standard Occupational Classification (SOC) code: 25-1126

About the Program

A great philosopher once said, "Philosophy has just interpreted the world--but the point is to change it." At Drexel, we believe ideas do affect and change the world--in how we choose what to do, in how we approach our activities, and in what we learn from them. At Drexel we believe that the most important reason to engage in philosophy is because it does change the world.

The Drexel philosophy program is organized around the idea that the study of philosophy should help students confront life's most difficult and complex challenges. Philosophy classes at Drexel involve students in the active development of their reflective, creative, rational, logical, and linguistic abilities by engaging them with the problems of life and the world. The Drexel philosophy major is an excellent preparation for success in any field of endeavor that values thoughtful reflection, logical thinking, and clear communication about real issues and concerns. It is particularly valuable as a preparation for careers in education and law, or in graduate study in philosophy, or in fields related to philosophy like critical media studies, public policy, or science, technology, and society (STS).

Drexel philosophy majors take a mixture of historical and topical courses in the major fields of philosophical inquiry. These fields include ethics, metaphysics (philosophy of reality), epistemology (philosophy of knowledge), aesthetics (philosophy of art and beauty), social and political philosophy, philosophy of science, and logic. Our philosophy elective classes cover a wide range of applied subjects including technology,

medicine, law, religion, science, the environment, and more. Our upper-level seminar classes are discussion-driven, reading- and writing-intensive classes usually limited to 10-12 students.

Prior to the end of sophomore year students may choose to focus their philosophical studies in one of three areas of concentration. These are:

Ethical Theory and Practice,

Philosophy and Law,

Philosophy, Technology and Science.

Students may also remain in the general Philosophy concentration, which gives them the widest range of options from which to select their courses.

Prior to the end of junior year, students may opt to work on a nine-credit Senior Thesis. This is a year-long, self-designed independent research and writing project, culminating in a defense before the program's faculty and students. This project consists of three one-on-one tutorials with a faculty member of the student's choosing.

The philosophy BA includes about 50.0 credits of free electives, which makes it possible for many students to double major. The Drexel philosophy program also offers a minor in philosophy (24.0 credits) and certificate programs in Philosophy in the Arts and Humanities and Philosophy in Science and Technology, (18.0 credits each).

Additional Information

For more information about Drexel philosophy classes and programs, please visit the Department of English & Philosophy website or drop by to see our director anytime. The Department of English and Philosophy is located in MacAlister Hall, room 5044. You can contact the director directly at:

Dr. Peter Amato
Director of Programs in Philosophy
Department of English and Philosophy

MacAlister 5030
215-895-1353

peterama@drexel.edu

Degree Requirements

College of Arts and Sciences Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CIVC 101	Introduction to Civic Engagement	1.0
PHIL 105	Critical Reasoning	3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Two Studies in Diversity Electives		6.0
Two International Studies Electives		6.0-8.0
Two Math Electives		6.0-8.0
Two Science Electives		6.0-8.0
Four Social and Behavioral Sciences Electives		12.0-16.0
Select two of the following:		6.0

ARTH 101	History of Art I: Ancient to Medieval
ARTH 102	History of Art II: High Renaissance to Modern
ARTH 103	History of Art: Early to Late Modern

Language Requirement

Any two (2) consecutive foreign language courses (completing level 201) 8.0

Major Requirements - All Concentrations

COM 230	Techniques of Speaking	3.0
PHIL 101	Introduction to Western Philosophy	3.0
PHIL 211	Metaphysics	3.0
PHIL 212	Ancient Philosophy	3.0
PHIL 214	Modern Philosophy	3.0
PHIL 215	Contemporary Philosophy	3.0
PHIL 221	Epistemology	3.0
PHIL 251	Ethics	3.0
PHIL 421 [WI (p. 143)]	Seminar in Ancient Philosophy	3.0
or PHIL 425	Seminar in Medieval Philosophy	
PHIL 431 [WI (p. 143)]	Seminar in Modern Philosophy	3.0
PHIL 461 [WI (p. 143)]	Seminar in Contemporary Philosophy	3.0
or PHIL 465	Seminar in American Philosophy	

Professional Ethics Elective

Select one of the following:		3.0
PHIL 301	Business Ethics	
PHIL 305	Communication Ethics	
PHIL 311	Computer Ethics	
PHIL 315	Engineering Ethics	
PHIL 317	Ethics and Design Professions	
PHIL 321	Biomedical Ethics	
PHIL 322	Ethics of Human Enhancement	
PHIL 323	Organizational Ethics	
PHIL 325	Ethics in Sports Management	
PHIL 330	Ethical Issues in Criminal Justice	
PHIL 335	Global Ethical Issues	
PHIL 340	Environmental Ethics	

Thesis or Non-Thesis Option 9.0

Thesis Option:

PHIL 497 [WI (p. 143)]	Senior Essay I: Research & Thesis Development	
PHIL 498 [WI (p. 143)]	Senior Essay II: Argument Construction	
PHIL 499 [WI (p. 143)]	Senior Essay III: Defense	

Non-Thesis Option:

PHIL 481 [WI (p. 143)]	Seminar in a Philosophical School	
PHIL 485 [WI (p. 143)]	Seminar in a Major Philosopher	
Select one of the following:		
PHIL 341	Philosophy of the Environment	
PHIL 351	Philosophy of Technology	
PHIL 355	Philosophy of Medicine	

PHIL 361	Philosophy of Science
PHIL 371	Philosophy of Social Sciences
PHIL 381 [WI (p. 143)]	Philosophy in Literature
PHIL 385	Philosophy of Law
PHIL 391	Philosophy of Religion
PHIL 395	Advanced Topics in Logic

Electives

Free Electives 51.0

Concentration Option 21.0

General Philosophy Concentration:

PHIL 111	Symbolic Logic 1
PHIL 231	Aesthetics
PHIL 481 [WI (p. 143)]	Seminar in a Philosophical School
PHIL 485 [WI (p. 143)]	Seminar in a Major Philosopher

Select one of the following courses:

PHIL 207	Symbolic Logic 2
PHIL 301	Business Ethics
PHIL 305	Communication Ethics
PHIL 311	Computer Ethics
PHIL 315	Engineering Ethics
PHIL 317	Ethics and Design Professions
PHIL 321	Biomedical Ethics
PHIL 322	Ethics of Human Enhancement
PHIL 323	Organizational Ethics
PHIL 325	Ethics in Sports Management
PHIL 330	Ethical Issues in Criminal Justice
PHIL 335	Global Ethical Issues
PHIL 340	Environmental Ethics

Select two of the following courses:

PHIL 341	Philosophy of the Environment
PHIL 351	Philosophy of Technology
PHIL 355	Philosophy of Medicine
PHIL 361	Philosophy of Science
PHIL 371	Philosophy of Social Sciences
PHIL 381 [WI (p. 143)]	Philosophy in Literature
PHIL 385	Philosophy of Law
PHIL 391	Philosophy of Religion
PHIL 395	Advanced Topics in Logic

Philosophy & Law Concentration:

PHIL 111	Symbolic Logic 1
PHIL 207	Symbolic Logic 2
PHIL 241	Social & Political Philosophy
PHIL 385	Philosophy of Law
PHIL 391	Philosophy of Religion
PHIL 481 [WI (p. 143)]	Seminar in a Philosophical School
or PHIL 485	Seminar in a Major Philosopher

Select one of the following courses:

PHIL 301	Business Ethics
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PHIL 305	Communication Ethics
PHIL 311	Computer Ethics
PHIL 315	Engineering Ethics
PHIL 317	Ethics and Design Professions
PHIL 321	Biomedical Ethics
PHIL 322	Ethics of Human Enhancement
PHIL 323	Organizational Ethics
PHIL 325	Ethics in Sports Management
PHIL 330	Ethical Issues in Criminal Justice
PHIL 335	Global Ethical Issues
PHIL 340	Environmental Ethics

Ethical Theory & Practice Concentration:

PHIL 102	Introduction to Eastern Philosophy
PHIL 231	Aesthetics
or PHIL 241	Social & Political Philosophy
PHIL 385	Philosophy of Law
PHIL 391	Philosophy of Religion
PHIL 481 [WI (p. 143)]	Seminar in a Philosophical School
PHIL 485 [WI (p. 143)]	Seminar in a Major Philosopher

Select one of the following courses:

PHIL 301	Business Ethics
PHIL 305	Communication Ethics
PHIL 311	Computer Ethics
PHIL 315	Engineering Ethics
PHIL 317	Ethics and Design Professions
PHIL 321	Biomedical Ethics
PHIL 322	Ethics of Human Enhancement
PHIL 323	Organizational Ethics
PHIL 325	Ethics in Sports Management
PHIL 330	Ethical Issues in Criminal Justice
PHIL 335	Global Ethical Issues
PHIL 340	Environmental Ethics

Philosophy, Technology & Science Concentration:

PHIL 111	Symbolic Logic 1
PHIL 207	Symbolic Logic 2
PHIL 231	Aesthetics
PHIL 351	Philosophy of Technology
PHIL 361	Philosophy of Science
PHIL 481 [WI (p. 143)]	Seminar in a Philosophical School
PHIL 485 [WI (p. 143)]	Seminar in a Major Philosopher

Total Credits**182.0-192.0****Sample Plan of Study**

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PHIL 101	Introduction to Western Philosophy	3.0
PHIL 105	Critical Reasoning	3.0

UNIV H101	The Drexel Experience	1.0
Math elective		3.0-4.0
Science elective		3.0-4.0
Term Credits		16.0-18.0
Term 2		
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHIL 212	Ancient Philosophy	3.0
Language elective*		4.0
Science elective		3.0-4.0
Term Credits		14.0-15.0
Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 214	Modern Philosophy	3.0
Free elective		3.0
Language elective		4.0
Math elective		3.0-4.0
Term Credits		16.0-17.0
Term 4		
ARTH 101	History of Art I: Ancient to Medieval	3.0
PHIL 111	Symbolic Logic 1	3.0
PHIL 215	Contemporary Philosophy	3.0
Free elective		3.0
Social science elective		3.0-4.0
Term Credits		15.0-16.0
Term 5		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
PHIL 207	Symbolic Logic 2	3.0
or		
Professional Ethics elective**		
PHIL 211	Metaphysics	3.0
Diversity studies elective		3.0
Free elective		3.0
Term Credits		15.0
Term 6		
COM 230	Techniques of Speaking	3.0
PHIL 221	Epistemology	3.0
Free elective		3.0
International studies elective		3.0-4.0
Social science elective		3.0-4.0
Term Credits		15.0-17.0
Term 7		
PHIL 231	Aesthetics	3.0
PHIL 481 [WI (p. 143)]	Seminar in a Philosophical School	3.0
Free electives		6.0
Social science elective		3.0-4.0
Term Credits		15.0-16.0
Term 8		

PHIL 251	Ethics	3.0
PHIL 485 [WI (p. 143)]	Seminar in a Major Philosopher	3.0
Free electives		6.0
International studies elective		3.0-4.0
Term Credits		15.0-16.0
Term 9		
Diversity studies elective		3.0
Free electives		6.0
Professional Ethics elective**		3.0
Social science elective		3.0-4.0
Term Credits		15.0-16.0
Term 10		
PHIL 421 [WI (p. 143)]	Seminar in Ancient Philosophy	3.0
PHIL 497 [WI (p. 143)]	Senior Essay I: Research Thesis Development or Philosophy Elective***	3.0
UNIV H201	Looking Forward: Academics and Careers	1.0
Free electives		9.0
Term Credits		16.0
Term 11		
PHIL 431 [WI (p. 143)]	Seminar in Modern Philosophy	3.0
PHIL 498 [WI (p. 143)]	Senior Essay II: Argument Construction Seminar in a Philosophical School or 481 [WI (p. 143)]	3.0
Philosophy Elective PHIL341-395		3.0
Free electives		6.0
Term Credits		15.0
Term 12		
PHIL 461 [WI (p. 143)]	Seminar in Contemporary Philosophy	3.0
PHIL 499 [WI (p. 143)]	Senior Essay III: Defense Seminar in a Major Philosopher or 485 [WI (p. 143)]	3.0
Philosophy Elective PHIL 341-395		3.0
Free electives		6.0
Term Credits		15.0
Total Credit: 182.0-192.0		

* Students must complete two consecutive courses in a foreign language and must reach the 201 level. This may require incoming students to complete preliminary classes.

** Complete a course within this range: PHIL 301 - PHIL 340.

*** Complete a course within this range: PHIL 341 - PHIL 395.

Minor in Philosophy

This minor is intended for undergraduates seeking to broaden and enhance their education by attaining a firm grounding in philosophy. The minor requires seven carefully-selected classes, plus one of the senior seminars. Students who have completed 30.0 credits may apply for the

philosophy minor by submitting the Application for Admission to Minor Program form, available online at the Drexel Central (<http://drexel.edu/drexelcentral>) website.

Required Courses

PHIL 101	Introduction to Western Philosophy	3.0
Select one of the following:		3.0
PHIL 105	Critical Reasoning	
PHIL 111	Symbolic Logic 1	
Select three Philosophy Foundations Electives:		9.0
PHIL 207	Symbolic Logic 2 *	
PHIL 211	Metaphysics	
PHIL 212	Ancient Philosophy	
PHIL 214	Modern Philosophy	
PHIL 215	Contemporary Philosophy	
PHIL 221	Epistemology	
PHIL 231	Aesthetics	
PHIL 241	Social & Political Philosophy	
PHIL 251	Ethics	
Select one Philosophy Elective:		3.0
PHIL 341	Philosophy of the Environment	
PHIL 351	Philosophy of Technology	
PHIL 355	Philosophy of Medicine	
PHIL 361	Philosophy of Science	
PHIL 371	Philosophy of Social Sciences	
PHIL 381 [WI (p. 143)]	Philosophy in Literature	
PHIL 385	Philosophy of Law	
PHIL 391	Philosophy of Religion	
PHIL 395	Advanced Topics in Logic **	
Select one Professional Ethics Elective:		3.0
PHIL 301	Business Ethics	
PHIL 305	Communication Ethics	
PHIL 311	Computer Ethics	
PHIL 315	Engineering Ethics	
PHIL 317	Ethics and Design Professions	
PHIL 321	Biomedical Ethics	
PHIL 322	Ethics of Human Enhancement	
PHIL 323	Organizational Ethics	
PHIL 325	Ethics in Sports Management	
PHIL 330	Ethical Issues in Criminal Justice	
PHIL 335	Global Ethical Issues	
PHIL 340	Environmental Ethics	
Select one Philosophy Seminar Elective:		3.0
PHIL 421 [WI (p. 143)]	Seminar in Ancient Philosophy	
PHIL 425 [WI (p. 143)]	Seminar in Medieval Philosophy	
PHIL 431 [WI (p. 143)]	Seminar in Modern Philosophy	
PHIL 461 [WI (p. 143)]	Seminar in Contemporary Philosophy	

Total Credits **24.0**

* Requires PHIL 111 - Propositional Logic

** Requires PHIL 207 - Predicate Logic

Additional Information

For more information about the Drexel philosophy minor, please visit or contact the program director:

Dr. Peter Amato
Director of Programs in Philosophy
Department of English and Philosophy

MacAlister 5030

215-895-1353

peterama@drexel.edu (peterama@drexel.edu)

Co-op/Career Opportunities

No major prepares students for success in as wide a variety of careers as a philosophy major does. Because philosophical work helps students develop superior reasoning, communication, and analytical skills, a philosophy major can be an ideal choice for students in pre-med or pre-law. It is also particularly valuable as a preparation for graduate study in philosophy, and in fields related to philosophy such as critical media studies, public policy, and science, technology, and society (STS). The Drexel philosophy major is an excellent preparation for success in any field of endeavor that values thoughtful reflection, logical thinking, and clear communication. Philosophy majors graduate into a wide range of successful careers in business, industry, law, government, and service organizations and agencies as well as many fields of graduate study and research.

In only its first five years, the Drexel philosophy program has graduated students into careers including the law, public policy, and academic philosophy taking them to The Law School of the University of Pennsylvania, The New School, and Northeastern University.

Co-op Experiences

Philosophy students at Drexel are encouraged to seek out interesting co-op opportunities related to the skills and interests they are developing through their philosophical studies and potential career options they would like to explore. These can be as broad as the difference between an ethics-related co-op that has the student shadowing an ethicist working for a hospital's board of institutional review, to a student who is interested in aesthetics and politics working with the Philadelphia Mural Arts Program in liaison with community groups. Students in philosophy who are pre-law frequently pursue law-related co-ops and co-ops at public and private agencies and organizations that employ lawyers and law students. Students in philosophy who are thinking about careers in academia have the full gamut of writing, editing, and publishing co-ops available to them, as well as research related co-ops they can develop by working with professors. While academically-oriented co-ops and co-ops in the Humanities generally pay less than those in the sciences, business, law, and engineering—if they pay at all—they are still enormously valuable as a way for students to develop a sense of what various careers might actually be like and how they work.

For detailed information on co-op and career opportunities, visit the Drexel Steinbright Career Development Center web page. For further information about co-op and career prospects related to philosophy, contact the Drexel philosophy program director:

Dr. Peter Amato

Director of Programs in Philosophy

Department of English and Philosophy

MacAlister 5030
215-895-1353

peterama@drexel.edu

Philosophy Faculty

Stacey Ake, PhD (*Pennsylvania State University*). Associate Teaching Professor. Ethics, semiotics, existentialism

Peter Amato, PhD (*Fordham University*) Director, *Philosophy*. Associate Teaching Professor. Ethics, Marxism, Continental philosophy.

Jacques N. Catudal, PhD (*Temple University*). Associate Professor. Epistemology, aesthetics, philosophy of religion.

Nathan Hanna, PhD (*Syracuse University*). Assistant Professor. Ethics; philosophy of law; political philosophy.

Adam Knowles, PhD (*The New School for Social Research*). Assistant Teaching Professor. Continental philosophy, phenomenology, Ancient Greek philosophy, ethics and feminism, drawing especially on Plato, Aristotle, Nietzsche, Heidegger, Irigaray and Derrida.

Carol Mele, PhD (*University of Pennsylvania*). Associate Teaching Professor. Ethics, medical ethics, critical reasoning.

Flavia Padovani, PhD (*University of Geneva*). Assistant Professor. History and philosophy of science, philosophy of science, epistemology, logic.

Andrew Smith, PhD (*SUNY, Stony Brook*). Assistant Professor. Social and political philosophy, ethics, American philosophy.

Interdepartmental Faculty

Marilyn Gaye Piety, PhD (*McGill University*). Associate Professor. History of philosophy, philosophy of religion, critical reasoning, Kierkegaard.

Physics

Major: *Physics*

Degree Awarded: *Bachelor of Science (BS)*

Calendar Type: *Quarter*

Total Credit Hours: *180.0*

Classification of Instructional Programs (CIP) code: *40.0801*

Standard Occupational Classification (SOC) code: *19-2012*

About the Program

Drexel's undergraduate program provides a solid foundation in physics suitable for graduate study or to branch out into other scientific or technical disciplines. The physics program offers an innovative curriculum in a top-notch learning environment: small class sizes, personal input from faculty, and close interaction with researchers who are leaders in their fields. Students explore the span of universal phenomenon—

from the farthest reaches of astrophysics and cosmology, to molecular biophysics and subatomic particle physics— providing a solid foundation for continued study and exploration. Most undergraduates actively participate in research projects, including co-authoring publications and presenting results at conferences.

Virtually every course in the physics major is designed to extend the students' ability to handle real-world problems solved by state-of-the-art techniques. An important feature of the program is the large number of electives, which allow a student to pursue topics of special interest. There are numerous elective courses in areas as diverse as biophysics and cosmology, nanoscience and particle physics. Students can also choose electives to meet teacher certification requirements.

The Laboratory for High-Performance Computational Physics is a venue for students to become proficient in numerical techniques, parallel processing, electronic communication, and the basic computer languages and software relevant to advanced studies and research in physics.

The Department of Physics (<http://www.drexel.edu/coas/academics/departments-centers/physics>) conducts a broad array of outreach activities including the Kaczmarczik Lecture Series, public observing nights at the Lynch Observatory (<http://www.physics.drexel.edu/observatory>), and demonstrations in grade school performed by the Drexel Chapter of the Society of Physics Students (<http://www.drexel.edu/coas/academics/departments-centers/physics/student-organizations/society-physics-students>) (SPS).

In addition to the physics major, the Department also offers a minor in physics as well as a minor in astrophysics (p. 55).

Degree Requirements

Core Physics Requirements

PHYS 113	Contemporary Physics I	5.0
PHYS 114	Contemporary Physics II	5.0
PHYS 115	Contemporary Physics III	5.0
PHYS 105	Computational Physics I	3.0
PHYS 217	Thermodynamics	4.0
PHYS 311	Classical Mechanics I	4.0
PHYS 223 [WI (p. 148)]	Modern Physics Laboratory	3.0
PHYS 317	Statistical Mechanics	3.0
PHYS 321	Electromagnetic Fields I	4.0
PHYS 322	Electromagnetic Fields II	4.0
PHYS 326	Quantum Mechanics I	4.0
PHYS 327	Quantum Mechanics II	4.0
PHYS 328 [WI (p. 148)]	Advanced Laboratory	3.0
PHYS 491	Senior Research I	3.0
PHYS 492	Senior Research II	3.0
PHYS 493 [WI (p. 148)]	Senior Research III	3.0
PHYS 408	Physics Seminar (To be taken 3 times.)	3.0

Method Classes: Complete 12 credits from the following * 12.0

PHYS 160	Introduction to Scientific Computing
PHYS 226	Instrumentation for Scientists I
PHYS 227	Instrumentation for Scientists II
PHYS 232	Observational Astrophysics

PHYS 305	Computational Physics II
PHYS 324	Topics in Mathematical Physics
PHYS 325	Computational Physics III
PHYS 405	Advanced Computational Physics
MATH 322	Complex Variables
MATH 323	Partial Differential Equations
MATH 331	Abstract Algebra I
MATH 489	Tensor Calculus

Subject Courses: Complete 15 credits from the following: ** 15.0

PHYS 231	Introductory Astrophysics
PHYS 262	Introduction to Biophysics
HNRS 301	Colloquium II (Special Relativity)
PHYS 330	Introduction to Nuclear Physics
PHYS 312	Classical Mechanics II
PHYS 428	Quantum Mechanics III
PHYS 431	Galactic Astrophysics
PHYS 432	Cosmology
PHYS 452	Solid State Physics
PHYS 453	Nanoscience
PHYS 461	Biophysics
PHYS 462	Computational Biophysics
PHYS 463	Single Molecule Methods
PHYS 471	Nonlinear Dynamics
PHYS 476	Particle Physics

Math and Technical Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra	3.0-4.0
or MATH 261	Linear Algebra	
MATH 210	Differential Equations	4.0
Sciences		
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III (OR Any Bio OR an ENGR class at 200 or higher)	5.0
CS 171	Computer Programming I	3.0

General Education

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV S101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Liberal electives		9.0
Technical elective ***		3.0
Business elective		4.0
Free electives		24.0

Total Credits 180.0-181.0

- * At least 6 credits must have a PHYS subject code
- ** Except for PHYS 480, courses at the 400 level and above will also be accepted.
- *** Technical electives can be any course in BIO, CHEM, ENVS, GEO, MATH, PHYS, or any course from the College of Engineering.

Sample Plan of Study

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
PHYS 113	Contemporary Physics I	5.0
PHYS 223 [WI (p. 148)]	Modern Physics Laboratory	3.0
UNIV S101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		Credits
CS 171	Computer Programming I	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
PHYS 114	Contemporary Physics II	5.0
Term Credits		15.0
Term 3		Credits
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
PHYS 105	Computational Physics I	3.0
PHYS 115	Contemporary Physics III	5.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		16.0
Term 4		Credits
CHEM 101	General Chemistry I	3.5
MATH 201 or 261	Linear Algebra	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 217	Thermodynamics	4.0
Term Credits		15.5
Term 5		Credits
CHEM 102	General Chemistry II	4.5
MATH 210	Differential Equations	4.0
PHYS 311	Classical Mechanics I	4.0
Subject course*		3.0
Term Credits		15.5
Term 6		Credits
PHYS 326	Quantum Mechanics I	4.0
One of the following:		3.0-5.0
CHEM 103	General Chemistry III	
Any Biology (BIO) course		
Any ENGR course 200-level or higher		
Method course*		3.0

Free elective		3.0
Term Credits		13.0-15.0
Term 7		
PHYS 327	Quantum Mechanics II	4.0
PHYS 317	Statistical Mechanics	3.0
Method course		3.0
Business elective		3.0
Liberal studies elective		3.0
Term Credits		16.0
Term 8		
PHYS 321	Electromagnetic Fields I	4.0
Two Subject courses		6.0
Technical elective		3.0
Free elective		3.0
Term Credits		16.0
Term 9		
PHYS 322	Electromagnetic Fields II	4.0
PHYS 328 [WI (p. 148)]	Advanced Laboratory	3.0
Method course		3.0
Liberal studies elective		3.0
Business elective		3.0
Term Credits		16.0
Term 10		
PHYS 408	Physics Seminar	1.0
PHYS 491	Senior Research I	3.0
Subject course		3.0
Liberal studies elective		3.0
Free elective		3.0
UNIV S201	Looking Forward: Academics and Careers (Recommended only. For students pursuing graduate study.)	1.0
Term Credits		14.0
Term 11		
PHYS 408	Physics Seminar	1.0
PHYS 492	Senior Research II	3.0
Subject course		3.0
Free electives		6.0
Term Credits		13.0
Term 12		
PHYS 408	Physics Seminar	1.0
PHYS 493 [WI (p. 148)]	Senior Research III	3.0
Method course		3.0
Free electives		7.0
Term Credits		14.0
Total Credit: 180.0-182.0		

* See degree requirements (p. 148).

Co-op/Career Opportunities

Students who complete a degree in physics have many options. Some enter graduate school with the intention of obtaining a master's or a PhD. Others attend medical school. Engineering is yet another option, and graduates of an undergraduate physics program can enter this field with an unusually solid background in fundamental physical principles, mathematics, and computation. It is also possible for physics graduates to work in business and finance; for example, Wall Street employs many analysts trained in such "hard sciences" as physics.

Many Drexel physics graduates proceed directly into graduate schools, or medical or other professional programs. Physics graduates have attended some of the best graduate programs in the United States, including Columbia, Harvard, and CalTech. Other graduates have found jobs in engineering and business, and with such government agencies as the National Bureau of Standards.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) for more detailed information on co-op and post-graduate opportunities.

Minor in Physics

Physics is a science that studies the natural phenomena at all scales, from that of the universe to elementary particles. This minor exposes the students to some of the basic principles of physics and would easily complement any other discipline—from engineering to other sciences.

The minor in physics requires a total of 10.0 credits from the elective list in addition to the prerequisite and core courses.

Because of the overlap in requirements between the astrophysics minor (p. 55) and the physics minor, students cannot minor in both.

Required Prerequisite Courses *

PHYS 113	Contemporary Physics I
PHYS 114	Contemporary Physics II
PHYS 115	Contemporary Physics III

Required Courses

PHYS 311	Classical Mechanics I	4.0
PHYS 321	Electromagnetic Fields I	4.0
PHYS 217	Thermodynamics	4.0
PHYS 326	Quantum Mechanics I	4.0

Electives

Select at least 10 credits from PHYS courses at the 300 level or above 10.0

Total Credits **26.0**

* PHYS 101, PHYS 102 and PHYS 201 will also satisfy the prerequisite requirements.

Physics Faculty

Alexey Aprelev, PhD (*St Petersburg State University*). Assistant Teaching Professor. Experimental biophysics.

Shyamalendu Bose, PhD (*University of Maryland*). Professor. Theory of surfaces and interfaces, disordered systems, electron and X-ray spectroscopy of solids, high-temperature superconductivity.

Luis R. Cruz Cruz, PhD (*MIT*). Associate Professor. Correlation studies and density map analysis of the loss of spatial organization of neurons in the aged brain: computational studies of the folding of the Alzheimer amyloid beta protein using all-atom molecular dynamics: cellular automata models of the growth of plaques in Alzheimer's disease: fluid flow through porous media using computer lattice models.

N. John Dinardo, PhD (*University of Pennsylvania*) *Vice Provost for Academic Affairs*. Professor. Vibrational and electron dynamics at semiconductor surfaces and interfaces, metal-semiconductor interfaces, polymer surfaces and interfaces, diamond-like carbon thin films, and protein and cell interactions with biomaterials surfaces.

Michelle Dolinski, PhD (*University of California, Berkeley*). Assistant Professor. Neutrino physics, rare nuclear decays, cryogenic detector technologies.

Frank A. Ferrone, PhD (*Princeton University*). Professor. Experimental and theoretical protein dynamics, kinetics of biological self-assembly, including sickle cell and Alzheimer's disease.

Robert Gilmore, PhD (*Massachusetts Institute of Technology*). Professor. Applications of compact and non-compact Lie algebras for problems in nuclear, atomic, and molecular physics; nonlinear dynamics and chaos and the analysis of chaotic data.

David M. Goldberg, PhD (*Princeton University*) *Associate Dean for Research and Graduate Education, Associate Department Head for Undergraduate Studies*. Professor. Theoretical and computational cosmology, extragalactic astrophysics, parallel computing.

Maher Harb, PhD (*University of Toronto*). Assistant Professor. Solid state physics; ultrafast Electron diffraction; time-resolved X-ray diffraction; nanofabrication; nano/microfluidics; instrument development; vacuum technologies.

Goran Karapetrov, PhD (*Oregon State University*). Associate Professor. Experimental solid state physics, scanning probe microscopy, nanoscale catalysis, mesoscopic superconductivity.

Charles Lane, PhD (*California Institute of Technology*). Professor. Experimental tests of invariance principles and conservation laws, experimental search for magnetic monopoles and high-energy cosmic neutrinos, solar neutrinos and neutrino oscillations.

Teck-Kah Lim, PhD (*University of Adelaide*). Professor. Structures and dynamics of small nuclear and molecular systems, spin-polarized quantum systems, physics in two dimensions. Physics education.

Christina Love, PhD (*Temple University*). Assistant Teaching Professor. Educational methods and technology, STEM education, science literacy and outreach, particle physics, astrophysics.

Stephen L. W. McMillan, PhD (*Harvard University*) *Department Head*. Professor. Stellar dynamics, large-scale computations of stellar systems, and high-performance special-purpose computers.

Naoko Kurahashi Neilson, PhD (*Stanford University*). Assistant Professor. Neutrino physics, high energy astro-particle physics.

Russell Neilson, PhD (*Stanford University*). Assistant Professor. Dark matter, neutrino physics.

Gordon Richards, PhD (*University of Chicago*). Professor. Quasars, active galactic nuclei, supermassive black holes, sky surveys, gravitational lensing, galaxy evolution.

Richard I Steinberg, PhD (*Yale University*). Adjunct Professor. Experimental tests of invariance principles and conservation laws, experimental search for magnetic monopoles and high-energy cosmic neutrinos (MACRO experiment at Gran Sasso Laboratory, Italy), solar neutrinos and neutrino oscillations (CHOOZ project).

Somdev Tyagi, PhD (*Brigham Young University*) *Associate Head of Non-Major Studies in Physics*. Professor. Nanobiophysics, Raman spectroscopy, magnetic materials.

Brigita Urbanc, PhD (*University of Ljubljana, Slovenia*). Associate Professor. Landau-Ginsburg theory of ferroelectric liquid crystals; cellular automaton model of Alzheimer's senile plaque growth; protein folding and assembly relevant to Alzheimer's and Parkinson's diseases; discrete (discontinuous) molecular dynamics simulations and coarse-grain protein models; applications of automated neuron recognition and density map methods to quantify spatial correlations in aging brain.

Michel Vallières, PhD (*University of Pennsylvania*). Professor. Shell-model and mean field studies of nuclei on and off beta-stability, chaotic scattering, computational physics.

Michael Vogeley, PhD (*Harvard University*) *Director of Graduate Studies*. Professor. Cosmology; galaxy formation and evolution; statistical analysis of large data sets; active galactic nuclei.

Jian-Min Yuan, PhD (*University of Chicago*). Professor. Protein folding, signal transduction pathways, computational biophysics, nonlinear dynamics and chaos in atomic and molecular systems, protein folding.

Interdepartmental Faculty

Jonathan E. Spanier, PhD (*Columbia University*) *Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Emeritus Faculty

Leonard D. Cohen, PhD (*University of Pennsylvania*). Professor Emeritus.

Leonard X. Finegold, PhD (*University of London*). Professor Emeritus. Biological physics and granular physics.

Richard D. Haracz, PhD (*Wayne State University*). Professor Emeritus.

Frederick House, PhD (*University of Wisconsin*). Professor Emeritus.

Arthur P. Joblin, PhD (*Drexel University*). Professor Emeritus.

Donald C. Larson, PhD (*Harvard University*). Professor Emeritus.

Arthur E. Lord, PhD (*Columbia University*). Professor Emeritus.

James McCray, PhD (*California Institute of Technology*). Professor Emeritus.

T. S. Venkataraman, PhD (*Worcester Polytechnic Institute*). Professor Emeritus. Material engineering and physics.

Political Science

Major: Political Science

Degree Awarded: Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 181.0

Classification of Instructional Programs (CIP) code: 45.1001

Standard Occupational Classification (SOC) code: 19-3094

About the Program

The political science program in the Department of Politics (<http://www.drexel.edu/coas/academics/departments-centers/politics>) helps students cultivate perspective, develop critical thinking and communication skills, and understand the economic, social, and political systems within which we live and work. Our curriculum builds on the department's research focuses and strengths. These include public policy, environmental politics, international organizations, human rights, and law and society. This flexible program allows students to shape a curriculum that meets their needs, whether they are preparing for public service, the business world, graduate school in political science, an MBA or other business program, or law school.

Degree Offered

The department offers a Bachelor of Arts (BA) in political science. Students may choose a substantive 'track' that best fits their needs and future goals. Our current tracks are: American Politics and Policy, International Politics, and Law and Politics.

The Bachelor of Arts (BA) provides a flexible course of study, which includes foreign language and allows for options in the fulfillment of humanities, social science, math, and science requirements.

Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Two Math courses		6.0-8.0
Two Science courses*		6.0-8.0

Foundation Requirements

Two Studies in Diversity electives	6.0
Three Consecutive Foreign Language courses (must complete level 201)**	12.0
Four Humanities/Fine Arts electives	12.0
Four Social Science electives	12.0
Two International Studies electives	6.0

Core Political Science Requirements

PSCI 110	American Government I	4.0
PSCI 120	History of Political Thought	4.0
PSCI 140	Introduction to Comparative Political Analysis	4.0

PSCI 150	International Politics	4.0
Political Science Research Methods Sequence		
PSCI 131 [WI (p. 152)]	Research Design for Political Science	4.0
PSCI 231	Qualitative and Mixed-Methods Research in Political Science	4.0
PSCI 232	Quantitative Research Methods in Political Science	4.0
Intermediate Courses		16.0
Select four of the following courses:		
PSCI 200	The Public Policy Process	
PSCI 211	American Government II	
PSCI 220	Constitutional Law I	
PSCI 223	Comparative Political Thought	
PSCI 229	Theories of Justice	
PSCI 240	Comparative Government	
PSCI 250	American Foreign Policy	
PSCI 251	Global Governance	
PSCI 260 [WI (p. 152)]	Power in Protest: Social Movements in Comparative Perspective	
PSCI 270	Problems of Individual Liberty and Government Authority	
PSCI 330	Public Opinion & Propaganda	
PSCI 363	Constitutional Law II	
Political Science Electives ***		32.0
Free Electives		33.0
Total Credits		181.0-185.0

- * Any Biology (BIO), Chemistry (CHEM), Geoscience (GEO), Nutrition (NFS), Physics (PHYS) or Environmental Science (ENVS) course.
- ** University requirement is two consecutive courses; the third language course, though listed here, is a departmental requirement.
- *** Choose eight 200-level or above PSCI courses.

Sample Plan of Study

Term 1		Credits
UNIV H101	The Drexel Experience	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSCI 110	American Government I	4.0
PSCI 150	International Politics	4.0
	Foreign Language course	4.0
Term Credits		16.0
Term 2		Credits
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PSCI 120	History of Political Thought	4.0
PSCI 131 [WI (p. 152)]	Research Design for Political Science	4.0
	Foreign Language course	4.0
Term Credits		16.0
Term 3		Credits
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

PSCI 140	Introduction to Comparative Political Analysis	4.0
	Foreign Language course	4.0
	Diversity Studies elective	3.0
	Social Science elective	3.0

Term Credits	17.0
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Term 4

PSCI 232	Quantitative Research Methods in Political Science	4.0
	Choose one intermediate course	4.0
	Mathematics course	3.0
	Diversity Studies elective	3.0
	Free elective	3.0

Term Credits	17.0
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Term 5

PSCI 231	Qualitative and Mixed-Methods Research in Political Science	4.0
	Choose one intermediate course	4.0
	Social Science elective	3.0
	Mathematics course	3.0
	Free elective	3.0

Term Credits	17.0
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Term 6

	Choose one intermediate course	4.0
	Political Science elective	4.0
	Humanities/Fine Arts elective	3.0
	Science elective	3.0
	Free elective	3.0

Term Credits	17.0
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Term 7

	Political Science elective	4.0
	Free electives	9.0

Term Credits	13.0
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Term 8

	Choose one intermediate course	4.0
	Political Science elective	4.0
	Humanities/Fine Arts elective	3.0
	Social Science elective	3.0

Term Credits	14.0
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Term 9

	Social Science elective	3.0
	Humanities/Fine Arts elective	3.0
	Political Science elective	4.0
	Free elective	3.0

Term Credits	13.0
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Term 10

UNIV H201	Looking Forward: Academics and Careers	1.0
	Social Science elective	3.0
	Humanities/Fine Arts elective	3.0
	Political Science elective	4.0
	Free elective	3.0

Term Credits	14.0
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Term 11

	International Area Studies elective	3.0
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	Political Science electives	8.0
	Free elective	3.0

Term Credits	14.0
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Term 12

	Political Science elective	4.0
	International Area Studies elective	3.0
	Free electives	6.0

Term Credits	13.0
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Total Credit: 181.0

Accelerated BA in Political Science and MS in Science, Technology & Society

About the Program

Drexel University permits undergraduate students to apply for graduate programs while completing their undergraduate programs, allowing students to complete their master's degrees in a shorter amount of time.

The accelerated-degree program provides an opportunity to simultaneously earn both a BA degree and an MS degree in Science, Technology & Society (<http://catalog.drexel.edu/graduate/collegeofartsandsciences/sciencetechnologyandsociety>) (two diplomas are awarded) in five years.

Students entering the program must:

- have and maintain a minimum of 3.0 grade point average throughout the program
- have no fewer than 90.0 earned credits
- have no more than 120.0 registered credits

The Department of Politics would especially like to encourage its own majors to consider the accelerated degree program in Science, Technology & Society. If you are currently enrolled in a 4+1 (4COP Accelerated Program) degree program, you are required to fill out the Accelerated Degree Level Conversion Form. After obtaining all the required signatures, please direct the form to the Assistant Director for Graduate Studies Office, Randell 240.

For more information about the accelerated BA/MS program, contact:
 STS Program Director
 Macalister Hall, 3025
 215.895.2463

Recommended Plan of Study

Students should work closely with faculty advisors in the Science, Technology & Society program to schedule an individualized plan of study for their accelerated degree completion.

The following is a sample plan of study for a student starting in junior year, with 108.0 credit hours completed:

Dual Bachelor's Degree & MSTS Degree

222.0 minimum credits

Term 7	Credits
Undergraduate Courses	13.0
Two Science, Technology & Society Courses*	6.0
Term Credits	19.0

Term 8

Undergraduate Courses	13.0
Two Science, Technology & Society Courses	6.0
Term Credits	19.0

Term 9

Undergraduate Courses	10.0
Two Science, Technology & Society Courses	6.0
One Graduate Elective **	3.0
Term Credits	19.0

Term 10

Undergraduate Courses	10.0
Two Science, Technology & Society Courses	6.0
HIST 696 Seminar in Science, Technology, and Society	3.0
Term Credits	19.0

Term 11

Undergraduate Courses	13.0
One Graduate Elective **	3.0
HIST 697 Practicum: Science and Technology in Action	3.0
Term Credits	19.0

Term 12

One Graduate Elective	10.0
Undergraduate Courses **	3.0
HIST 698 Master's Thesis	6.0
Term Credits	19.0

Total Credit: 114.0

* HIST 501 recommended as the first course.

** Graduate electives may be taken as graduate-level courses in History-Politics or from other departments/Colleges within the University

Co-Op/Career Opportunities

Political science majors have a wide variety of co-op experiences from which to choose. Business and public utilities offer many lucrative possibilities, and local, state, and federal governments; museums and archives; and law firms present many additional interesting co-op placements. Pre-law students, for example, are especially eager to see the inside of a law office, whether the co-op job they receive is clerical or a more challenging paralegal assignment. These practical experiences in the "real" world can reinforce the lessons of the classroom, sharpen skills, and establish important contacts. Sample co-op positions include:

- Law clerk/paralegal, Joe Davidson, Attorney-at-Law, Philadelphia
- Research analyst, Legislative Office for Research Liaison, Harrisburg, PA
- Legislative intern, Corporate Public Affairs Division, Philadelphia Electric Company
- Assistant lobbyist, Government Relations Office, Drexel University
- Education intern, Philadelphia Museum of Art
- Researcher, Philadelphia Chamber of Commerce
- Assistant, Office of the Governor, Harrisburg, PA

Career Opportunities

The flexible programs allow students to shape a curriculum that meets their needs, whether they are preparing for the business world, graduate

school in history or political science, the Department's Masters Program in Science, Technology, and Society (<http://drexel.edu/coas/academics/departments-centers/science-technology-society>), an MBA or other business program, or law school.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Politics Faculty

Phillip Ayoub, PhD (*Cornell University*). Assistant Professor. International relations, comparative politics, transnational social movements, marginalized groups

Scott Barclay, PhD (*Northwestern University*) *Department Head, Politics*. Professor. Judicial systems, civil rights, public policy and administration.

Zoltan Buzas, PhD (*Ohio State University*). Post-Doctoral Fellow. International relations theory, international security, race and politics, diplomatic history.

George Ciccariello-Maher, PhD (*University of California, Berkeley*). Assistant Professor. Colonialism, social movements, political theory.

Audrey Comstock, PhD (expected 2015) (*Cornell University*). Post-Doctoral Fellow. International law, international LGBT politics, foreign aid, African politics

Rose Corrigan, PhD (*Rutgers University*). Associate Professor. Women, public law, American politics and policy.

Richardson Dilworth, PhD (*Johns Hopkins University*) *Director, Center for Public Policy*. Associate Professor. American political development, urban politics, public policy.

Erin R. Graham, PhD (*Ohio State University*). Assistant Professor. International institutions, international relations theory, global environmental politics.

Amelia Hoover Green, PhD (*Yale University*). Assistant Professor. Dynamics of conflict-related violence; intra-armed group politics and socialization; statistics in human rights.

Christian Hunold, PhD (*University of Pittsburgh*). Associate Professor. Environmental policy; comparative politics; political theory.

Alison Kenner, PhD (*Rensselaer Polytechnic Institute*). Assistant Professor. Science, technology, and health; environmental health problems; cities and place; feminist theory; medical anthropology; digital humanities

Julie Mostov, PhD (*New York University*) *Vice Provost for Global Initiatives*. Professor. Modern political thought, democratic theory, nationalism, gender studies, South Eastern Europe and the Balkans.

Elva Orozco-Mendoza, PhD (*University of Massachusetts*). Assistant Teaching Professor. Political freedom and action in the thought of Hanna Arendt; Feminist theory and feminist methodology; Protest politics; Theories of Violence; Identity politics, race, and gender in Latin American politics

Gwen Ottinger, PhD (*University of California, Berkeley*). Assistant Professor. Social studies of science and technology, environmental justice, science and engineering ethics, environmental ethics.

William L. Rosenberg, PhD (*Temple University*). Professor. Behavioral politics, public opinion, and political communication.

Chloe Silverman, PhD (*University of Pennsylvania*). Associate Professor. Parent advocacy for autism and pollinator health research.

Jose Tapia, PhD (*New School for Social Research*). Associate Professor. The crises and fluctuations of the economy and the relation between these fluctuations and health conditions; quantitative aspects of social science.

Interdepartmental Faculty

Joel E. Oestreich, PhD (*Brown University*) *Director of International Area Studies*. Associate Professor. International organizations, international finance, development, and human rights.

Emeritus Faculty

Richard L. Rosen, PhD (*Case Western Reserve University*). Associate Professor Emeritus. History of science, appropriate technology, and world history.

Michael J. Sullivan, PhD (*University of Virginia*). Professor Emeritus. Comparative politics and developing nations.

Minor in Politics

Required Courses

Select three of the following: 12.0

PSCI 100 Introduction to Political Science

PSCI 110 American Government I

PSCI 120 History of Political Thought

PSCI 130 Research Design for Political Science

PSCI 140 Introduction to Comparative Political Analysis

PSCI 150 International Politics

Political Science Electives

12.0 credits of any additional 200-level or higher PSCI courses. 12.0

Total Credits 24.0

Psychology

Major: Psychology

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 183.0

Classification of Instructional Programs (CIP) code: 42.0101

Standard Occupational Classification (SOC) code: 19-3031; 19-3032; 19-3039

About the Program

Psychology seeks the answers to a broad variety of questions regarding the behavior, thoughts, and emotions of individuals. These questions range from the biochemical basis of memory and the effects of stress on health to understanding the causes of emotional problems or such experiences as falling in love. These questions are studied by using scientific research techniques both in the laboratory and the “real” world. The answers are applied in fields such as business, the health sciences, law, education, counseling, and the design of useful and usable technologies.

One strength of the psychology program at Drexel is its emphasis on psychological statistics and research methodology. Psychology majors are well trained in research data analysis and find employment opportunities in research and corporate settings more readily. One other opportunity available to Drexel psychology undergraduates is the cooperative education/internship programs, through which students mix periods of full-time, career-related employment with their academic studies. This allows students to have “hands on” experience in a variety of clinical settings throughout the Philadelphia metropolitan region, and makes them more competitive for employment after graduation.

Combined Bachelors/Masters Degree

There is an accelerated MS program entitled the Psychology BS/MS Scholars program to which undergraduates may apply. For more information, visit the Drexel University Department of Psychology (<http://www.drexel.edu/coas/academics/departments-centers/psychology>) homepage.

Additional Information

To schedule an appointment students should contact the Psychology department’s academic advisor:

Tara McNair
Academic Advisor
Psychology Department
3141 Chestnut Street
215-895-0487
tym22@drexel.edu

Degree Requirements

College Requirements

ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research 3.0

ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0

ENGL 103 Composition and Rhetoric III: Themes and Genres 3.0

CS 161 Introduction to Computing 3.0

Select one of the following: 8.0

MATH 101 Introduction to Analysis I
& MATH 102 and Introduction to Analysis II

MATH 121 Calculus I
& MATH 122 and Calculus II

PSCI 100 Introduction to Political Science 4.0

UNIV H101 The Drexel Experience 3.0

Economics elective 4.0

Fine Arts elective 3.0

History electives 6.0

Philosophy elective 3.0

Two English (ENGL) courses, 200-level or above 6.0

Select one of the following sequences: 8.0

Biology

BIO 107 Cells, Genetics & Physiology

BIO 108 Cells, Genetics and Physiology Laboratory

BIO 109 Biological Diversity, Ecology & Evolution

BIO 110 Biological Diversity, Ecology and Evolution Laboratory

Chemistry

CHEM 111	General Chemistry I	
CHEM 112	General Chemistry II	
Physics		
PHYS 103 & PHYS 104	General Physics I and General Physics II	
Other Courses		
Free electives		53.0
Departmental Requirements		
General Psychology Requirements		
PSY 111	Pre-Professional General Psychology I *	3.0
PSY 112	Pre-Professional General Psychology II *	3.0
Sociology/Anthropology Requirements		
Sociology (SOC) course		3.0
Anthropology (ANTH) course		3.0
100-Level Requirements		
Select two of the following:		6.0
PSY 120	Developmental Psychology	
PSY 140	Approaches to Personality	
PSY 150	Introduction to Social Psychology	
Required Psychology Courses		
PSY 212	Physiological Psychology	3.0
PSY 325	Psychology of Learning	3.0
PSY 240 [WI (p. 155)]	Abnormal Psychology	3.0
PSY 280	Psychological Research I	3.0
PSY 264	Computer-Assisted Data Analysis I	3.0
PSY 265	Computer-Assisted Data Analysis II	3.0
PSY 290	History and Systems of Psychology	3.0
PSY 330	Cognitive Psychology	3.0
PSY 360 [WI (p. 155)]	Experimental Psychology	3.0
PSY 380	Psychological Testing and Assessment	3.0
Advanced Psychology Electives		
Select four of the following:		12.0
PSY 210	Evolutionary Psychology	
PSY 213	Sensation and Perception	
PSY 225	Child Psychopathology	
PSY 245 [WI (p. 155)]	Sports Psychology	
PSY 250 [WI (p. 155)]	Industrial Psychology	
PSY 252	Death and Dying	
PSY 310	Drugs & Human Behavior	
PSY 322	Advanced Developmental Psychology	
PSY 332	Human Factors and Cognitive Engineering	
PSY 337	Human-Computer Interaction	
PSY 342	Counseling Psychology	
PSY 350	Advanced Social Psychology	
PSY 355	Health Psychology	
PSY 356	Women's Health Psychology	
PSY 410	Neuropsychology	
PSY 440	Advanced Personality Seminar	

PSY 442	Theories & Practices in Clinical Psychology	
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Senior Seminar Sequence **

PSY 490 [WI (p. 155)]	Psychology Senior Thesis I	4.0
PSY 491 [WI (p. 155)]	Psychology Senior Thesis II	4.0
PSY 492 [WI (p. 155)]	Psychology Senior Thesis III	4.0

Total Credits		182.0
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* Students with AP psychology, or transfer students with PSY 101 credit, should check the AP Student Placement Exam Crosswalk (http://www.drexel.edu/provost/policies/pdf/supporting/ap_crosswalk.pdf) or check with their advisor.

** Students who do not wish to elect the research seminar sequence are required to take four additional advanced psychology electives instead.

Sample Plan of Study

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSY 111	Pre-Professional General Psychology I	3.0
MATH 121 or 101	Calculus I Introduction to Analysis I	4.0
UNIV H101	The Drexel Experience	2.0
Select one of the following:		4.0
CHEM 111	General Chemistry I	
PHYS 103	General Physics I	
BIO 107 & BIO 108	Cells, Genetics Physiology & BIO 108	
Term Credits		16.0
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PSY 112	Pre-Professional General Psychology II	3.0
MATH 102 or 122	Introduction to Analysis II Calculus II	4.0
UNIV H101	The Drexel Experience	2.0
Select one of the following:		4.0
BIO 109	Biological Diversity, Ecology Evolution	
CHEM 112	General Chemistry II	
PHYS 104	General Physics II	
Select one of the following:		3.0
PSY 120	Developmental Psychology	
PSY 140	Approaches to Personality	
PSY 150	Introduction to Social Psychology	
Term Credits		19.0
Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 240 [WI (p. 155)]	Abnormal Psychology	3.0
Select one of the following:		3.0
PSY 120	Developmental Psychology	

PSY 150	Introduction to Social Psychology	
PSY 140	Approaches to Personality	
Sociology/Anthropology elective (SOC or ANTH)		3.0
Fine Arts elective		3.0

Term Credits	15.0
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Term 4

PSCI 100	Introduction to Political Science	4.0
PSY 264	Computer-Assisted Data Analysis I	3.0
PSY 290	History and Systems of Psychology	3.0
Sociology/Anthropology elective (SOC or ANTH)		3.0
English (ENGL) course, 200-level or above		3.0

Term Credits	16.0
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Term 5

COM 150 or 230	Mass Media and Society Techniques of Speaking	3.0
PSY 265	Computer-Assisted Data Analysis II	3.0
PSY 330	Cognitive Psychology	3.0
PSY 212	Physiological Psychology	3.0
English (ENGL) course, 200-level or above		3.0
Philosophy (PHIL) elective		3.0

Term Credits	18.0
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Term 6

PSY 212	Physiological Psychology	3.0
PSY 280	Psychological Research I	3.0
PSY 360 [WI (p. 155)]	Experimental Psychology	3.0
UNIV H101	The Drexel Experience	1.0
Psychology elective		3.0
Economics (ECON) elective		4.0

Term Credits	17.0
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Term 7

PSY 325	Psychology of Learning	3.0
PSY 380	Psychological Testing and Assessment	3.0
History elective		3.0
Free electives		9.0

Term Credits	18.0
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Term 8

Advanced Psychology course*		3.0
History elective		3.0
Free electives		9.0

Term Credits	15.0
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Term 9

Advanced Psychology course*		3.0
Free electives		9.0

Term Credits	12.0
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Term 10

PSY 490 [WI (p. 155)]	Psychology Senior Thesis I (or adv. PSY elective (If electives are chosen, 12.0 credits in total are required.))	4.0
Advanced Psychology elective		3.0
Free electives		6.0

Term Credits	13.0
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Term 11

PSY 491 [WI (p. 155)]	Psychology Senior Thesis II	4.0
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Free electives		9.0
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Term Credits	13.0
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Term 12

PSY 492 [WI (p. 155)]	Psychology Senior Thesis III (or adv. PSY elective (If electives are chosen, 12.0 credits in total are required.))	4.0
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Free electives		9.0
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Term Credits	13.0
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Total Credit: 185.0

* See degree requirements (p. 155).

Co-op/Career Opportunities

Some graduates seek employment immediately after receiving their bachelor's degrees. They are well trained to work as research assistants in consulting firms and medical settings or to provide front-line services in mental health and educational settings. Other graduates go on to professional schools in law, business, medicine, and other health professions. Still others pursue graduate training in psychology and related fields. Students build skills and knowledge that provide a foundation for advanced study, create opportunities for future growth, and can be used to improve the quality of life for others.

Co-Op Experiences

Drexel University has long been known for its co-operative education programs, through which students mix periods of full-time, career-related employment with their studies. Co-op/internship employment is an option for psychology majors. Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Psychology

The minor in psychology is intended to meet the needs of students who recognize that an understanding and analysis of individual psychological processes is an important component of their education. The minor may also be of interest to students who have an interest in a double major but are unable to satisfy all of the requirements in two major fields.

Entry into the minor requires that PSY 101 General Psychology (or an equivalent introductory course) be taken as a prerequisite. Students who have completed and who are interested in a minor in Psychology are expected to meet with a Psychology Department faculty member to discuss the selection of courses appropriate to their major and their own personal interests. No more than three courses that are required for a student's major can count towards fulfilling requirements for the minor.

Required Prerequisite

PSY 101	General Psychology I (or equivalent)
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Required Courses

Select eight of the following: 24.0

PSY 120	Developmental Psychology
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PSY 140	Approaches to Personality
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PSY 150	Introduction to Social Psychology
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PSY 210	Evolutionary Psychology
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PSY 212	Physiological Psychology
PSY 213	Sensation and Perception
PSY 240 [WI (p. 155)]	Abnormal Psychology
PSY 245 [WI (p. 155)]	Sports Psychology
PSY 250 [WI (p. 155)]	Industrial Psychology
PSY 252	Death and Dying
PSY 264	Computer-Assisted Data Analysis I
PSY 265	Computer-Assisted Data Analysis II
PSY 290	History and Systems of Psychology
PSY 310	Drugs & Human Behavior
PSY 322	Advanced Developmental Psychology
PSY 325	Psychology of Learning
PSY 330	Cognitive Psychology
PSY 332	Human Factors and Cognitive Engineering
PSY 337	Human-Computer Interaction
PSY 340	Psychological Testing and Assessment
PSY 350	Advanced Social Psychology
PSY 360 [WI (p. 155)]	Experimental Psychology
PSY 380	Psychological Testing and Assessment
PSY 410	Neuropsychology
PSY 442	Theories & Practices in Clinical Psychology
PSY 480	Special Topics in Psychology

Total Credits **24.0**

Psychology Faculty

Cathy Bolton, PhD (*Drexel University*). Assistant Teaching Professor. Program Evaluation in healthcare, supportive housing, and government-based social services; Design of performance metrics for quality assessment and clinical outcomes; Implementing Systems and Change Leadership to sustain Compliance with Regulatory Bodies.

Meghan Butryn, PhD (*Drexel University*). Associate Research Professor. Treatment and prevention of obesity and eating disorders, behavioral treatment, acceptance and commitment therapy.

Dorothy Charbonnier, PhD (*SUNY Stony Brook*). Assistant Teaching Professor. The nature of the creative process and writing.

Douglas L. Chute, PhD (*University of Missouri*) *Louis and Bessie Stein Fellow; Faculty coordinator of ePsychology*. Professor. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Brian Daly, PhD (*Loyola University, Chicago*) *Director, Practicum Training*. Assistant Professor. Pediatric neuropsychology, intervention with at-risk youth.

Paige Davis, PhD (*Durham University, England*). Assistant Teaching Professor. The development of imagination in children; private speech; theory of mind and executive functioning; mental state commentary and mind minded parenting; audio verbal hallucinations.

David DeMatteo, PhD, JD (*MCP Hahnemann University; Villanova University School of Law*) *Director of the JD-PhD Program in Law and*

Psychology. Associate Professor. Psychopathy, forensic mental health assessment, drug policy; offender diversion.

Evan M. Forman, PhD (*University of Rochester*) *Director of Graduate Studies*. Professor. Clinical psychology: mechanisms and measurement of psychotherapy outcome, cognitive-behavioral and acceptance based psychotherapies, the development and evaluation of acceptance-based interventions for health behavior change (for problems of obesity and cardiac disease) as well as mood and anxiety disorders; neurocognition of eating.

Jennifer Gallo, PhD (*Drexel University*) *Director, Neuropsychology Concentration*. Associate Teaching Professor. Neuropsychology of aging and dementia; neurocognitive correlates of goal-directed activities; behavioral and psychological symptoms associated with dementia

Pamela Geller, PhD (*Kent State University*). Associate Professor. Stressful life events and physical and mental health outcomes, particularly in the area of women's reproductive health (e.g. pregnancy, pregnancy loss, infertility, medical education).

Maureen Gibney, PsyD (*Widener University*). Associate Teaching Professor. Clinical psychopathology; neuropsychological evaluation and intervention with the elderly.

Naomi Goldstein, PhD (*University of Massachusetts*) *Co-Director of the JD-PhD Program; Stoneleigh Foundation Fellow*. Associate Professor. Forensic psychology; juvenile justice; Miranda rights comprehension; false confessions; juvenile justice treatment outcome research; anger management intervention development; child and adolescent behavior problems.

Kirk Heilbrun, PhD (*University of Texas at Austin*) *Interim Department Head*. Professor. Forensic psychology, juvenile and adult criminality, violence risk assessment, forensic psychological assessment, treatment of mentally disordered offenders, academic-sports mentoring.

James D. Herbert, PhD (*University of North Carolina*) *Dean, Graduate College; Executive Vice Provost*. Professor. Assessment and treatment of anxiety disorders; acceptance and mindfulness-based psychotherapies; the role of empiricism in clinical psychology; evidence-based practice in behavioral health.

Adrienne Juarascio, PhD (*Drexel University*). Assistant Research Professor. Enhancing treatment outcomes for eating disorders and obesity; Acceptance-based behavioral treatments; Evaluating mechanisms of action in behavioral treatments

Marlin Killen, PhD (*Trident University International*) *Faculty Coordinator of ePsychology; Online Learning Council Fellow*. Associate Teaching Professor.

Jacqueline D. Kloss, PhD (*Binghamton University*). Associate Professor. Health psychology; clinical psychology; written emotional expression and health; women and sleep; college students and sleep and cognitive-behavioral approaches to insomnia.

John Kounios, PhD (*University of Michigan*) *Director, PhD Program in Applied Cognitive and Brain Sciences*. Professor. Cognitive neuroscience, especially creativity, problem solving, and cognitive enhancement.

Michael Lowe, PhD (*Boston College*). Professor. Prevention and treatment of eating disorders and obesity; effects of appetitive

responsiveness and dietary restraint on eating regulation; psychobiology of obesity-proneness; empirical foundations of unconscious processes.

Tamara Medina, PhD (*Johns Hopkins University*). Assistant Teaching Professor. Developmental psychology, cognitive psychology, statistics.

Dan Mirman, PhD (*Carnegie Mellon University*). Assistant Professor. Recognition, comprehension, and production of spoken words; organization and processing of semantic knowledge; computational models of brain and behavior; statistical methods for analysis of time course data

Arthur Nezu, PhD (*State University of New York at Stony Brook*). Distinguished Professor. Behavioral medicine applications of problem-solving therapy and other cognitive-behavior therapies (e.g., to decrease emotional and psychosocial risk factors; improve adherence), particularly with regard to patients with cardiovascular disease; assessment.

Christine Maguth Nezu, PhD (*Fairleigh Dickinson University*). Professor. Cognitive-behavioral assessment and treatment for mood, anxiety, personality disorders, and coping with chronic illness; mind/body studies; stress and coping; developmental disabilities and comorbid behavioral and emotional disorders; spirituality and psychology.

Karol Osipowicz, PhD (*Thomas Jefferson University*). Assistant Teaching Professor. The application of advanced neuroimaging to the study of human brain function and anatomy.

Nancy Raitano Lee, PhD (*University of Denver*). Assistant Professor. Neuropsychological and neuroanatomic correlates of intellectual and developmental disabilities; Verbal memory and language difficulties in Down syndrome and other genetic disorders; Comorbid autism spectrum disorder symptoms in youth with genetic disorders; Neuroanatomic correlates of individual differences in typical and atypical cognition

Ludo Scheffer, PhD (*University of Pennsylvania*) *Director of Undergraduate Studies*. Teaching Professor. Metacognition; early literacy and language acquisition; program evaluation and measurement to improve student achievement and teacher performance.

Maria Schultheis, PhD (*Drexel University*) *Director of Clinical Training*. Associate Professor. Clinical Neuropsychology and rehabilitation following neurological compromise (brain injury, stroke, multiple sclerosis), application of technologies in psychology. Specialization in the use of virtual reality (VR) simulation, and evaluation of the demands of driving after disability.

Jennifer Schwartz, PhD (*Idaho State University*) *Director of Psychological Services Center*. Associate Teaching Professor. Adult psychopathology; evidence-based clinical practice; competency-based training; competency-based clinical supervision.

Chris Sims, PhD (*Rensselaer Polytechnic Institute*). Assistant Professor. Learning and decision-making under uncertainty; visual memory and perceptual expertise; sensorimotor control and motor learning; computational models of cognition.

Julia Sluzenski, PhD (*Temple University*). Assistant Teaching Professor. Spatial and episodic memory, memory loss across the lifespan, developmental psychology.

Mary Spiers, PhD (*University of Alabama at Birmingham*) *Director, Psychology Master's Program*. Associate Professor. Clinical neuropsychology and medical psychology; memory and practical

applications for memory disorders in the elderly; cognitive health of women.

J. Michael Williams, PhD (*University of Vermont*). Associate Professor. Memory disorder; traumatic brain injury; auditory neglect; neuropsychological assessment; recovery and rehabilitation of brain function; functional magnetic resonance imaging.

Eric A Zillmer, PsyD (*Florida Institute of Technology*) *Carl R. Pacifico Professor of Neuropsychology and the Director of Athletics*. Professor. Psychological assessment (neuropsychological, cognitive, personality), psychiatric and neurological disorders, behavioral medicine, neurogerontology, mathematical modeling, sports psychology, psychology of genocide.

Interdepartmental Faculty

Donald Bersoff, JD, PhD (*Yale University, New York University*). Professor Emeritus. Law and psychology; mental health law.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Emeritus Faculty

Thomas T. Hewett, PhD (*University of Illinois at Urbana-Champaign*). Professor Emeritus. Human computer interaction and cognitive engineering; development of computing environments to support knowledge, workers, and high performance experts.

Myrna Shure, PhD (*Cornell University*). Professor Emeritus. Child development, problem-solving interventions with children, prevention programs.

Minor in Science, Technology and Society

The minor in Science, Technology and Society [STS] allows students to explore the cultural, ethical, historical, political and institutional dimensions of science, medicine and technology. By taking courses in different disciplines, students will develop a multidisciplinary approach that empowers them to critically analyze the social dimensions of science, medicine and technology.

For more information about this program, visit Drexel's Center for Science, Technology and Society (<http://drexel.edu/coas/academics/departments-centers/science-technology-society>) page.

Select 6 - 8 classes from the list below, with a minimum of 24 credits. At least 3 different subject areas must be represented among these classes. 24.0

ANTH 330	Media Anthropology
ANTH 345	Visual Anthropology
ANTH 355	Anthropology of Cyberspace
ANTH 360	Culture and the Environment
ARCH 315	Sustainable Built Environment I
BIO 112	Biotechnology for Society
BIO 312	Genetically Modified Foods
COM 240	New Technologies In Communication
COM 351	Computer Mediated Communication
COM 352	Social Media and Communication

ENGL 300 [WI (p. 159)]	Literature & Science
ENGL 302	Environmental Literature
ENGL 303	Science Fiction
ENGL 370	Topics in Literature and Medicine
INTR 310	Sustainability: History, Theory and Critic
HIST 283	Technology and Identity
HIST 285	Technology in Historical Perspective
HIST 287	History of Science: Ancient to Medieval
HIST 288	History of Science: Medieval to Enlightenment
HIST 289	History of Science: Enlightenment to Modernity
HIST 290	Technology and the World Community
HIST 291	Global History of Engineering
HIST 292	Technology in American Life
HIST 320	Disaster in Global History
HIST 321	Themes in Global Environmental History
HIST 340	History of Bodies in Science, Technology, and Medicine
HIST 341	Disabilities in History
HIST 385	Transnational History of Science, Technology and Environment
PHIL 111	Symbolic Logic 1
PHIL 207	Symbolic Logic 2
PHIL 311	Computer Ethics
PHIL 321	Biomedical Ethics
PHIL 322	Ethics of Human Enhancement
PHIL 340	Environmental Ethics
PHIL 341	Philosophy of the Environment
PHIL 351	Philosophy of Technology
PHIL 355	Philosophy of Medicine
PHIL 361	Philosophy of Science
PSCI 331	Environmental Politics
PSCI 334	Politics of Environment and Health
PSCI 369	The Politics of Food
PSCI 371	Science, Technology, & Public Policy
PBHL 302	Introduction to the History of Public Health
PSY 332	Human Factors and Cognitive Engineering
PSY 337	Human-Computer Interaction
SOC 235	Sociology of Health and Illness
SOC 250	Research Methods I
SOC 312	Topics in Sociology of Science and Technology
SOC 326	Cities and Sustainability
SOC 341	Environmental Movements in America
SOC 345	Sociology of the Environment
SOC 346	Environmental Justice
SOC 349	Sociology of Disasters
WGST 225	Women & Human Rights Worldwide

Sociology

Major: Sociology

Degree Awarded: Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 45.1101

Standard Occupational Classification (SOC) code: 19-3041

About the Program

The sociology major at Drexel University has three components: theory, methods, substantive coursework and features specialized coursework relating to social justice issues.

Sociology is the systematic study of societies. Society is the sum total of individual and group interaction and relations, from small groups and families to global networks and complex social organizations. The discipline covers a wide variety of fields of inquiry. Sociologists examine structural relations—how human society is organized from small groups to large institutions—and is committed to developing a *critical understanding* of these relationships. Thus the sociology major stresses theory, research methods, quantitative and qualitative data analysis as applied to a wide variety of substantive areas including but not limited to social inequality, political power, gender, class, race, ethnicity, family, crime, technology and environmental change as well as a wide variety of social and political movements connected with social change. The stress on *critical understanding* means that sociology majors will strive not only to develop strong analytic abilities but an intellectual and ethical engagement reflected in sociologically informed thinking and action. The research and analytical skills developed in our program are sought after by a wide variety of professions.

Specialized social justice coursework is typically carried out in connection with community groups and organizations. It is a way through which the Sociology Program and Drexel University as a whole seeks to become practically engaged with the wider community while promoting social justice.

For more information about the sociology major, visit the Department of Sociology (<http://www.drexel.edu/coas/academics/departments-centers/sociology>) web page.

Degree Requirements

General Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV H101	The Drexel Experience	1.0
UNIV H201	Looking Forward: Academics and Careers	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Four Humanities/Fine Arts Courses		12.0
Two Mathematics Courses		6.0-8.0
Two Science Courses		6.0-8.0
Two Consecutive Foreign Language Courses *		8.0

Social and Behavioral Sciences

COM 150	Mass Media and Society	3.0
SOC 101	Introduction to Sociology	3.0
Two Additional Social and Behavioral Sciences Courses		6.0

International Studies

Two International Studies Courses		6.0
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Studies in Diversity

ANTH 101	Introduction to Cultural Diversity	3.0
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One Additional Studies in Diversity Course 3.0

Sociology Core Requirements

Required Major Seminar

SOC 395 Seminar in Sociology (3-credit course, taken 4 or 5 terms) 12.0-15

Theory Sequence

COM 210 Theory and Models of Communication 3.0

SOC 260 [WI] Classical Social Theory 3.0
(p. 160)]

ANTH 410 Cultural Theory 3.0

SOC 460 [WI] Contemporary Social Theory 3.0
(p. 160)]

Methods Sequence

ANTH 370 Ethnographic Methods 3.0

COM 220 Qualitative Research Methods 3.0

SOC 250 Research Methods I 3.0

SOC 364 Computer-Assisted Data Analysis 3.0

Core Courses

Select five of the following: 15.0

SOC 210 Race, Ethnicity and Social Inequality

SOC 230 Gender and Society

SOC 220 Wealth and Power

SOC 240 Urban Sociology

SOC 320 Sociology of Deviant Behavior

SOC 330 Development and Underdevelopment in the Global South

Other Program Requirements

Select ten of the following: 30.0

ANTH 110 Human Past: Anthropology and Prehistoric Archeology

ANTH 120 Biblical Archaeology: The Archaeology of Israel and Jordan

ANTH 212 [WI] Topics in World Ethnography 3.0
(p. 160)]

ANTH 220 Aging In Cross-Cultural Perspective

ANTH 310 Societies In Transition: The Impact of Modernization and the Third World

ANTH 312 Approaches to Intercultural Behavior

ANTH 380 Special Topics in Anthropology

CJS 360 Juvenile Justice

COM 230 Techniques of Speaking

COM 270 [WI] Business Communication 3.0
(p. 160)]

COM 280 Public Relations Principles and Theory

SOC 110 Sociology of the Future

SOC 115 Social Problems

SOC 120 Sociology of the Family

SOC 125 Sociology of Aging

SOC 215 Sociology of Work

SOC 235 Sociology of Health and Illness

SOC 230 Gender and Society

SOC 240 Urban Sociology

SOC 270 Theory of Applied and Community Sociology

SOC 310 Topics in Political Sociology

SOC 311 Topics in Sociology of Religion

SOC 312 Topics in Sociology of Science and Technology

SOC 315 HIV/AIDS and Africa

SOC 325 Introduction to Urban and Environmental Planning

SOC 335 Sociology of Education

SOC 341 Environmental Movements in America

SOC 344 Social Movements

SOC 345 Sociology of the Environment

SOC 349 Sociology of Disasters

SOC 350 Research Methods II

SOC 370 Practicum in Applied and Community Sociology

SOC 365 Computer-Assisted Data Analysis II

SOC 380 Special Topics in Sociology

SOC 470 Social Change & Planning

SOC 490 Sociology Research Seminar I: Research Design

SOC 491 Sociology Research Seminar II: Data Acquisition and Analysis

SOC 492 Sociology Research Seminar III: Practicum in Sociological Research

PSY 150 Introduction to Social Psychology

PSY 252 Death and Dying

PSY 350 Advanced Social Psychology

UNIV 380 Special Topics-University Wide

Free Electives 33.0

Total Credits 182.0-189.0

* At least one foreign language course must be at the 200-level. In addition, the department recommends students take 2 additional foreign language courses as free electives.

Sample Plan of Study

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
SOC 101	Introduction to Sociology	3.0
SOC 395	Seminar in Sociology	3.0
UNIV H101	The Drexel Experience	1.0
	Mathematics Course	3.0-4.0
	Foreign Language Course	4.0
Term Credits		17.0-18.0
Term 2		Credits
COM 150	Mass Media and Society	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101	Introduction to Civic Engagement	1.0
	Foreign Language Course	4.0
	Mathematics Course	3.0-4.0
Term Credits		14.0-15.0
Term 3		Credits
ANTH 101	Introduction to Cultural Diversity	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

SOC 260 [WI Classical Social Theory (p. 160)]	3.0	Other Program Requirements*	6.0
Science Elective*	3.0-4.0	Humanities/Fine Arts Elective	3.0
Foreign Language Course	4.0	Term Credits	15.0
Term Credits	16.0-17.0	Term 11	
Term 4		SOC 460 [WI Contemporary Social Theory (p. 160)]	3.0
COM 220 Qualitative Research Methods	3.0	Other Program Requirements*	6.0
SOC 210 Race, Ethnicity and Social Inequality	3.0	International Studies Elective	3.0
SOC 250 Research Methods I	3.0	Free Elective	4.0
SOC 395 Seminar in Sociology	3.0	Term Credits	16.0
Foreign Language Course	4.0	Term 12	
Term Credits	16.0	Other Program Requirement*	3.0
Term 5		Sociology Core Course*	3.0
ANTH 370 Ethnographic Methods	3.0	Humanities/Fine Arts Electives	6.0
COM 210 Theory and Models of Communication	3.0	Term Credits	12.0
SOC 240 Urban Sociology	3.0	Total Credit: 182.0-186.0	
Free Elective	3.0		
Science Elective*	3.0-4.0		
Term Credits	15.0-16.0		
Term 6			
SOC 364 Computer-Assisted Data Analysis	3.0		
Diversity Studies Elective	3.0		
Social and Behavioral Sciences Elective	3.0		
Other Program Requirement*	3.0		
Free Elective	3.0		
Term Credits	15.0		
Term 7			
SOC 220 Wealth and Power	3.0		
SOC 230 Gender and Society	3.0		
Social and Behavioral Sciences Elective	3.0		
Other Program Requirement*	3.0		
Free Elective	3.0		
Term Credits	15.0		
Term 8			
SOC 320 Sociology of Deviant Behavior	3.0		
SOC 330 Development and Underdevelopment in the Global South	3.0		
SOC 395 Seminar in Sociology	3.0		
Other Program Requirement*	3.0		
UNIV H201 Looking Forward: Academics and Careers	1.0		
Free Elective	3.0		
Term Credits	16.0		
Term 9			
Humanities/Fine Arts Elective	3.0		
Free Elective	3.0		
International Studies Elective	3.0		
Other Program Requirements*	6.0		
Term Credits	15.0		
Term 10			
ANTH 410 Cultural Theory	3.0		
SOC 395 Seminar in Sociology	3.0		

* See degree requirements (p. 160).

Co-op/Career Opportunities

An undergraduate degree in sociology is excellent preparation for law school, medical school, or for graduate work in such fields as sociology, history, gerontology, or political science.

Outside of academics, sociologists work in a wide variety of settings. Some serve as statistical analysts for market research firms, health care agencies, and government. Others are involved in urban planning, survey research, public relations, agency management, trend analysis, or criminal justice. There are sociologists of religion working for national church organizations, and sociologists specializing in gerontology who are engaged in research or administration for agencies concerned with the aged.

Co-op Experiences

Some recent co-op positions held by sociology students include the following:

- Research Coordinator, West Philadelphia Community Center
- Counselor, Camden Youth Program
- Research Analyst, Philadelphia Stock Exchange
- Case Investigator, Howard County Police Department
- Assistant Copy Editor, Philadelphia Newspapers, Inc.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Sociology

The sociology minor is designed to give students specializing in other fields a broader knowledge of contemporary social issues and the ability to analyze them in a reasoned fashion. For students majoring in such fields as business and engineering, the minor helps develop skills in critical thinking that go beyond the acquisition of specialized, professional techniques. For students majoring in another area of the liberal arts, the minor offers the opportunity to place the issues raised in the major discipline within a larger social context.

Please note: No more than three courses that are required for a student's major can count towards fulfilling requirements for the minor.

Required Courses

SOC 250	Research Methods I	3.0
SOC 260 [WI (p. 160)]	Classical Social Theory	3.0
SOC 460 [WI (p. 160)]	Contemporary Social Theory	3.0
Select five of the following:		15.0
ANTH 220	Aging In Cross-Cultural Perspective	
ANTH 310	Societies In Transition: The Impact of Modernization and the Third World	
CJ 362	Gender, Crime and Justice	
SOC 110	Sociology of the Future	
SOC 115	Social Problems	
SOC 120	Sociology of the Family	
SOC 125	Sociology of Aging	
SOC 205	Criminology & Criminal Justice	
SOC 210	Race, Ethnicity and Social Inequality	
SOC 215	Sociology of Work	
SOC 220	Wealth and Power	
SOC 225	Sociology of Technology & Aging	
SOC 230	Gender and Society	
SOC 235	Sociology of Health and Illness	
SOC 310	Topics in Political Sociology	
SOC 320	Sociology of Deviant Behavior	
SOC 330	Development and Underdevelopment in the Global South	
SOC 335	Sociology of Education	
SOC 336	Sociology of Education II	
SOC 340	Globalization	
SOC 350	Research Methods II	
SOC 470	Social Change & Planning	

Total Credits **24.0**

Communication Faculty

Ronald Bishop, III, PhD (*Temple University*). Professor. Investigative reporting, sports journalism, journalism history, journalism sourcing patterns, textual narrative and ideological analysis, cultural history of fame.

Joan W. Blumberg, BA (*Pennsylvania State University*). Instructor. Publishing, electronic publishing, publishing and communications, publishing and mass-media.

Karen Cristiano, PhD (*Temple University*) *Assistant Department Head of Communication*. Associate Teaching Professor. Journalism, medical writing, feature writing, copy editing, mass media and society.

Paul Evangelista, PhD (*Temple University*). Assistant Teaching Professor. Public relations, communication theory, new technologies in communication (classroom and online); business communication; electronic publishing; social media.

Richard Forney Instructor. Broadcast journalism technology and the effects of new technologies on personal and corporate communication skills.

Alexander Friedlander, PhD (*Carnegie Mellon University*) *Associate Dean for Undergraduate Education, College of Arts and Sciences*. Associate Professor. Rhetorical theory and practice, document design, writing and technology.

Julia Hagemann-May, PhD (*Drexel University*). Assistant Teaching Professor. Political communication; international politics and its news coverage; public opinion; transatlantic relations; war, torture and human rights; debate in the public sphere.

Ernest A. Hakanen, PhD (*Temple University*). Professor. Telecommunications policy, adolescent media use, communication theory and history, global media, and semiotics.

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Frank Kelley, PhD (*Temple University*). Associate Teaching Professor. Corporate university systems online, power structure of media enterprises, public relations, event planning.

Jordan McClain, PhD (*Temple University*). Assistant Teaching Professor. Media framing and music journalism; relationship between television and music; American popular culture; celebrity, consumerism, and consumer behavior; branding, brand positioning, and advertising criticism.

Alexander Nikolaev, PhD (*Florida State University*). Associate Professor. Public relations, political communication, organizational communication, mass communication, international communications and negotiations, communications theory.

Devon Powers, PhD (*New York University*) *Director, Communication Undergraduate Programs*. Associate Professor. Popular music, cultural intermediaries, promotional culture, 20th-century history, journalism studies.

David Ridgway, MS (*St. Joseph's University*). Instructor. Deviant behaviors, social problems.

Rosemary Rys, MA. Instructor. Public relations and marketing.

Lawrence Souder, PhD (*Temple University*). Associate Teaching Professor. Science and technical writing, communication ethics, nonprofit communication.

Allan Stegeman, MA (*University of Houston*). Teaching Professor. Communication, technology and mass media, video.

Susan Stein, PhD (*University of Wisconsin*) *Director, Professional MS Programs*. Associate Teaching Professor. Science, environmental, and health communication

Asta Zelenkauskaitė, PhD (*Indiana University*). Assistant Professor. Social media; user-generated content; computer-mediated communication; interactivity; active audience analysis; mobile communication; gender and online identity; prosumer culture; internet of things; quantitative/qualitative research.

Interdepartmental Faculty

Michelle Sahl, PhD, MEd, MBA, MBE (*The University of the Sciences in Philadelphia*). Assistant Teaching Professor. Health management and policy: management and leadership of health services organizations, urban health, and the history of health care systems.

Minor in Women's and Gender Studies

The minor in women's and gender studies is intended to give students a broad, interdisciplinary understanding of the ways in which gender interacts with race, age, class, and sexual orientation to shape human consciousness and the social, political, and cultural organization of society. In addition, the minor is intended to enrich the educational experience of students. It may also provide both men and women with tools for understanding and coping with the larger societal systems in which they must operate as both students and professionals. Because business and industry are increasingly sensitive to issues such as sex discrimination, sexual harassment, equal pay for comparable work, parental leave, and day care, students with a minor in women's studies will have a definite edge over other applicants for managerial and policy-making positions.

Required Courses

WGST 101	Introduction to Women's and Gender Studies	3.0
WGST 301	Sex, Gender, Feminism: A Seminar in Feminist Theories	3.0

Select 6 of the following elective courses:

CJS 274	Sex, Violence, & Crime on the Internet	18.0
CJS 275	Issues in Domestic Violence	
CJS 362	Gender, Crime, and Justice	
ENGL 335	Mythology	
PSY 356	Women's Health Psychology	
SOC 230	Gender and Society	
WGST 220	Writing on the Body	
WGST 225	Women & Human Rights Worldwide	
WGST 230	Arab Women Writers	
WGST 235	African Francophone Women Writers: Displacement. From One Continent To Another	
WGST 240	Women and Society in a Global Context	
WGST 255	Gender and Black Popular Culture	
WGST 260	Gender and Judaism	
WGST 270	Cigarettes and High Heels	
WGST 275	Women's Health and Human Rights	
WGST 308	Queer Theory	
WGST 320	Masculinities	

Total Credits **24.0**

Certificate in Medical Humanities

Certificate Level: Undergraduate

Admission Requirements: Current Drexel students only

Certificate Type: Certificate

Number of Credits to Completion: 18.0

Instructional Delivery: Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 24.0103

Standard Occupational Classification (SOC) Code:

The Certificate Program in Medical Humanities is designed for students majoring in any of the biological sciences, health professions including biomedical engineering, nursing and public health, the humanities, and the social sciences, with the aim of promoting dialogue and mutual appreciation for various approaches to health related issues.

The wide range of applicable courses within designated disciplines fosters an interdisciplinary context for investigating the many challenges within medicine and caregiving. This format, in turn, encourages students to explore illness, disability, dying and healing as *human* experiences and to evaluate some of the limitations of an exclusively scientific perspective on medical practice and research.

A three credit introductory seminar (HUM 315) and a concluding Capstone Seminar (ENGL 470) further provide intellectual cohesiveness and a sense of community among students enrolled in the program. Both co-directors of the program and other student advisors will help students choose courses best suited for their personal and professional interests. Note that most courses applicable to the program also fulfill humanities electives for other majors and that courses may change as departments offer more options.

Opportunities

Those students who successfully complete the program will receive a certificate in medical humanities. This certificate highlights the student's proficiency in an interdisciplinary approach to health related issues not easily attainable through isolated courses.

Additional information

For additional information, contact the program directors:

Emilie S. Passow, PhD
Department of English and Philosophy
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Required Courses

HUM 315	Perspectives in Medical Humanities	3.0
ENGL 470	Capstone Seminar in Medical Humanities	3.0

Select one of the following literature courses: 3.0

ENGL 360 [WI] Literature and Society (Portrayals of Mental (p. 164)] Disorders)

ENGL 370 Topics in Literature and Medicine (Illness and Healing in Literature)

ENGL 370 Topics in Literature and Medicine (The Physician in Literature and Film)

ENGL 370 Topics in Literature and Medicine (Health Matters in Drama)

Select one of the following philosophy courses: 3.0

PHIL 251 Ethics

PHIL 321 Biomedical Ethics

PHIL 355 Philosophy of Medicine

PHIL 361	Philosophy of Science	
Select two courses from the following:		6.0
ANTH 210 [WI	Worldview: Science, Religion and Magic (p. 164)]	
ANTH 220	Aging In Cross-Cultural Perspective	
ARTH 320	Art in the Age of Technology	
ARTH 465 [WI	Special Topics in Art History (p. 164)]	
BIO 212	Biotechnology	
BMES 338	Biomedical Ethics and Law	
ENVS 321	Environmental Health	
HIST 280	History of Science: Ancient to Medieval	
HIST 285	Technology in Historical Perspective	
PSY 242	Psychology of Disability	
PSY 244	Culture and Personality	
PSY 252	Death and Dying	
PSY 356	Women's Health Psychology	
SOC 120	Sociology of the Family	
SOC 125	Sociology of Aging	
SOC 225	Sociology of Technology & Aging	
SOC 235	Sociology of Health and Illness	

Total Credits 18.0

Philosophy in Science and Technology Certificate

Certificate Level: Undergraduate

Admissions Requirements: Current Drexel students only

Certificate Type: Undergraduate

Number of Credits to Completion: 18.0

Instructional Delivery: Online, Campus, Hybrid

Calendar Type: Quarter

The Certificate in Philosophy in Science and Technology provides an excellent opportunity for undergraduate students in all majors to deepen and broaden their educational experience by enhancing and exercising their philosophical skills in relation to some of the most central issues and ideas related to science and technology.

Required Courses

PHIL 101	Introduction to Western Philosophy	3.0
PHIL 105	Critical Reasoning	3.0
PHIL 107	Philosophy and Knowledge Organization	3.0
PHIL 351	Philosophy of Technology	3.0
PHIL 355	Philosophy of Medicine	3.0
Select one of the following:		3.0
PHIL 361	Philosophy of Science	
PHIL 371	Philosophy of Social Sciences	

Total Credits 18.0

Philosophy in Arts & Humanities Certificate

Certificate Level: Undergraduate

Admissions Requirements: Current Drexel students only

Certificate Type: Undergraduate

Number of Credits to Completion: 18.0

Instructional Delivery: Campus, Online, Hybrid

Calendar Type: Quarter

The Certificate in Philosophy in Arts and Humanities provides an excellent opportunity for undergraduate students in all majors to deepen and broaden their educational experience by enhancing and exercising their philosophical skills in relation to some of the most central issues and ideas related to the arts and the humanities.

Required Courses

PHIL 101	Introduction to Western Philosophy	3.0
PHIL 105	Critical Reasoning	3.0
PHIL 107	Philosophy and Knowledge Organization	3.0
PHIL 231	Aesthetics	3.0
PHIL 381 [WI	Philosophy in Literature (p. 165)]	3.0
Select one of the following:		3.0
PHIL 385	Philosophy of Law	
PHIL 391	Philosophy of Religion	

Total Credits 18.0

Certificate in Writing and Publishing

Certificate Level: Undergraduate

Admission Requirements: Current Drexel students only

Certificate Type: Certificate

Number of Credits to Completion: 18.0

Instructional Delivery: Campus, Online, Hybrid

Calendar Type: Quarter

Expected Time to Completion: Not Applicable

About the program

The certificate in writing and publishing (CWP) offers the opportunity for both professional and personal development through a combination of available courses in professional writing, creative writing and publishing. The certificate enhances employment opportunities, opening a broad range of professional choices in cooperative employment and in the post-degree job market as skills are acquired. The CWP improves on-the-job performance, as the student develops writing skills and associated professional knowledge.

The program develops core competencies through the synergy of writing and publishing courses. The courses develop the student's skills in writing and publishing both through theory and practical application.

General requirements

The certificate in writing and publishing allows students to achieve certification in one or more of the following tracks:

- professional writing and publishing
- creative writing and publishing
- comprehensive writing and publishing

Each track requires the completion of a minimum of six courses (18.0 credits). Tracks can be designed to meet the professional needs and personal interests of the individual student.

Working with an advisor, students will choose not only the track but the courses within the track to develop an individually tailored program. Students can choose courses that will meet the general requirements of the program, while also satisfying their own professional and personal requirements.

Those students who have successfully completed this program will receive a certificate in writing and publishing. The transcript will indicate the completion of the CWP. This certification will indicate proficiency in written communication and familiarity with techniques in publishing in a variety of venues. The certificate program in writing and publishing highlights the student's acquisition of skills more than they would be in a list of courses on a transcript.

The completion of the certificate demonstrates the student's commitment to writing and publishing skills. It highlights writing skills of students majoring in business and technical areas; similarly, for students in the humanities and social sciences, it certifies writing and publishing skills, either in creative writing or professional writing.

Students meet with one of the two program co-directors to determine their track:

Harriet Levin Millan
 Director, Certificate in Writing and Publishing
 harriet.levin.millan@drexel.edu

Henry Israeli
 Associate Director, Certificate in Writing and Publishing
 hpi22@drexel.edu

Track Requirements

The professional writing and publishing track offers three options: business communication and publishing; technical communication and publishing; and journalism. This track is useful for business majors or students in technical or science areas who want to highlight their acquisition of writing skills. For students majoring in the humanities it provides an opportunity to develop areas of writing and publishing competencies in the professional arena. The creative writing and publishing track, is useful to all students as it encourages personal and professional development through creative writing and a knowledge of publishing. The comprehensive track is for students who do not wish to specialize in either of the other two tracks.

Note: Many majors already require one or more of the courses leading to the certificate in writing and publishing or list these courses as recommended electives

Professional Writing and Publishing Track

18.0 quarter credits

The professional writing and publishing track is useful for business majors or students in technical or science areas who want to highlight their acquisition of writing skills. For students majoring in the humanities it provides an opportunity to develop areas of writing and publishing competencies in the professional arena.

This track offers three focus options:

- business communication and publishing: for students interested in a career in business.
- technical communication and publishing: for students interested in engineering, science, information science and technology and careers in higher education.
- journalism: for students interested in global journalism and international affairs.

Business Communication and Publishing

Required Courses

COM 270 [WI (p. 165)]	Business Communication	3.0
COM 350 [WI (p. 165)]	Message Design and Evaluation	3.0
or COM 375	Grant Writing	
Select one of the following:		3.0
COM 320 [WI (p. 165)]	Science Writing	
COM 420	Technical Editing	
COM 380	Special Topics in Communication Theory	
Select one of the following:		3.0
WRIT 400 [WI (p. 165)]	Writing in Cyberspace	
WRIT 310	Literary Editing & Publication	
COM 335	Electronic Publishing	
COM 340	Desktop Publishing	
Select two of the following:		6.0
COM 260 [WI (p. 165)]	Fundamentals of Journalism	
COM 300 [WI (p. 165)]	On-line Journalism	
COM 315	Investigative Journalism	
COM 390 [WI (p. 165)]	Global Journalism	
WRIT 220 [WI (p. 165)]	Creative Nonfiction Writing	
WRIT 225 [WI (p. 165)]	Creative Writing	
WRIT 301 [WI (p. 165)]	Writing Poetry	
WRIT 302	Writing Fiction	
WRIT 303	Writing Humor and Comedy	
WRIT 304 [WI (p. 165)]	Special Topics in Writing	
WRIT 306	Writing About the Media	
Total Credits		18.0

Technical Communication and Publishing

Required Courses

COM 310 [WI (p. 165)]	Technical Communication	3.0
COM 375 [WI (p. 165)]	Grant Writing	3.0
Select one of the following:		3.0

COM 320 [WI] Science Writing (p. 165)]	
COM 350 [WI] Message Design and Evaluation (p. 165)]	
COM 380 Special Topics in Communication Theory	
COM 420 Technical Editing	
Select one of the following:	3.0
WRIT 310 Literary Editing & Publication	
WRIT 400 [WI] Writing in Cyberspace (p. 165)]	
COM 335 Electronic Publishing	
COM 340 Desktop Publishing	
Select any two additional Certificate in Writing and Publishing courses, including but not limited to the following:	6.0
COM 260 [WI] Fundamentals of Journalism (p. 165)]	
COM 300 [WI] On-line Journalism (p. 165)]	
COM 390 [WI] Global Journalism (p. 165)]	
COM 315 Investigative Journalism	
WRIT 220 [WI] Creative Nonfiction Writing (p. 165)]	
WRIT 301 [WI] Writing Poetry (p. 165)]	
WRIT 302 Writing Fiction	
WRIT 303 Writing Humor and Comedy	
WRIT 304 [WI] Special Topics in Writing (p. 165)]	
WRIT 306 Writing About the Media	
Total Credits	18.0

Journalism

Required Courses

COM 260 [WI] Fundamentals of Journalism (p. 165)]	3.0
Select two of the following:	6.0
COM 300 [WI] On-line Journalism (p. 165)]	
COM 315 Investigative Journalism	
COM 390 [WI] Global Journalism (p. 165)]	
Select one of the following:	3.0
WRIT 310 Literary Editing & Publication	
WRIT 400 [WI] Writing in Cyberspace (p. 165)]	
COM 335 Electronic Publishing	
COM 340 Desktop Publishing	
Select any two additional Certificate in Writing and Publishing courses, including but not limited to the following:	6.0
COM 270 [WI] Business Communication (p. 165)]	
or COM 310 Technical Communication	
COM 320 [WI] Science Writing (p. 165)]	

COM 375 [WI] Grant Writing (p. 165)]	
COM 420 Technical Editing	
WRIT 220 [WI] Creative Nonfiction Writing (p. 165)]	
WRIT 225 [WI] Creative Writing (p. 165)]	
WRIT 301 [WI] Writing Poetry (p. 165)]	
WRIT 302 Writing Fiction	
WRIT 303 Writing Humor and Comedy	
WRIT 304 [WI] Special Topics in Writing (p. 165)]	
WRIT 306 Writing About the Media	
Total Credits	18.0

Creative Writing and Publishing track

18.0 quarter credits

This track is designed for students who want to develop their creative writing skills either for personal development and expression, or because they recognize that creative writing develops imagination; sharpens clarity of expression; and enhances sensitivity to other people. Creative writing is a good pre-professional concentration for pre-law, pre-med, and the social sciences. The importance of creative writing has been recognized for engineering and for business.

Select three of the following (one of which must be a 200-level course): 9.0

WRIT 220 [WI] Creative Nonfiction Writing (p. 165)]	
WRIT 225 [WI] Creative Writing (p. 165)]	
WRIT 301 [WI] Writing Poetry (p. 165)]	
WRIT 302 Writing Fiction	
WRIT 303 Writing Humor and Comedy	
WRIT 304 [WI] Special Topics in Writing (p. 165)]	
WRIT 306 Writing About the Media	
Select one of the following:	3.0
WRIT 310 Literary Editing & Publication	
WRIT 400 [WI] Writing in Cyberspace (p. 165)]	
WRIT 405 Internship in Literary Publishing *	
COM 335 Electronic Publishing	
COM 340 Desktop Publishing	
COM 350 [WI] Message Design and Evaluation (p. 165)]	
Select any two additional Certificate in Writing and Publishing courses, including but not limited to the following:	6.0
COM 260 [WI] Fundamentals of Journalism (p. 165)]	
COM 300 [WI] On-line Journalism (p. 165)]	

COM 390 [WI]	Global Journalism	(p. 165)]
COM 315	Investigative Journalism	
COM 270 [WI]	Business Communication	(p. 165)]
COM 310 [WI]	Technical Communication	(p. 165)]
COM 320 [WI]	Science Writing	(p. 165)]
COM 350 [WI]	Message Design and Evaluation	(p. 165)]
COM 420	Technical Editing	
COM 375 [WI]	Grant Writing	(p. 165)]

Total Credits **18.0**

* WRIT 405 must be taken twice if no other publishing course is taken.

Comprehensive Certificate track

18.0 quarter credits

The Comprehensive Track is designed for students whose majors and minors include writing courses (either as electives or required courses) and whose schedules allow for the additional credits to obtain certification.

Select two of the following: 6.0

WRIT 310	Literary Editing & Publication
WRIT 400 [WI]	Writing in Cyberspace (p. 165)]
WRIT 405	Internship in Literary Publishing *
COM 335	Electronic Publishing
COM 340	Desktop Publishing

Select two of the following: ** 12.0

Creative Writing

Track A

WRIT 220 [WI]	Creative Nonfiction Writing	(p. 165)]
Any 300-level writing (WRIT) course		

Track B

WRIT 225 [WI]	Creative Writing	(p. 165)]
Any 300-level writing (WRIT) course		

Professional Writing

Track A

COM 310 [WI]	Technical Communication	(p. 165)]
COM 420	Technical Editing	
or COM 375	Grant Writing	

Track B

COM 270 [WI]	Business Communication	(p. 165)]
COM 375 [WI]	Grant Writing	(p. 165)]
or COM 350	Message Design and Evaluation	

Journalism

COM 260 [WI]	Fundamentals of Journalism	(p. 165)]
Select one of the following:		
COM 300 [WI]	On-line Journalism	(p. 165)]
COM 315	Investigative Journalism	
COM 390 [WI]	Global Journalism	(p. 165)]

Total Credits **18.0**

* WRIT 405 Must be taken twice.

** Students select two of the following course sequences from at least two different categories

Minor in Writing

The minor in writing invites students from all disciplines to develop their writing skills and further their abilities to think critically and creatively by encouraging them to make connections beyond the scope of their discipline.

Students who complete the writing minor will:

- obtain a strong background in theoretical perspectives and practices of writing and rhetoric, as well as reading;
- be able to select additional writing courses in a variety of areas of interest;
- achieve a better understanding of writing within their major fields of study;
- gain significant practice and experience in writing in many genres and rhetorical modes;
- be better positioned to succeed as writers in their future professional and personal endeavors.

Required Courses

ENGL 340 [WI]	Classical Rhetoric	(p. 168)]	3.0
WRIT 225 [WI]	Creative Writing	(p. 168)]	3.0
WRIT 312 [WI]	The Practice of Professional Writing	(p. 168)]	3.0
COM 210	Theory and Models of Communication		3.0
or ANTH 350	Anthropology of Language		
or PHIL 305	Communication Ethics		

Reading Courses

Select one of the following: 3.0

ENGL 200 [WI]	Classical to Medieval Literature	(p. 168)]
ENGL 201	Renaissance to the Enlightenment	
ENGL 202 [WI]	Romanticism to Modernism	(p. 168)]
ENGL 203 [WI]	Post-Colonial Literature I	(p. 168)]
ENGL 204	Post-Colonial Literature II	
ENGL 205 [WI]	American Literature I	(p. 168)]

ENGL 206 [WI American Literature II (p. 168)]	
ENGL 207 [WI African American Literature (p. 168)]	
ENGL 211 [WI British Literature I (p. 168)]	
ENGL 212 British Literature II	
ENGL 214 Readings in Fiction	
ENGL 215 [WI Readings in Poetry (p. 168)]	
ENGL 216 [WI Readings in Drama (p. 168)]	
PHIL 105 Critical Reasoning	
PSCI 330 Public Opinion & Propaganda	
WRIT 210 [WI The Peer Reader in Context (p. 168)]	

Theoretical Perspectives on Writing Courses

Select one of the following: 3.0

ANTH 330 Media Anthropology	
ANTH 350 Anthropology of Language *	
CJS 377 Intellectual Property Theft in the Digital Age	
COM 220 Qualitative Research Methods	
COM 355 Ethnography of Communication	
EDUC 236 Early Literacy I	
EDUC 256 Teaching Writing Grades 4-8	
EDUC 326 [WI Language Arts Processes (p. 168)]	
ENGL 340 [WI Classical Rhetoric (p. 168)]	
PHIL 305 Communication Ethics *	
PSCI 335 Political Communication	
PSY 336 Psychology of Language	

Writing in Practice Courses

Select two of the following: 6.0

COM 260 [WI Fundamentals of Journalism (p. 168)]	
COM 270 [WI Business Communication (p. 168)]	
COM 310 [WI Technical Communication (p. 168)]	
COM 320 [WI Science Writing (p. 168)]	
COM 335 Electronic Publishing	
CULA 412 Food Writing for Culinary Professionals	
DSMR 233 [WI Retail Image Analysis (p. 168)]	
FASH 467 Style and the Media	
SCRIP 220 Playwriting I	
SCRIP 225 Playwriting II	
SCRIP 270 [WI Screenwriting I (p. 168)]	
SCRIP 275 [WI Screenwriting II (p. 168)]	
SCRIP 350 TV Comedy Practicum	

SCRIP 353 TV Drama Practicum	
TVPR 220 TV News Writing	
WRIT 220 [WI Creative Nonfiction Writing (p. 168)]	
WRIT 301 [WI Writing Poetry (p. 168)]	
WRIT 302 Writing Fiction	
WRIT 303 Writing Humor and Comedy	
WRIT 304 [WI Special Topics in Writing (p. 168)]	
WRIT 306 Writing About the Media	
WRIT 310 Literary Editing & Publication	
WRIT 400 [WI Writing in Cyberspace (p. 168)]	

Total Credits 24.0

* Courses marked with an asterisk are also listed as options for the 4th required course for the minor. A student who elects to take one of these courses may not count it twice (once as a required course and once as an elective). For example, a student who chooses to take Anthropology 350, "Anthropology of Language," as a required course may not take it again as one of the electives; however, this student could take Philosophy 305, "Communication Ethics," as an elective.

College of Computing & Informatics

The College of Computing & Informatics provides a focal point for the broad range of inquiry related to computation and information. The College addresses both theory and practice along dimensions that include technical, human, organizational, policy, and societal considerations. This broad expertise positions the College's education and research programs to address the complex, multi-disciplinary problems that are increasingly common as society becomes ever more dependent on information technology.

Founded in fall 2013, the College unites the faculty, staff, and students from the former College of Information Science and Technology (the iSchool), the Department of Computer Science from the College of Engineering and the Department of Computing and Security Technology from Goodwin College of Professional Studies. For more information, please visit the College's website (<http://www.drexel.edu/cci>).

Majors

- Computer Science (p. 171)
 - Computer Security (p. 209)
 - Game Programming and Development (p. 185)
- Computing and Security Technology (p. 182)
- Data Science (p. 187)
- Informatics (p. 190)
- Information Systems (p. 194)
- Information Technology (p. 199)
- Software Engineering (p. 204)

Minors

- Computer Science (p. 179)
- Data Science (p. 189)
- Emergency Management (p. 208)
- Human Centered Computing (p. 208)
- Informatics (p. 192)
- Information Systems (p. 197)
- Security Technology (p. 203)
- Software Engineering (p. 206)

Certificates

- Computing Security (p. 209)
- Emergency Management (p. 209)

About the College

The College of Computing & Informatics (<http://www.drexel.edu/cci>) (CCI) offers a number of undergraduate degrees in computer science, computing & security technology, data science, information systems, and software engineering. The degree programs are open to freshmen and transfers from other departments at Drexel and other universities. Students have access to the computing facilities available to all Drexel students.

The College educates professionals through its interdisciplinary programs to meet a wide range of needs in the computing and informatics fields to benefit all sectors of society.

Transfer admission for traditional undergraduate programs occurs in the fall term only due to the sequence of required courses. Internal transfer students can be admitted at any term. Admission to the BS online completion program in computing & security technology is offered on a rolling basis. Please contact an undergraduate advisor (<http://cci.drexel.edu/resources/current-students/undergraduate/advising.aspx>) for more information.

Cooperative Education

Cooperative education emphasizes career management through experiential learning as an integral part of the education process. The co-op is based on employment in practical, major-related positions consistent with the interests, abilities, and aptitudes of the students.

For more general information on Drexel University's co-op opportunities, visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>).

About Computer-Related Disciplines

Drexel offers real choices among majors that are genuinely distinct. By learning more about computer-related disciplines, students can decide which discipline is best suited to their interests:

Data Science

College of Computing & Informatics

Note: Students will be accepted into this program beginning Fall 2016.

Data Science majors are prepared to meet the challenges presented by the explosive growth of very large scale data sources and develop the knowledge and skills to address this growth for the benefit of individuals and organizations.

Students who are interested in solving big data problems and/or improving technology using large, disparate data sources should consider a major in data science.

Informatics

College of Computing & Informatics

Note: Effective Fall 2016, students will no longer be accepted into this program. Students are encouraged to apply for the BS in Data Science (p. 187) program, which encompasses the content of the BS in Informatics program while adding additional coverage in computational techniques.

Informatics majors learn to define information needs of individuals and organizations; select and transform data to increase usefulness for solving particular problems; analyze and synthesize big, unstructured data to create actionable information; create information visualizations for big data exploration and presentation; manage very large volume data sources from acquisition through disposal, and secure, preserve, and control access to data in a manner consistent with legal and organizational considerations.

Information Systems

College of Computing & Informatics

Information systems analysts and designers spend most of their time learning how to elicit system requirements from users, modeling these requirements, building and testing prototypes, developing software specifications, designing and developing graphical user interfaces, and evaluating the organizational effectiveness of information systems.

Students who are interested in designing requirements-driven information systems should consider a major in information systems.

Information Technology

College of Computing & Informatics

Note: Effective Fall 2016, students will no longer be accepted into this program. Students are encouraged to apply for the BS in Computing & Security Technology (p. 182) program, which encompasses the content of the BS in Information Technology program plus a significant expansion in coverage of computer security technology.

The Bachelor of Science in Information Technology program integrates closely with Drexel's Bachelor of Science in Information Systems (BSIS) program. The two degrees share a common freshman year and the same set of major courses, but they have different requirements. The difference is in the nature of specialization in upper-level courses. The BSIT is aimed at students who want a degree focused on applied information technology — but with an emphasis on IT infrastructure rather than applications in business.

Software Engineering

College of Computing & Informatics

Drexel's software engineering program focuses on the application of processes, methods, and tools to building and maintaining quality computer software, at a predictable cost, on a predictable schedule.

Students in this major learn to appropriately apply discrete mathematics, probability, statistics, and relevant topics in computer science and supporting disciplines to complex software systems, and to work in one or more significant application domains designing software.

Students interested in analyzing, designing, verifying, validating, implementing, applying and maintaining software systems should consider a major in software engineering.

Computer Science

College of Computing & Informatics

Computer science majors spend most of their time studying and designing algorithms, implementing them into software systems, and improving their performance. Study of theories and techniques are covered in such courses as object-oriented programming, analysis of algorithms, software engineering, and programming language concepts. Areas of application range from operating systems to artificial intelligence, scientific computing to computer networks, and expert systems to computer graphics.

Students interested in enhancing the performance of computers via software and related technology should consider a major in computer science.

Computer Engineering

College of Engineering

Computer engineers work for computer and microprocessor manufacturers; manufacturers of digital devices for telecommunications,

peripherals, electronics, control, and robotics; software engineering; the computer network industry; and related fields. A degree in computer engineering can also serve as an excellent foundation to pursue graduate professional careers in medicine, law, business, and government.

Management Information Systems (MIS)

LeBow College of Business

Combining the science, technology, and theory of information systems with an advanced knowledge of business functionality is the aim of management information specialists. The Management Information Systems concentration emphasizes human-computer interaction and the practical applications of computer systems in business, including effective data management and efficient systems of information relay. Career opportunities exist in a wide range of business settings.

Computer Science

Major: Computer Science

Degree Awarded: Bachelor of Science (BS) or Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 186.5

Classification of Instructional Programs (CIP) code: 11.0701

Standard Occupational Classification (SOC) code: 11-3021; 15-1111;

15-1131; 15-1132; 11-1199

About the Program

The College of Computing & Informatics' Bachelor of Science/Arts in Computer Science offers extensive exposure and hands-on practice in the core areas of the field, including programming paradigms and languages, algorithms, systems, networking, and software engineering. Students also select upper level tracks in areas such as artificial intelligence, security, graphics and vision, and human-computer interaction. The program's flexibility allows students to easily sample from areas in which they would like to apply their computing knowledge. This hands-on curriculum combined with co-op provides real-world experience that culminates in a full-year software project.

The programs of study in computer science are designed with the flexibility to prepare students for careers in a rapidly changing profession and to allow strong preparation for graduate education in the field. In addition to the courses in the major, the Bachelor of Science program emphasizes foundation courses in the sciences and in applied mathematics, leading to careers involving applications in science and engineering. The Bachelor of Arts degree emphasizes foundation courses in the humanities and the social sciences, leading to careers involving applications in those areas.

Core courses in all programs include programming and data structures, programming language concepts, computer systems architecture, and software methodology and engineering. Students also choose two other tracks from a list of possible specializations. Please contact your advisor (<http://cci.drexel.edu/resources/current-students/undergraduate/advising.aspx>) at the College of Computing & Informatics for a current list of computer science track and elective courses.

Concentrations

- Computer Security (p. 209)
- Game Programming and Development (p. 185)

Additional Information

For more information about this program, please visit the BS/BA in Computer Science web page (<http://drexel.edu/cci/programs/undergraduate-programs/bsba-computer-science>) on the College of Computing & Informatics' website.

Degree Requirements (BS)

The Bachelor of Science (BS) in Computer Science program emphasizes foundation courses in the sciences and in applied mathematics, leading to careers involving applications in science and engineering.

Computer Science Requirements

CS 164	Introduction to Computer Science	3.0
Select one of the following: *		3.0-6.0
CS 171 & CS 172	Computer Programming I and Computer Programming II	
CS 175	Computer Programming I-II	
CS 260	Data Structures	3.0
CS 265	Advanced Programming Tools and Techniques	3.0
CS 270	Mathematical Foundations of Computer Science	3.0
CS 275	Web and Mobile App Development	3.0
CS 281	Systems Architecture	4.0
CS 283	Systems Programming	3.0
CS 350 [WI (p. 171)]	Software Design	3.0
CS 360	Programming Language Concepts	3.0
CS 451	Software Engineering	3.0
Computer Science track courses (see below)		18.0
Computer Science electives (see below)		6.0

Computing & Informatics Requirements

CI 101	Computing and Informatics Design I	2.0
CI 102	Computing and Informatics Design II	2.0
CI 103	Computing and Informatics Design III	2.0
CI 491 [WI (p. 171)]	Senior Project I	3.0
CI 492 [WI (p. 171)]	Senior Project II	3.0
CI 493 [WI (p. 171)]	Senior Project III	3.0

Mathematics Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 201	Linear Algebra	4.0
or MATH 261	Linear Algebra	
or ENGR 231	Linear Engineering Systems	
MATH 221	Discrete Mathematics	3.0
MATH 311	Probability and Statistics I	4.0
or MATH 410	Scientific Data Analysis I	
Mathematics elective (see below)		4.0

Science Requirements

Select one of the following lab science sequences:

BIO 122 & BIO 124 & BIO 126	Cells and Genetics and Evolution & Organismal Diversity and Physiology and Ecology
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Or

CHEM 101 & CHEM 102 & CHEM 103	General Chemistry I and General Chemistry II and General Chemistry III
--------------------------------	--

Or

PHYS 101 & PHYS 102 & PHYS 201	Fundamentals of Physics I and Fundamentals of Physics II and Fundamentals of Physics III
--------------------------------	--

Science electives (see below)

Arts & Humanities Requirements

COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 311	Computer Ethics	3.0
Writing & Communication electives (see below)		6.0
Business elective (see below)		4.0
Social Studies elective (see below)		3.0
Arts & Humanities, Business, or Social Studies electives (see below)		17.0

University Requirements

UNIV CI101	The Drexel Experience	2.0
or CI 120	CCI Transfer Student Seminar	
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0

Free electives 10.5-15.5

Total Credits 186.5

* Not available to all students. Please see your Academic Advisor for eligibility requirements.

Program Electives

- **Computer Science electives:** any CS course numbered 300 or higher
- **Mathematics electives:** MATH 200, MATH 210, MATH 262, ENGR 232, any MATH course numbered 300 or higher
- **Science electives:** any CHEM (except 111, 112, 113, 114, 151), BIO (except 161, 162, 163; cannot take both BIO 100 and 122), PHYS (except 050, 100, 103, 104, 105, 106, 121, 122, 151, 160, 305, 306, 307, 324, 405; cannot take both PHYS 131 & 181)
- **Writing & Communications electives:** any WRIT, COM, ENGL courses officially certified as Writing Intensive (http://drexel.edu/engphil/about/DrexelWritingCenter/wiCourses/course_list) (WI)
- **Business electives:** any ACCT, BLAW, BUSN, ECON, FIN, HRMT, INTB, MGMT, MKTG, OPM, OPR, ORGB, POM, STAT, TAX
- **Social Studies electives:** any AFAS, ANTH, HIST, IAS, JUDA, PSCI, PSY (except 330, 332, 337, 364, 365), SOC (except 364, 365), WGST
- **Arts & Humanities electives:** any ARTH, COM, DANC, EDEX, EDUC, ENGL (except 101, 102, 103, 105), ESTM, FASH, FMVD, INTR, LING, MUSC, PHIL, PHTO, THTR, VSCM, VSST, WRIT, and Foreign Language courses (<http://www.drexel.edu/culturecomm/>)

academics/undergraduate/modernlang/languages) as defined by the College of Arts and Sciences

Computer Science Tracks

Students must complete two of the following Computer Science tracks for a total of 18.0 credits. The tracks may overlap by one course. Students should check with the College for any additional Special Topics courses being offered that may be appropriate for one of the tracks.

Algorithms and Data Structures

CS 440	Theory of Computation	3.0
CS 457	Data Structures and Algorithms I	3.0
CS 458	Data Structures and Algorithms II	3.0

Artificial Intelligence

CS 380	Artificial Intelligence	3.0
Select two of the following:		6.0
CS 383	Machine Learning	
CS 385	Evolutionary Computing	
CS 387	Game AI Development	
CS 481	Advanced Artificial Intelligence	

Computer and Network Security

CS 472	Computer Networks: Theory, Applications and Programming	3.0
CS 475	Computer and Network Security	3.0
CS 303	Algorithmic Number Theory and Cryptography	3.0

Computer Architecture

CS 352	Processor Architecture & Analysis	3.0
Select two of the following:		6.0
CS 476	High Performance Computing	
ECEC 356	Embedded Systems	
ECEC 413	Introduction to Parallel Computer Architecture	

Computer Graphics and Vision

CS 430	Computer Graphics	3.0
CS 435	Computational Photography	3.0
Select one of the following:		3.0
CS 431	Advanced Rendering Techniques	
CS 432	Interactive Computer Graphics	

Computing Systems

CS 361	Concurrent Programming	3.0
CS 370	Operating Systems	3.0
Select one of following:		3.0
CS 365	System Administration	
CS 461	Database Systems	
CS 472	Computer Networks: Theory, Applications and Programming	

Game Development and Design

CS 345	Computer Game Design and Development	3.0
or GMAP 345	Game Development Foundations	
Select two of the following:		6.0
CS/GMAP 347	Experimental Game Development	
CS/GMAP 348	Serious Game Development	
CS 387	Game AI Development	
CS 445	Topics in Computer Gaming	
GMAP 377	Game Development: Workshop I	

GMAP 378 Game Development: Workshop II

Human-Computer Interaction

CS 338	Graphical User Interfaces	3.0
Select one of the following:		3.0
INFO 310	Human-Computer Interaction II	
CS 337	The Psychology of Human-Computer Interaction	
or PSY 337	Human-Computer Interaction	
Select one of the following:		3.0
CS 345	Computer Game Design and Development	
or GMAP 345	Game Development Foundations	
CS 432	Interactive Computer Graphics	

Numeric and Symbolic Computation

CS 300	Applied Symbolic Computation	3.0
MATH 300	Numerical Analysis I	4.0
Select one of the following:		3.0-4.0
CS 303	Algorithmic Number Theory and Cryptography	
MATH 301	Numerical Analysis II	
MATH 305	Introduction to Optimization Theory	

Programming Languages

CS 440	Theory of Computation	3.0
CS 441	Compiler Workshop I	3.0
CS 442	Compiler Workshop II	3.0

Software Engineering

SE 311	Software Architecture II	3.0
SE 320	Software Verification and Validation	3.0
SE 410	Software Evolution	3.0

Sample Plan of Study (BS)

BS Computer Science

5 YR UG Co-op Concentration

Term 1		Credits
CI 101	Computing and Informatics Design I	2.0
CS 164	Introduction to Computer Science	3.0
MATH 121	Calculus I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV CI101	The Drexel Experience	1.0
Science lab		4.5
Term Credits		17.5
Term 2		
CI 102	Computing and Informatics Design II	2.0
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0
CS 171	Computer Programming I	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
Science lab		4.5
Term Credits		17.5
Term 3		

CI 103	Computing and Informatics Design III	2.0
CS 172	Computer Programming II	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
UNIV CI101	The Drexel Experience	1.0
Science lab		4.5

Term Credits **17.5**

Term 4

CS 265	Advanced Programming Tools and Techniques	3.0
CS 270	Mathematical Foundations of Computer Science	3.0
MATH 201	Linear Algebra	4.0
Science elective		3.0
Social Studies elective		3.0

Term Credits **16.0**

Term 5

CS 260	Data Structures	3.0
CS 275	Web and Mobile App Development	3.0
MATH 221	Discrete Mathematics	3.0
Science elective		3.0
Business elective		4.0

Term Credits **16.0**

Term 6

COM 230	Techniques of Speaking	3.0
CS 281	Systems Architecture	4.0
CS 350 [WI (p. 171)]	Software Design	3.0
Science elective		3.0
Arts & Humanities elective		3.0

Term Credits **16.0**

Term 7

CS 283	Systems Programming	3.0
CS 360	Programming Language Concepts	3.0
Science elective		3.0
Writing & Communications elective		3.0
Arts & Humanities elective		3.0

Term Credits **15.0**

Term 8

MATH 410 or 311	Scientific Data Analysis I Probability and Statistics I	3.0
PHIL 311	Computer Ethics	3.0
Computer science electives		6.0
Arts & Humanities elective		3.0

Term Credits **15.0**

Term 9

CS 451	Software Engineering	3.0
Arts & Humanities elective		3.0
Computer Science elective		3.0
Mathematics elective		3.0
Science elective		3.0

Term Credits **15.0**

Term 10

CI 491 [WI (p. 171)]	Senior Project I	3.0
Arts & Humanities elective		3.0
Computer Science electives		6.0
Free elective		3.0

Term Credits **15.0**

Term 11

CI 492 [WI (p. 171)]	Senior Project II	3.0
Arts & Humanities elective		3.0
Computer Science electives		6.0
Free elective		3.0

Term Credits **15.0**

Term 12

CI 493 [WI (p. 171)]	Senior Project III	3.0
Computer Science elective		3.0
Writing & Communications elective		3.0
Free elective		2.0

Term Credits **11.0**

Total Credit: 186.5

Degree Requirements (BA)

The Bachelor of Arts (BA) program emphasizes foundation courses in the humanities and the social sciences, leading to careers involving applications in those areas.

Computer Science Requirements

CS 164	Introduction to Computer Science	3.0
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Select one of the following: 3.0-6.0

CS 171 & CS 172	Computer Programming I and Computer Programming II	
CS 175	Computer Programming I-II	

CS 260	Data Structures	3.0
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CS 265	Advanced Programming Tools and Techniques	3.0
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CS 270	Mathematical Foundations of Computer Science	3.0
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CS 275	Web and Mobile App Development	3.0
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CS 281	Systems Architecture	4.0
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CS 283	Systems Programming	3.0
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CS 350 [WI (p. 171)]	Software Design	3.0
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CS 360	Programming Language Concepts	3.0
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CS 451	Software Engineering	3.0
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Computer Science track courses (see below)		18.0
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Computer Science electives (see below)		6.0
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Computing & Informatics Requirements

CI 101	Computing and Informatics Design I	2.0
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CI 102	Computing and Informatics Design II	2.0
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CI 103	Computing and Informatics Design III	2.0
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CI 491 [WI (p. 171)]	Senior Project I	3.0
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CI 492 [WI (p. 171)]	Senior Project II	3.0
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CI 493 [WI Senior Project III 3.0
(p. 171)]

Mathematics Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 201	Linear Algebra	3.0-4.0
or MATH 261	Linear Algebra	
or ENGR 231	Linear Engineering Systems	
MATH 221	Discrete Mathematics	3.0
MATH 311	Probability and Statistics I	3.0-4.0
or MATH 410	Scientific Data Analysis I	

Mathematics elective (see below) 4.0

Science Requirements 18.0

Select one of the following lab science sequences:

BIO 122	Cells and Genetics	
& BIO 124	and Evolution & Organismal Diversity	
& BIO 126	and Physiology and Ecology	
CHEM 101	General Chemistry I	
& CHEM 102	and General Chemistry II	
& CHEM 103	and General Chemistry III	
PHYS 101	Fundamentals of Physics I	
& PHYS 102	and Fundamentals of Physics II	
& PHYS 201	and Fundamentals of Physics III	

Science electives (see below)

Arts & Humanities Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 311	Computer Ethics	3.0
COM 230	Techniques of Speaking	3.0
Social Studies electives (see below)		12.0
International Area Studies electives (see below)		6.0
Diversity Studies electives (see below)		6.0
Arts & Humanities electives (see below)		6.0

University Requirements

UNIV CI101	The Drexel Experience	2.0
or CI 120	CCI Transfer Student Seminar	
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0

Free electives 17.5-20

Total Credits 186.5

Program Electives

- **Computer Science electives:** any CS course numbered 300 or higher
- **Mathematics electives:** MATH 200, MATH 210, MATH 262, ENGR 232, any MATH course numbered 300 or higher
- **Science electives:** any CHEM (except 111, 112, 113, 114, 151), BIO (except 161, 162, 163; cannot take both BIO 100 and 122), PHYS

(except 050, 100, 103, 104, 105, 106, 121, 122, 151, 160, 305, 306, 307, 324, 405; cannot take both PHYS 131 & 181)

- **Social Studies electives:** any AFAS, ANTH, HIST, IAS, JUDA, PSCI, PSY (except 330, 332, 337, 364, 365), SOC (except 364, 365), WGST
- **International Area Studies electives:** any IAS, MUSC 331, PSCI 150, PSCI 255, PSCI 340, PSCI 345, PSCI 357, PSCI 358, PSCI 367
- **Diversity Studies electives:** any AFAS, WGST
- **Arts & Humanities electives:** any ARTH, COM, DANC, EDEX, EDUC, ENGL (except 101, 102, 103, 105), ESTM, FASH, FMVD, INTR, LING, MUSC, PHIL, PHTO, THTR, VSCM, VSST, WRIT, and Foreign Language courses (<http://www.drexel.edu/culturecomm/academics/undergraduate/modernlang/languages>) as defined by the College of Arts and Sciences

Computer Science Tracks

Students must complete two of the following Computer Science tracks for a total of 18.0 credits. The tracks may overlap by one course. Students should check with the College for any additional Special Topics courses being offered that may be appropriate for one of the tracks.

Algorithms and Data Structures

CS 440	Theory of Computation	3.0
CS 457	Data Structures and Algorithms I	3.0
CS 458	Data Structures and Algorithms II	3.0

Artificial Intelligence

CS 380 Artificial Intelligence 3.0

Select two of the following: 6.0

CS 383	Machine Learning	
CS 385	Evolutionary Computing	
CS 387	Game AI Development	
CS 481	Advanced Artificial Intelligence	

Computer and Network Security

CS 472	Computer Networks: Theory, Applications and Programming	3.0
CS 475	Computer and Network Security	3.0
CS 303	Algorithmic Number Theory and Cryptography	3.0

Computer Architecture

CS 352 Processor Architecture & Analysis 3.0

Select two of the following: 6.0

CS 476	High Performance Computing	
ECEC 356	Embedded Systems	
ECEC 413	Introduction to Parallel Computer Architecture	

Computer Graphics and Vision

CS 430 Computer Graphics 3.0

CS 435 Computational Photography 3.0

Select one of the following: 3.0

CS 431	Advanced Rendering Techniques	
CS 432	Interactive Computer Graphics	

Computing Systems

CS 361 Concurrent Programming 3.0

CS 370 Operating Systems 3.0

Select one of the following: 3.0

CS 365	System Administration	
CS 461	Database Systems	

CS 472	Computer Networks: Theory, Applications and Programming	
Game Development and Design		
CS 345	Computer Game Design and Development	3.0
or GMAP 345	Game Development Foundations	
Select two of the following:		6.0
CS 347	Experimental Game Development	
CS 348	Serious Game Development	
CS 387	Game AI Development	
CS 445	Topics in Computer Gaming	
GMAP 377	Game Development: Workshop I	
GMAP 378	Game Development: Workshop II	
Human-Computer Interaction		
CS 338	Graphical User Interfaces	3.0
Select one of the following:		
INFO 310	Human-Computer Interaction II	
CS 337	The Psychology of Human-Computer Interaction	
or PSY 337	Human-Computer Interaction	
Select one of the following:		3.0
CS 345	Computer Game Design and Development	
or GMAP 345	Game Development Foundations	
CS 432	Interactive Computer Graphics	
Numeric and Symbolic Computation		
CS 300	Applied Symbolic Computation	3.0
MATH 300	Numerical Analysis I	4.0
Select one of the following:		3.0-4.0
CS 303	Algorithmic Number Theory and Cryptography	
MATH 301	Numerical Analysis II	
MATH 305	Introduction to Optimization Theory	
Programming Languages		
CS 440	Theory of Computation	3.0
CS 441	Compiler Workshop I	3.0
CS 442	Compiler Workshop II	3.0
Software Engineering		
SE 311	Software Architecture II	3.0
SE 320	Software Verification and Validation	3.0
SE 410	Software Evolution	3.0

Sample Plan of Study (BA)

5 YR UG Co-op Concentration

Term 1		Credits
CI 101	Computing and Informatics Design I	2.0
CS 164	Introduction to Computer Science	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV CI101	The Drexel Experience	1.0
Science lab		4.0
Term Credits		17.0
Term 2		
CI 102	Computing and Informatics Design II	2.0
CIVC 101	Introduction to Civic Engagement	1.0

CS 171	Computer Programming I	3.0
or 175	Computer Programming I-II	
COOP 101	Career Management and Professional Development	0.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
Science lab		4.0
Term Credits		17.0
Term 3		
CI 103	Computing and Informatics Design III	2.0
CS 172*	Computer Programming II	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
UNIV CI101	The Drexel Experience	1.0
Science lab		4.0
Term Credits		17.0
Term 4		
CS 265	Advanced Programming Tools and Techniques	3.0
CS 270	Mathematical Foundations of Computer Science	3.0
MATH 201	Linear Algebra	4.0
Science elective		3.0
Social Studies elective		3.0
Term Credits		16.0
Term 5		
CS 260	Data Structures	3.0
CS 275	Web and Mobile App Development	3.0
MATH 221	Discrete Mathematics	3.0
Science elective		3.0
International Area Studies elective		3.0
Term Credits		15.0
Term 6		
COM 230	Techniques of Speaking	3.0
CS 281	Systems Architecture	4.0
CS 350 [WI (p. 171)]	Software Design	3.0
International Area Studies elective		3.0
Arts & Humanities elective		3.0
Term Credits		16.0
Term 7		
CS 283	Systems Programming	3.0
CS 360	Programming Language Concepts	3.0
Social Studies elective		3.0
Diversity Studies elective		3.0
Free elective		3.0
Term Credits		15.0
Term 8		
MATH 311	Probability and Statistics I	4.0
or 410	Scientific Data Analysis I	
PHIL 311	Computer Ethics	3.0
Computer Science electives		6.0

Diversity Studies elective	3.0
Term Credits	16.0
Term 9	
CS 451 Software Engineering	3.0
Arts & Humanities elective	3.0
Computer Science elective	3.0
Mathematics elective	3.0
Social Studies elective	3.0
Term Credits	15.0
Term 10	
CI 491 [WI Senior Project I (p. 171)]	3.0
Computer Science electives	6.0
Social Studies elective	3.0
Free elective	3.0
Term Credits	15.0
Term 11	
CI 492 [WI Senior Project II (p. 171)]	3.0
Computer Science electives	6.0
Free electives	6.0
Term Credits	15.0
Term 12	
CI 493 [WI Senior Project III (p. 171)]	3.0
Computer Science elective	3.0
Free electives	6.5
Term Credits	12.5

Total Credit: 186.5

Co-op/Career Opportunities

The demand for computing skills is tremendous and growing, with highly paid jobs. Most professionals in the field focus on the design and development of software and software-based applications. Typical jobs include software engineer, programmer, web designer, multimedia or software developer, systems analyst or consultant, manager of technical staff, client-server architect, network designer, and database specialist. Most positions require at least a bachelor's degree. Relevant work experience, such as that provided by co-operative education, is also very important, as cited by the Occupational Outlook Handbook (<http://www.bls.gov/ooh>) published by the US Bureau of Labor Statistics.

Co-Op Experiences

The following quotes were taken from recent student reports on their co-op experiences:

Co-op programmer/analyst, petroleum products manufacturer: "Member of a team responsible for implementation of upgrade to critical mainframe computer system. Prepared functional specs, coded, and tested new online and batch processing programs. Modified C programs to conform to new business requirements and government mandates. Challenging environment, great variety of technologies to work with."

Co-op programmer, U.S. government agency: "Programmed on distributed systems software in C on Sun SPARC Stations. Wrote a parser for HTML. Assisted in the administration of the local area network.

Wrote several scripts, including one to automate the cleaning of tape backup drives."

Technical assistant, pharmaceuticals manufacturer: "Provided customized desktop and mobile computer solutions for senior executives. Installed and tested telecommunications solutions. Configured and installed over 100 Compaq PC workstations. Provided full workstation support to over 800 corporate users."

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Accelerated Degrees

The College of Computing & Informatics offers several Accelerated Degree programs designed to allow students to complete both a bachelor's degree and a graduate degree along with cooperative educational experience in fewer years than would be typical if pursuing the degrees separately. Students accepted in this program can combine any of the College's bachelor's and master's degree programs as well as other options:

- Any CCI BS/any CCI MS Accelerated Degree (BS & MS in five years, including 2 Co-ops)
- Any CCI BS/MBA Accelerated Degree (BS/MBA)
- Any CCI BS/JD Accelerated Degree (BS/JD)

For more information on the criteria for entering this program, visit the BS/MS Accelerated Degree (<http://www.drexel.edu/undergrad/academics/accelerated-degrees>) page on Drexel's website.

Bachelor's/Master's Accelerated Degree in Computer Science

Applying

The guidelines for applying to the Computer Science Bachelor's/Master's (BS/MS) Accelerated Degree Program are as follows:

- University regulations require application after the completion of 90.0 credits but before the completion of 120.0 credits.
- Applicants must have an overall cumulative Grade Point Average of 3.25 or higher.
- Letters of recommendation from two Computer Science faculty are required.
- Students must submit a plan of study. Consult your advisor and course schedules for guidance.
- Applicants must have completed the following courses with a minimum GPA of 3.50:

Select one of the following:	3.0-6.0
CS 171 Computer Programming I & CS 172 and Computer Programming II	
CS 175 Computer Programming I-II	
CS 260 Data Structures	3.0
CS 265 Advanced Programming Tools and Techniques	3.0
CS 270 Mathematical Foundations of Computer Science	3.0
CS 275 Web and Mobile App Development	3.0
CS 281 Systems Architecture	4.0
MATH 221 Discrete Mathematics	3.0

CS 350 [WI (p. 171)]	Software Design	3.0
CS 360	Programming Language Concepts	3.0
One additional CS course numbered 300 or higher		3.0

Requirements

The requirements of the Computer Science BS/MS program follow the requirements of both the BS in Computer Science (<http://catalog.drexel.edu/undergraduate/collegeofcomputingandinformatics/computerscience/#requirementsbtext>) and the MS in Computer Science (<http://catalog.drexel.edu/graduate/collegeofcomputingandinformatics/computerscience/#degreerequirementsmstext>). Students must complete all the requirements of the BS in Computer Science (<http://catalog.drexel.edu/undergraduate/collegeofcomputingandinformatics/computerscience/#requirementsbtext>) except that they may drop two free electives (still maintaining the 180.0 credit minimum for the BS degree). In addition, students must complete 45.0 credits of graduate courses to satisfy the requirements of the MS in Computer Science (<http://catalog.drexel.edu/graduate/collegeofcomputingandinformatics/computerscience/#degreerequirementsmstext>). Please refer to the linked program pages for the details of these requirements.

When completing undergraduate CS electives and graduate CS courses, students should take care to avoid equivalent courses at both the undergraduate and graduate levels. The table below indicates pairs of equivalent courses; students may only take one or the other in each pair but not both.

CS 338	Graphical User Interfaces	3.0
or CS 530	Developing User Interfaces	
CS 370	Operating Systems	3.0
or CS 543	Operating Systems	
CS 380	Artificial Intelligence	3.0
or CS 510	Introduction to Artificial Intelligence	
CS 430	Computer Graphics	3.0
or CS 536	Computer Graphics	
CS 431	Advanced Rendering Techniques	3.0
or CS 636	Advanced Computer Graphics	
CS 432	Interactive Computer Graphics	3.0
or CS 637	Interactive Computer Graphics	
CS 435	Computational Photography	3.0
or CS 583	Introduction to Computer Vision	
CS 440	Theory of Computation	3.0
or CS 525	Theory of Computation	
CS 457	Data Structures and Algorithms I	3.0
or CS 521	Data Structures and Algorithms I	
CS 458	Data Structures and Algorithms II	3.0
or CS 522	Data Structures and Algorithms II	
CS 472	Computer Networks: Theory, Applications and Programming	3.0
or CS 544	Computer Networks	
CS 475	Computer and Network Security	3.0
or CS 645	Network Security	
CS 481	Advanced Artificial Intelligence	3.0
or CS 610	Advanced Artificial Intelligence	

Plan of Study

Students in the BS/MS program typically forego their third co-op and take advanced courses during those two terms. The sample plan of study below thus assumes a total of 14 terms completed within a 5-year period.

Term 1		Credits
CI 101	Computing and Informatics Design I	2.0
CS 164	Introduction to Computer Science	3.0
MATH 121	Calculus I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV 101	The Drexel Experience	1.0
Science lab		4.5
Term Credits		17.5
Term 2		
CI 102	Computing and Informatics Design II	2.0
CS 171	Computer Programming I	3.0
MATH 122	Calculus II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
COOP 101	Career Management and Professional Development	0.0
CIVC 101	Introduction to Civic Engagement	1.0
Science lab		4.5
Term Credits		17.5
Term 3		
CI 103	Computing and Informatics Design III	2.0
CS 172	Computer Programming II	3.0
MATH 123	Calculus III	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV 101	The Drexel Experience	1.0
Science lab		4.5
Term Credits		17.5
Term 4		
CS 265	Advanced Programming Tools and Techniques	3.0
CS 270	Mathematical Foundations of Computer Science	3.0
MATH 201	Linear Algebra	4.0
Science elective		3.0
Social Studies elective		3.0
Term Credits		16.0
Term 5		
CS 260	Data Structures	3.0
CS 275	Web and Mobile App Development	3.0
MATH 221	Discrete Mathematics	3.0
Science elective		3.0
Business elective		4.0
Term Credits		16.0
Term 6		
CS 281	Systems Architecture	4.0
CS 350 [WI (p. 171)]	Software Design	3.0
COM 230	Techniques of Speaking	3.0
Science elective		3.0

Arts & Humanities elective	3.0
Term Credits	16.0

Term 7

CS 283	Systems Programming	3.0
CS 360	Programming Language Concepts	3.0
Science elective		3.0
Writing & Communications elective		3.0
Arts & Humanities elective		3.0
Free elective		3.0

Term Credits	18.0
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Term 8

Computer Science electives	6.0	
MATH 410	Scientific Data Analysis I	3.0
or 311	Probability and Statistics I	
PHIL 311	Computer Ethics	3.0
Arts & Humanities elective		3.0
Writing & Communications elective		3.0

Term Credits	18.0
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Term 9

CS 451	Software Engineering	3.0
Computer Science electives		6.0
Mathematics elective		3.0
Science elective		3.0
Arts & Humanities elective		3.0

Term Credits	18.0
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Term 10

Computer Science electives	6.0
Arts & Humanities elective	3.0
Graduate course	3.0
Graduate course	3.0

Term Credits	15.0
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Term 11

Computer Science electives	6.0
Arts & Humanities elective	3.0
Graduate course	3.0
Graduate course	3.0

Term Credits	15.0
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Term 12

CI 491 [WI	Senior Project I	3.0
(p. 171)]		
Graduate course		3.0
Graduate course		3.0
Graduate course		3.0
Graduate course		3.0

Term Credits	15.0
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Term 13

CI 492 [WI	Senior Project II	3.0
(p. 171)]		
Graduate course		3.0
Graduate course		3.0
Graduate course		3.0

Graduate course	3.0
Term Credits	15.0

Term 14

CI 493 [WI	Senior Project III	3.0
(p. 171)]		
Graduate course		3.0
Graduate course		3.0
Graduate course		3.0

Term Credits	12.0
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Total Credit: 226.5

Minor

The computer science minor provides students with a breadth of knowledge in areas that form the foundation of computer science. The student adds some depth by selecting courses from a list of advanced computer science courses.

The Computer Science minor is available to all University students in good standing, with the exception of Computer Science majors.

Prerequisites

One of the following Mathematics sequences must be completed before entering the program:

- MATH 101 and MATH 102
- MATH 121 and MATH 122

Requirements

Select one of the following: 3.0-6.0

CS 171	Computer Programming I	
& CS 172	and Computer Programming II	
CS 175	Computer Programming I-II	

CS 260	Data Structures	3.0
CS 265	Advanced Programming Tools and Techniques	3.0

Additional CS courses numbered 200 or higher. ##Students who take CS 175 should select 5 courses; all other students should select 4 courses. 12.0-15.0

Total Credits	24.0
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Note: No more than 9 credits from a student's major may be used to fulfill the minor requirements. Students who, because of this rule, require additional credits to reach 24 total credits may select additional Advanced Electives as needed.

Computer Science Faculty

Yuan An, PhD (<http://drexel.edu/ccf/contact/Faculty/An-Yuan>) (*University of Toronto, Canada*) Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web

David Augenblick, MS (<http://drexel.edu/ccf/contact/Faculty/Augenblick-David>) (*University of Pennsylvania*) Associate Teaching Professor. Introductory and object-oriented programming, data structures and database systems, computer application project management, application of computer programming principles and solutions to engineering problems

Marcello Balduccini, PhD (<http://drexel.edu/cci/contact/Faculty/Balduccini-Marcello>) (*Texas Tech University*) Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

David Breen, PhD (<http://drexel.edu/cci/contact/Faculty/Breen-David>) (*Rensselaer Polytechnic Institute*) Associate Professor. Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Yuanfang Cai, PhD (<http://drexel.edu/cci/contact/Faculty/Cai-Yuanfang>) (*University of Virginia*) Associate Professor. Formal software design modeling and analysis, software economics, software evolution and modularity

Bruce Char, PhD (<http://drexel.edu/cci/contact/Faculty/Char-Bruce>) (*University of California, Berkeley*) Professor. Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments, parallel and distributed

Andrea Forte, PhD (<http://drexel.edu/cci/contact/Faculty/Forte-Andrea>) (*Georgia Institute of Technology*) Assistant Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy

Christopher Geib, PhD (<http://drexel.edu/cci/contact/Faculty/Geib-Christopher>) (*University of Pennsylvania*) Associate Professor. Decision making and reasoning under conditions of uncertainty, planning, scheduling, constraint, based reasoning, human computer and robot interaction, probabilistic reasoning, computer network security, large scale process control, user interfaces

Rachel Greenstadt, PhD (<http://drexel.edu/cci/contact/Faculty/Greenstadt-Rachel>) (*Harvard University*) Associate Professor. Artificial intelligence, privacy, security, multi-agent systems, economics of electronic privacy and information security

Tony H. Grubestic, PhD (<http://drexel.edu/cci/contact/Faculty/Grubestic-Tony>) (*The Ohio State University*) Professor (Joint appointment in the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Xiaohua Tony Hu, PhD (<http://drexel.edu/cci/contact/Faculty/Hu-Xiaohua-Tony>) (*University of Regina, Canada*) Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics

Jeremy Johnson, PhD (<http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy>) (*Ohio State University*) Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Constantine Katsinis, PhD (<http://drexel.edu/cci/contact/Faculty/Katsinis-Constantine>) (*University of Rhode Island*) Associate Teaching Professor. Computer Security, network security, parallel computer architectures, mobile computing, information assurance, fault tolerant systems, image processing and pattern recognition

Weimao Ke, PhD (<http://drexel.edu/cci/contact/Faculty/Ke-Weimao>) (*University of North Carolina at Chapel Hill*) Assistant Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex

systems, machine learning, text/data mining, multi-agent systems, the notion of information

Geoffrey Mainland, PhD (<http://drexel.edu/cci/contact/Faculty/Mainland-Geoffrey>) (*Harvard University*) Assistant Professor. High-level programming languages and runtime support for non-general purpose computation

Spiros Mancoridis, PhD (<http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros>) (*University of Toronto*) Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

Adelaida Alban Medlock, MS (<http://drexel.edu/cci/contact/Faculty/Medlock-Adelaida-Alban>) (*Drexel University*) Associate Teaching Professor. Introductory programming, computer science education

William Mongan, MS (<http://drexel.edu/cci/contact/Faculty/Mongan-William>) (*Drexel University*) Associate Teaching Professor. Service-oriented architectures, program comprehension, reverse engineering, software engineering, computer architecture, computer science education

Alan T. Murray, PhD (<http://drexel.edu/cci/contact/Faculty/Murray-Alan>) (*University of California, Santa Barbara*) Professor. Geographic information science, urban, regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

Ko Nishino, PhD (<http://drexel.edu/cci/contact/Faculty/Nishino-Ko>) (*University of Tokyo*) Director of Computing Graduate Affairs & Research, Associate Professor. Computer vision, computer graphics, analysis and synthesis of visual appearance

Krzysztof Nowak, PhD (<http://drexel.edu/cci/contact/Faculty/Nowak-Krzysztof>) (*Washington University*) Associate Teaching Professor. Fourier analysis, partial differential equations, image processing, wavelets, asymptotic distribution of eigenvalues, numerical methods and algorithms, computer science education

Santiago Ontañón, PhD (<http://drexel.edu/cci/contact/Faculty/Ontanon-Santiago>) (*University of Barcelona*) Assistant Professor. Game AI, computer games, artificial intelligence, machine learning, case-based reasoning

Jeffrey L. Popyack, PhD (<http://drexel.edu/cci/contact/Faculty/Popyack-Jeffrey>) (*University of Virginia*) Professor. Operations research, stochastic optimization, computational methods for Markov decisions processes, artificial intelligence, computer science education

William Regli, PhD (<http://drexel.edu/cci/contact/Faculty/Regli-William>) (*University of Maryland at College Park*) Professor. Artificial intelligence, computer graphics, engineering design and Internet computing

Jeffrey Salvage, MS (<http://drexel.edu/cci/contact/Faculty/Salvage-Jeffrey>) (*Drexel University*) Associate Teaching Professor. Object-oriented programming, multi-agent systems, software engineering, database theory, introductory programming, data structures

Dario Salvucci, PhD (<http://drexel.edu/cci/contact/Faculty/Salvucci-Dario>) (*Carnegie Mellon University*) Associate Dean for CCI Undergraduate Studies, Professor. Human computer interaction, cognitive science, machine learning, applications for driving

Aleksandra Sarcevic, PhD (<http://drexel.edu/cci/contact/Faculty/Sarcevic-Aleksandra>) (*Rutgers University*) Assistant Professor.

Computer-supported cooperative work, human-computer interaction, healthcare informatics; crisis informatics; social analysis of information & communications technology (ICT)

Kurt Schmidt, MS (<http://drexel.edu/cci/contact/Faculty/Schmidt-Kurt>) (*Drexel University*) Associate Teaching Professor. Data structures, math foundation for computer science, programming tools, programming languages

Ali Shokoufandeh, PhD (<http://drexel.edu/cci/contact/Faculty/Shokoufandeh-Ali>) (*Rutgers University*) Professor. Theory of algorithms, graph theory, combinatorial optimization, computer vision

Erin Solovey, PhD (<http://drexel.edu/cci/contact/Faculty/Solovey-Erin>) (*Tufts University*) Assistant Professor. Human-computer interaction, brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Il-Yeol Song, PhD (<http://drexel.edu/cci/contact/Faculty/Song-Il-Yeol>) (*Louisiana State University*) PhD Program Director, Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration

Julia Stoyanovich, PhD (<http://drexel.edu/cci/contact/Faculty/Stoyanovich-Julia>) (*Columbia University*) Assistant Professor. Data and knowledge management, software development, database management, data-intensive workflow, social context search and ranking, information discovery

Brian Stuart, PhD (<http://drexel.edu/cci/contact/Faculty/Stuart-Brian>) (*Purdue University*) Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics

Filippos Vokolos, PhD (<http://drexel.edu/cci/contact/Faculty/Vokolos-Filippos>) (*Polytechnic University*) Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems

Christopher C. Yang, PhD (<http://drexel.edu/cci/contact/Faculty/Yang-Christopher>) (*University of Arizona, Tucson*) Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Maxwell Young, PhD (<http://drexel.edu/cci/contact/Faculty/Young-Maxwell>) (*University of Waterloo*) Assistant Professor. Algorithms for decentralized networks that yield provable guarantees with respect to fault tolerance and performance.

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Computer Science degree is evaluated relative to the following Objectives and Outcomes.

Computer Science Program Educational Objectives

Drexel Computer Science alumni will:

- a. be valued employees in a wide variety of occupations in industry, government and academia, in particular as computer scientists and software engineers;
- b. succeed in graduate and professional studies, such as engineering, science, law, medicine and business;
- c. pursue life-long learning and professional development to remain current in an ever changing technological world;
- d. provide leadership in their profession, in their communities, and society;
- e. function as responsible members of society with an awareness of the social and ethical ramifications of their work.

Computer Science Student Outcomes (for Bachelor of Science and Bachelor of Arts)

The Drexel Computer Science program enables students to attain, by the time of graduation:

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline
- b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- c. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- d. An ability to function effectively on teams to accomplish a common goal
- e. An understanding of professional, ethical, legal, security and social issues and responsibilities
- f. An ability to communicate effectively with a range of audiences
- g. An ability to analyze the local and global impact of computing on individuals, organizations, and society
- h. Recognition of the need for and an ability to engage in continuing professional development
- i. An ability to use current techniques, skills, and tools necessary for computing practice
- j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- k. An ability to apply design and development principles in the construction of software systems of varying complexity.

Additional Information

The Computer Science BS and BA programs are accredited by the Computing Accreditation Commission (CAC) of ABET, <http://www.abet.org>.

To view the latest BS/BA in Computer Science program enrollment numbers, please click here (<http://drexel.edu/cci/programs/undergraduate-programs/Facts>).

Computing and Security Technology

Major: *Computing and Security Technology*

Degree Awarded: *Bachelor of Science (BS)*

Calendar Type: *Quarter*

Total Credit Hours: *188.0*

Classification of Instructional Programs (CIP) Code: *11.1003*

Standard Occupational Classification (SOC) Code: *15-1122*

About the Program

The College of Computing & Informatics' Bachelor of Science in Computing & Security Technology (BSCST) prepares students for work related to administration and management of large-scale computing infrastructure. Students gain experience with core information technology areas including servers, databases, networking, the Web, and computer security. The program places emphasis on practical education and fundamental concepts that are supplemented by laboratory experience.

The BS in Computing & Security Technology is an online, part-time degree completion program for students who have already earned an associate's degree or have completed approximately two years of college work. Beginning Fall 2016, the BS in Computing & Security Technology will also be offered as a full-time, on-campus bachelor's degree program located at the University City Campus of Drexel University.

The curriculum centers on the application of software and hardware technology to solve real-world problems. Attention is given to maintenance and administration of information systems, with courses covering each of the major components of computer infrastructure: hardware, servers, Linux, Windows, networks, web, security, databases and OO programming.

Students have an opportunity to pursue one of two educational paths: a concentration in Computing Technology (CT) or a concentration in Computing Security (CSEC). Each concentration consists of 96.0 credits. In both concentrations, the curriculum prepares students for a dynamic career in information science.

The BS in Computing & Security Technology is supported by state-of-the-art computer labs in the College of Computing & Informatics' facilities and in a virtual environment. Students learn from instructors selected to provide both leading edge research results and industry experience.

Students who are currently enrolled full-time through the Drexel at Burlington County College (BCC), Delaware County Community College (DCCC), and the Montgomery County Community College (MCCC) programs will be able to complete their Drexel University education on-site at those locations. However, *Drexel will no longer be admitting new students into its on-site degree programs at BCC, DCCC, and MCCC.*

Effective January 1, 2015, *Drexel will no longer be enrolling new students in the Saturday Scholars Program (SS PRG)*, but are continuing to accept students into the online Bachelor of Science Computing and Security Technology program. Current students in the SS PRG will be provided resources to continue their studies out of the program.

Additional Information

Scott J. White, PhD
Associate Clinical Professor
(Tel) 215-895-0910
(Fax) 215-895-0962

sjw@drexel.edu

For more information about this program, please visit the BS in Computing & Security Technology web page (<http://drexel.edu/cci/programs/undergraduate-programs/bs-computing-security>) on the College of Computing & Informatics' website.

Degree Requirements

Students completing this major must select either a concentration in computing technology or a concentration in computing security.

English Requirements

COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Mathematics Requirements

MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0

Natural Science Electives * 9.0

Liberal Studies Electives ** 12.0

Free Electives 47.0

Computing and Security Technology Core Requirements

CT 200	Server I	3.0
CT 320	Server II	3.0
CT 140	Network Administration I	3.0
CT 330	Network Administration II	3.0
CT 350	Network Administration III	3.0
CT 210	Linux I	3.0
CT 310	Linux II	3.0
CT 340	Operating Systems Architecture I	3.0
CT 360	Operating Systems Architecture II	3.0
CT 380	Operating Systems Architecture III	3.0
CT 230	Web Development I	3.0
CT 240	Web Development II	3.0
CT 400	Network Security	3.0
CT 395	Information Technology Security I	3.0
CT 420	Information Technology Security II	3.0
CT 491	Senior Project I	3.0
CT 496	Senior Project II	3.0

Students completing this major must select either a concentration in Computing Technology or a concentration in Computing Security. see below 45.0

Total Credits 185.0

* Students select 9.0 credits from the following subject areas: ANAT, BIO, CHEM, ENVS, FDSC, NFS, PHEV, and PHYS. Courses from other departments may be considered with advisor approval.

** Students must complete 12.0 credits in Liberal Studies covering a range of subject areas in the humanities and/or social sciences: anthropology, psychology, sociology, political science, history, philosophy, literature, economics, communication, music or art.

Concentration in Computing Technology

Computing Technology Concentration Requirements

CT 100	Microcomputer Hardware	3.0
CT 120	Microcomputer Operating System	3.0
CT 220	Database I	3.0
CT 375	Database II	3.0
CT 425	Database III	3.0
CT 370	Object Oriented Systems Analysis	3.0
CT 290	Client Side Programming	3.0
CT 431	Project Management	3.0

Computing Technology Electives

Select three of the following: 9.0

CT 339	Computing and Security Technology Practicum	
CT 385	Web Development III	
CT 390	Server Side Programming	
CT 392	Web Development IV	
CT 405	Enterprise Programming	
CT 410	Linux III	
CT 430	Database IV	
CT 435	Database V	
CT 438	Database VI	

Additional Security Electives

Students select any four (4) Security courses from the list of required Computing Security Concentration Courses or from the list of Computing Security electives. 12.0

Total Credits 45.0

Concentration in Computing Security

Computing Security Concentration Requirements

CT 300	Security Technology Models and Architecture I	3.0
CT 312	Access Control and Intrusion Detection Technology	3.0
CT 315	Security Management Practice	3.0
CT 325	Operating System Security Architecture I	3.0
CT 336	Internet Protocol Security and Virtual Private Network Technology	3.0
CT 393	Information Technology Security Risk Assessment	3.0
CT 402	Network Security II	3.0
CT 412	Information Technology Security Policies	3.0
CT 415	Disaster Recovery and Continuity Planning	3.0
CT 422	Incident Response Best Practices	3.0
CT 432	Information Technology Security Systems Audits	3.0
CT 472	Security Defense Countermeasures	3.0

Computing Security Electives

Select three of the following: 9.0

CT 212	Computer Forensics I: Fundamentals	
CT 214	Computer Forensics II: Forensics and Investigations	
CT 215	Computer Forensics III: Advanced Computer Forensics	

CT 222	Security and Information Warfare	
CT 225	Data Mining Technology for Security	
CT 295	Public Key Infrastructure Technology	
CT 326	Operating System Security Architecture II	
CT 339	Computing and Security Technology Practicum	
CT 355	Wireless Network Security Technology	
CT 362	Network Auditing Tools	
CT 382	Applied Cryptography	
CT 407	Network Security III	
CT 427	E-Commerce and Web Security Technology	

Total Credits 45.0

Concentrations: Sample Plans of Study

Computing Technology Concentration (3rd + 4th year)

Third Year

Fall		Credits
CT 140	Network Administration I	3.0
CT 210	Linux I	3.0
CT 230	Web Development I	3.0
CT 340	Operating Systems Architecture I	3.0
CT 395	Information Technology Security I	3.0
Term Credits		15.0

Winter

CT 240	Web Development II	3.0
CT 310	Linux II	3.0
CT 330	Network Administration II	3.0
CT 360	Operating Systems Architecture II	3.0
CT 420	Information Technology Security II	3.0
Term Credits		15.0

Spring

CT 200	Server I	3.0
CT 350	Network Administration III	3.0
CT 370	Object Oriented Systems Analysis	3.0
CT 380	Operating Systems Architecture III	3.0
CT 400	Network Security	3.0
Term Credits		15.0

Fourth Year

Fall		Credits
CT 220	Database I	3.0
CT 320	Server II	3.0
Computing Technology electives		6.0
Computing Security elective		3.0
Term Credits		15.0

Winter

CT 290	Client Side Programming	3.0
CT 375	Database II	3.0
CT 431	Project Management	3.0
CT 491	Senior Project I	3.0
Computing Security elective		3.0
Term Credits		15.0

Spring		
CT 425	Database III	3.0
CT 496	Senior Project II	3.0
Computing Technology elective		3.0
Computing Security electives		6.0
Term Credits		15.0

Total Credit: 90.0

Computing Security Concentration (3rd + 4th year)

Third Year

Fall		Credits
CT 140	Network Administration I	3.0
CT 210	Linux I	3.0
CT 230	Web Development I	3.0
CT 340	Operating Systems Architecture I	3.0
CT 395	Information Technology Security I	3.0
Term Credits		15.0

Winter

CT 240	Web Development II	3.0
CT 310	Linux II	3.0
CT 330	Network Administration II	3.0
CT 360	Operating Systems Architecture II	3.0
CT 420	Information Technology Security II	3.0
Term Credits		15.0

Spring

CT 200	Server I	3.0
CT 350	Network Administration III	3.0
CT 380	Operating Systems Architecture III	3.0
CT 400	Network Security	3.0
Computing Security elective		3.0
Term Credits		15.0

Fourth Year

Fall		Credits
CT 312	Access Control and Intrusion Detection Technology	3.0
CT 315	Security Management Practice	3.0
CT 320	Server II	3.0
CT 402	Network Security II	3.0
CT 415	Disaster Recovery and Continuity Planning	3.0
Term Credits		15.0

Winter

CT 336	Internet Protocol Security and Virtual Private Network Technology	3.0
CT 393	Information Technology Security Risk Assessment	3.0
CT 412	Information Technology Security Policies	3.0
CT 472	Security Defense Countermeasures	3.0
CT 491	Senior Project I	3.0
Computing Security elective		3.0
Term Credits		18.0

Spring

CT 300	Security Technology Models and Architecture I	3.0
CT 325	Operating System Security Architecture I	3.0

CT 422	Incident Response Best Practices	3.0
CT 432	Information Technology Security Systems Audits	3.0
CT 496	Senior Project II	3.0
Computing Security elective		3.0
Term Credits		18.0

Total Credit: 96.0

Accelerated Degrees

The College of Computing & Informatics offers several Accelerated Degree programs designed to allow students to complete both a bachelor's and a graduate degree along with cooperative educational experience in fewer years than would be typical if pursuing the degrees separately. Students accepted in this program can combine any of the College bachelor's and master's degree programs as well as other options:

- Any CCI BS/any CCI MS Accelerated Degree (BS & MS in five years, including 2 Co-ops)
- Any CCI BS/MBA Accelerated Degree (BS/MBA)
- Any CCI BS/JD Accelerated Degree (BS/JD)

For more information on the criteria for entering this program visit the BS/MS Accelerated Degree (<http://www.drexel.edu/undergrad/academics/accelerated-degrees>) page on Drexel's website.

Career Opportunities

Graduates of the Computing and Security Technology program who complete a concentration in Computing Technology can pursue careers as information technologists and advanced technicians in a wide range of industries. Information technologists are capable of performing multiple IT tasks and accessing various information resources. The program gives students a unique set of applied skills that allow them to fill a number of roles as part of the information systems team. Potential careers include the following:

- Network administrators
- Database administrators
- Database developers
- Web developers
- Security specialists

Graduates with a concentration in Computing Security pursue careers as advanced technicians who operate and administer the security tools, technologists who create and install security solutions, and leaders who define the security policies. Potential careers include the following:

- Security technicians
- Security administrators
- Security analysts
- Security managers
- Chief information security officers

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more information on career opportunities.

Computing and Security Technology Faculty

Marcello Balduccini, PhD (<http://drexel.edu/cci/contact/Faculty/Balduccini-Marcello>) (*Texas Tech University*) Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

Jennifer Booker, PhD (<http://drexel.edu/cci/contact/Faculty/Booker-Jennifer>) (*Drexel University*) Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

Christopher Carroll, MS (<http://drexel.edu/cci/contact/Faculty/Carroll-Chris>) (*Drexel University*) Assistant Teaching Professor. Information security, computer networking and design, IT Infrastructure, server technology, information technology management

Christopher Geib, PhD (<http://drexel.edu/cci/contact/Faculty/Geib-Christopher>) (*University of Pennsylvania*) Associate Professor. Decision making and reasoning under conditions of uncertainty, planning, scheduling, constraint, based reasoning, human computer and robot interaction, probabilistic reasoning, computer network security, large scale process control, user interfaces

Jane Greenberg, PhD (<http://drexel.edu/cci/contact/Faculty/Greenberg-Jane>) (*University of Pittsburgh*) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Rachel Greenstadt, PhD (<http://drexel.edu/cci/contact/Faculty/Greenstadt-Rachel>) (*Harvard University*) Associate Professor. Artificial intelligence, privacy, security, multi-agent systems, economics of electronic privacy and information security

Peter Grillo, PhD (<http://drexel.edu/cci/contact/Faculty/Grillo-Peter>) (*Temple University*) Associate Teaching Professor. Strategic applications of technology within organizations

Gregory W. Hislop, PhD (<http://drexel.edu/cci/contact/Faculty/Hislop-Gregory>) (*Drexel University*) Senior Associate Dean for Informatics and CCI Academic Affairs, Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization

Jeremy Johnson, PhD (<http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy>) (*Ohio State University*) Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Constantine Katsinis, PhD (<http://drexel.edu/cci/contact/Faculty/Katsinis-Constantine>) (*University of Rhode Island*) Associate Teaching Professor. Computer Security, network security, parallel computer architectures, mobile computing, information assurance, fault tolerant systems, image processing and pattern recognition

Weimao Ke, PhD (<http://drexel.edu/cci/contact/Faculty/Ke-Weimao>) (*University of North Carolina at Chapel Hill*) Assistant Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex

systems, machine learning, text/data mining, multi-agent systems, the notion of information

Spiros Mancoridis, PhD (<http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros>) (*University of Toronto*) Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

Scott White, PhD (<http://drexel.edu/cci/contact/Faculty/White-Scott>) (*University of Bristol*) Associate Teaching Professor. Homeland security, terrorism and intelligence analysis, and counter-terrorism & infrastructure protection

Maxwell Young, PhD (<http://drexel.edu/cci/contact/Faculty/Young-Maxwell>) (*University of Waterloo*) Assistant Professor. Algorithms for decentralized networks that yield provable guarantees with respect to fault tolerance and performance

Computer Science

Game Programming and Development Concentration

The concentration in game programming and development provides conceptual understanding of game design and practical experience in the design and the development of games. The courses in this concentration include fundamentals of game design and development, large-scale game development, and special topics in educational and experimental game design.

Game Programming and Development Concentration

Program Requirements

Students in the Game Programming and Development Concentration should follow the below concentration requirements in addition to the core degree requirements for the BS in Computer Science program (p. 172). For any questions regarding your plan of study, please contact your Undergraduate Advisor (<http://drexel.edu/cci/resources/current-students/undergraduate/advising>).

The Game Programming and Development concentration follows the requirements of the B.S. in Computer Science (p. 172) except as noted below.

Computer Science Requirements 58.0-61.0

The following courses must be taken to fulfill the Game Development and Design track:

CS 345	Computer Game Design and Development
or GMAP 345	Game Development Foundations
GMAP 377	Game Development: Workshop I
GMAP 378	Game Development: Workshop II

Computing & Informatics Requirements 15.0

Mathematics Requirements 27.0

Science Requirements 25.0

The sequence below must be taken as the lab science sequence:

PHYS 101	Fundamentals of Physics I
& PHYS 102	and Fundamentals of Physics II
& PHYS 201	and Fundamentals of Physics III

Arts & Humanities Requirements 45.0

The following course must be taken as the Social Studies elective:

PSY 101	General Psychology I	
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The following course must be taken as a Writing & Communications elective:

SCRP 270 [WI (p. 185)]	Screenwriting I	
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The following courses must be taken as Arts & Humanities electives:

GMAP 260	Overview of Computer Gaming	
ANIM 140	Computer Graphics Imagery I	
ANIM 141	Computer Graphics Imagery II	
ANIM 211	Animation I	

University Requirements		3.0
Free Electives		10.5-15.5

The following course must be taken as a free elective:

DIGM 100	Digital Design Tools	
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Total Credits		186.5
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Sample Plan of Study (BS) - Game Programming and Development Concentration

5 YR 5 YR UG Co-op Concentration /Game Programming & Development

Term		Credits
Term 1		
CI 101	Computing and Informatics Design I	2.0
CS 164	Introduction to Computer Science	3.0
MATH 121	Calculus I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PHYS 101	Fundamentals of Physics I	4.0
UNIV CI101	The Drexel Experience	1.0
	Term Credits	17.0
Term 2		
CI 102	Computing and Informatics Design II	2.0
CS 171	Computer Programming I	3.0
MATH 122	Calculus II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHYS 102	Fundamentals of Physics II	4.0
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0
	Term Credits	17.0
Term 3		
CI 103	Computing and Informatics Design III	2.0
CS 172	Computer Programming II	3.0
MATH 123	Calculus III	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHYS 201	Fundamentals of Physics III	4.0
UNIV CI101	The Drexel Experience	1.0
	Term Credits	17.0
Term 4		
CS 265	Advanced Programming Tools and Techniques	3.0

CS 270	Mathematical Foundations of Computer Science	3.0
MATH 201	Linear Algebra	4.0
PSY 101	General Psychology I	3.0
DIGM 100	Digital Design Tools	3.0
	Term Credits	16.0
Term 5		
Science elective		3.0
CS 260	Data Structures	3.0
CS 275	Web and Mobile App Development	3.0
MATH 221	Discrete Mathematics	3.0
ANIM 140	Computer Graphics Imagery I	3.0
	Term Credits	15.0
Term 6		
CS 281	Systems Architecture	4.0
CS 350 [WI (p. 185)]	Software Design	3.0
GMAP 260	Overview of Computer Gaming	3.0
ANIM 141	Computer Graphics Imagery II	3.0
COM 230	Techniques of Speaking	3.0
	Term Credits	16.0
Term 7		
CS 283	Systems Programming	3.0
CS 345	Computer Game Design and Development	3.0
CS 360	Programming Language Concepts	3.0
SCRP 270 [WI (p. 185)]	Screenwriting I	3.0
Science elective		3.0
	Term Credits	15.0
Term 8		
ANIM 211	Animation I	3.0
Mathematics elective		3.0
Computer Science elective		3.0
MATH 410	Scientific Data Analysis I	3.0
PHIL 311	Computer Ethics	3.0
	Term Credits	15.0
Term 9		
Computer Science elective		3.0
Business elective		4.0
Arts & Humanities elective		3.0
CS 451	Software Engineering	3.0
Science elective		3.0
	Term Credits	16.0
Term 10		
CI 491 [WI (p. 185)]	Senior Project I	3.0
GMAP 377	Game Development: Workshop I	3.0
Computer Science elective		3.0
Science elective		3.0
Arts & Humanities elective		3.0
	Term Credits	15.0
Term 11		

CI 492 [WI (p. 185)]	Senior Project II	3.0
GMAP 378	Game Development: Workshop II	3.0
	Computer Science elective	3.0
	Science elective	4.0
	Free elective	3.0

Term Credits **16.0**

Term 12

CI 493 [WI (p. 185)]	Senior Project III	3.0
	Computer Science elective	3.0
	Writing & Communications elective	3.0
	Free elective	2.5

Term Credits **11.5**

Total Credit: 186.5

Data Science

Major: Data Science

Degree Awarded: Bachelor of Science in Data Science (BSDS)

Calendar Type: Quarter

Total Credit Hours: 188.0

Classification of Instructional Programs (CIP) code: 11.0401; 11.0501; 11.0802

Standard Occupational Classification (SOC) code: 15-1121; 15-1141

About the Program

Note: Students will be accepted into this program beginning Fall 2016.

The Bachelor of Data Science (BSDS) prepares students to meet the challenges presented by the explosive growth of very large scale data sources. The availability of data from sources such as social media and scientific instruments creates opportunities and problems not imagined even a few years ago. BS in Data Science students develop the knowledge and skill to address these opportunities for the benefit of individuals and organizations. Students in the degree complete a minor, typically in business or the sciences, to provide knowledge and skill in a specific subject area to which data science techniques can be applied.

Data Science students learn to

- Define information needs of individuals and organizations;
- Select and transform data to increase usefulness for solving particular problems;
- Analyze and synthesize unstructured data to create actionable information;
- Create information visualization for data exploration and presentation;
- Manage very large volume data sources for acquisition through disposal;
- Secure and preserve data in ways consistent with legal and organizational considerations.

The degrees in Computing and Security Technology (p. 182), Data Science, and Information Systems (p. 194) share a common first year. This allows students to easily switch among the degrees early in their studies. In addition, some of the electives in each degree are accessible to students in the other two majors and this provides a deeper and broader set of advanced topics for students in all three majors.

Additional Information

For more information about this program, please visit the BS in Data Science web page (<http://drexel.edu/cci/programs/undergraduate-programs/bs-datascience>) on the College of Computing & Informatics' website.

Degree Requirements

Data Science Requirements

INFO 101	Introduction to Information Technology	3.0
INFO 105	Introduction to Informatics	3.0
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 151	Web Systems and Services I	3.0
INFO 152	Web Systems and Services II	3.0
INFO 153	Applied Data Management	3.0
INFO 154	Software System Construction	3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0
or CS 461	Database Systems	
INFO 215	Social Aspects of Information Systems	3.0
INFO 216	Issues in Information Policy	3.0
INFO 240	Introduction to Data Science	3.0
INFO 250	Information Visualization	3.0
INFO 300	Information Retrieval Systems	3.0
INFO 324	Team Process and Product	3.0
INFO 333	Introduction to Information Security	3.0
INFO 371	Data Mining with Machine Learning	3.0
INFO 440	Social Media Trend Spotting	3.0
INFO electives:	Select 2 INFO courses not otherwise required	6.0
Data Science electives:	Select 2 of the following courses:	6.0
INFO 150	Ubiquitous Information Technologies	
INFO 220	Geographic Information Science	
INFO 310	Human-Computer Interaction II	
INFO 350	Visual Analytics	
INFO 420 [WI (p. 187)]	Software Project Management	
INFO 435	Information Services	

Computing and Informatics Requirements

CI 101	Computing and Informatics Design I	2.0
CI 102	Computing and Informatics Design II	2.0
CI 103	Computing and Informatics Design III	2.0
CI 491 [WI (p. 187)]	Senior Project I	3.0
CI 492 [WI (p. 187)]	Senior Project II	3.0
CI 493 [WI (p. 187)]	Senior Project III	3.0

Mathematics and Statistics Requirements

Select one of the following sequences:		12.0
MATH 101	Introduction to Analysis I	
& MATH 102	and Introduction to Analysis II	
& MATH 180	and Discrete Computational Structures	

MATH 121 & MATH 122 & MATH 180	Calculus I and Calculus II and Discrete Computational Structures	
STAT 201	Introduction to Business Statistics	4.0
STAT 202	Business Statistics II	4.0
Natural Science Requirements		
Science electives: Select from ANAT, BIO, CHEM, ENVS, FDSC, NFS, PHEV, PHYS. Courses from other departments may be considered with advisor approval.		8.0
Behavioral and Social Science Requirements		
PSY 101	General Psychology I	3.0
PSY 330	Cognitive Psychology	3.0
Arts and Humanities Requirements		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230 or COM 310	Techniques of Speaking Technical Communication	3.0
University and College Requirements		
UNIV CI101 or CI 120	The Drexel Experience CCI Transfer Student Seminar	2.0
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0
Minor Requirements ¹		24.0
Free Electives		31.0
Total Credits		188.0

¹ Students should consult their academic advisor regarding a minor that requires more than 24.0 credits.

Sample Plan of Study

	Credits
Term 1	
CI 101	2.0
ENGL 101	3.0
INFO 101	3.0
INFO 108	3.0
MATH 101 or 121	4.0
UNIV CI101	1.0
Term Credits	16.0
Term 2	
CI 102	2.0
CIVC 101	1.0
ENGL 102	3.0
INFO 105	3.0
INFO 151	3.0
MATH 102 or 122	4.0

COOP 101	Career Management and Professional Development	0.0
Term Credits		16.0
Term 3		
CI 103	Computing and Informatics Design III	2.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 152	Web Systems and Services II	3.0
MATH 180	Discrete Computational Structures	4.0
UNIV CI101	The Drexel Experience	1.0
COOP 101	Career Management and Professional Development	0.0
Term Credits		16.0
Term 4		
INFO 153	Applied Data Management	3.0
INFO 200	Systems Analysis I	3.0
INFO 333	Introduction to Information Security	3.0
PSY 101	General Psychology I	3.0
Free Elective		3.0
Term Credits		15.0
Term 5		
INFO 210	Database Management Systems	3.0
INFO 216	Issues in Information Policy	3.0
INFO 240	Introduction to Data Science	3.0
INFO 300	Information Retrieval Systems	3.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		16.0
Term 6		
COM 230 or 310 [WI (p. 187)]	Techniques of Speaking Technical Communication	3.0
INFO 215	Social Aspects of Information Systems	3.0
INFO 250	Information Visualization	3.0
INFO Elective		3.0
STAT 202	Business Statistics II	4.0
Term Credits		16.0
Term 7		
INFO 440	Social Media Trend Spotting	3.0
PSY 330	Cognitive Psychology	3.0
Data Science Elective		3.0
Free Elective		3.0
Minor Course		3.0
Term Credits		15.0
Term 8		
INFO 371	Data Mining with Machine Learning	3.0
INFO 324	Team Process and Product	3.0
Free elective		3.0
Minor course		3.0
Science sequence		4.0
Term Credits		16.0
Term 9		
INFO elective		3.0

Data Science Elective		3.0
Free elective		3.0
Minor course		3.0
Science sequence		4.0
Term Credits		16.0
Term 10		
CI 491 [WI Senior Project I (p. 187)]		3.0
Free electives		7.0
Minor courses		6.0
Term Credits		16.0
Term 11		
CI 492 [WI Senior Project II (p. 187)]		3.0
INFO elective		3.0
Free elective		3.0
Minor courses		6.0
Term Credits		15.0
Term 12		
CI 493 [WI Senior Project III (p. 187)]		3.0
Free electives		9.0
Minor course		3.0
Term Credits		15.0
Total Credit: 188.0		

Accelerated Degrees

The College of Computing & Informatics offers several Accelerated Degree programs designed to allow students to complete both a bachelor's degree and a graduate degree along with cooperative educational experience in fewer years than would be typical if pursuing the degrees separately. Students accepted in this program can combine any of the College bachelor's and master's degree programs as well as other options.

- Any CCI BS/any CCI MS Accelerated Degree (BS & MS in five years, including 2 Co-ops)
- Any CCI BS/MBA Accelerated Degree (BS/MBA)
- Any CCI BS/JD Accelerated Degree (BS/JD)

For more information on the criteria for entering this program, visit the BS/MS Accelerated Degree (<http://www.drexel.edu/undergrad/academics/accelerated-degrees>) page on Drexel's website.

Co-op/Career Opportunities

Co-Op Options

Three co-op options are available for this program:

- 5-year/3 co-op
- 4-year/1 co-op
- Accelerated Degree (BS & MS): 5-year/2 co-op

Career Opportunities

The new data science major provides valuable skills that can be transported to a number of job settings. The demand for graduates with

data science knowledge is strong, and employers often want evidence of additional communication and problem-solving skills that can be applicable to specific disciplines. Data science program graduates could potentially serve as key members of organizational data science teams able to create novel information products, with an emphasis on solving problems that can only be addressed using large and disparate data sources. The program is also an excellent preparation for graduate study in data science.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Data Science degree is evaluated relative to the following Objectives and Outcomes.

BS Data Science Program Educational Objectives

Within three to five years of graduation, alumni of the program are expected to achieve one or more of the following milestones:

- Be valued contributors to private or public organizations as demonstrated by promotions, increased responsibility, or other professional recognition
- Contribute to professional knowledge as demonstrated by published papers, technical reports, patents, or conference presentations
- Succeed in continuing professional development as demonstrated by completion of graduate studies or professional certifications
- Display commitment and leadership within the professional and community as demonstrated by contributions towards society's greater good and prosperity.

BS Data Science Program Student Outcomes

The program enables students to attain, by the time of graduation

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An understanding of professional, ethical, legal, security and social issues
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations, and society
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practice

Minor in Data Science

Data Science provides a foundation for problem-solving in a data-driven society. The minor in Data Science combined basic courses in statistics,

information and technology and social contexts to address problems that require large and disparate datasets.

Any student in any major can benefit from a minor in data science. Graduates with such background knowledge are prepared to actively participate in the application of data science within their major area of study.

The minor is available to all University students in good standing, with the exception of students majoring in data science.

STAT 201	Introduction to Business Statistics	4.0
STAT 202	Business Statistics II	4.0
INFO 240	Introduction to Data Science	3.0
INFO 371	Data Mining with Machine Learning	3.0
INFO 440	Social Media Trend Spotting	3.0
Select 3 of the following:		9.0
INFO 150	Ubiquitous Information Technologies	
INFO 220	Geographic Information Science	
INFO 250	Information Visualization	
INFO 350	Visual Analytics	
INFO 435	Information Services	
CS 461	Database Systems	
or INFO 210	Database Management Systems	
Total Credits		26.0

Informatics

Major: Informatics

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 188.0-189.0

Classification of Instructional Programs (CIP) code: 11.1014

Standard Occupational Classification (SOC) code: 15-1132; 15-1133

About the Program

Note: Effective Fall 2016, students will no longer be accepted into this program. Students are encouraged to apply for the BS in Data Science (p. 187) program, which encompasses the content of the BS in Informatics program while adding additional coverage in computational techniques.

The College of Computing & Informatics' Bachelor of Science in Informatics (BSI) prepares students to extract and present valuable information from massive data sets. The volume of data from sources such as social media and scientific measurement continues to grow at high rates, and organizations are creating teams of technical experts who can deal with this deluge of data. BSI students develop the knowledge and skill to work on these problems in data science.

Informatics students learn to

- define information needs of individuals and organizations;
- select and transform data to increase usefulness for solving particular problems;
- analyze and synthesize unstructured data to create actionable information;
- create information visualizations for data exploration and presentation;

- manage very large volume data sources from acquisition through disposal;
- secure, preserve, and control access to data in a manner consistent with legal and organizational considerations.

The informatics curriculum focuses on the key components of informatics: people, information, and technology. The degree encompasses a broad range of topics related to the data life cycle from creation to presentation. To link the degree program to real work problems, students will be required to align themselves with a discipline through the identification of a minor.

Degree Requirements

Note: Effective Fall 2016, students are no longer being accepted into this program

Informatics Requirements

INFO 101	Introduction to Information Technology	3.0
INFO 105	Introduction to Informatics	3.0
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 151	Web Systems and Services I	3.0
INFO 152	Web Systems and Services II	3.0
INFO 153	Applied Data Management	3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0
INFO 215	Social Aspects of Information Systems	3.0
INFO 216	Issues in Information Policy	3.0
INFO 240	Introduction to Data Science	3.0
INFO 250	Information Visualization	3.0
INFO 300	Information Retrieval Systems	3.0
INFO 324	Team Process and Product	3.0
INFO 333	Introduction to Information Security	3.0
INFO 371	Data Mining with Machine Learning	3.0
INFO 440	Social Media Trend Spotting	3.0

Select two of the following: 6.0

INFO 150	Ubiquitous Information Technologies	
INFO 220	Geographic Information Science	
INFO 310	Human-Computer Interaction II	
INFO 350	Visual Analytics	
INFO 420 [WI (p. 190)]	Software Project Management	
INFO 435	Information Services	

INFO elective * 3.0

Computing and Informatics Requirements

CI 101	Computing and Informatics Design I	2.0
CI 102	Computing and Informatics Design II	2.0
CI 103	Computing and Informatics Design III	2.0
CI 491 [WI (p. 190)]	Senior Project I	3.0
CI 492 [WI (p. 190)]	Senior Project II	3.0
CI 493 [WI (p. 190)]	Senior Project III	3.0

Mathematics and Statistics Requirements

Select one of the following course sequences: 12.0

- MATH 101 Introduction to Analysis I
& MATH 102 and Introduction to Analysis II
& MATH 180 and Discrete Computational Structures
- MATH 121 Calculus I
& MATH 122 and Calculus II
& MATH 180 and Discrete Computational Structures

STAT 201 Introduction to Business Statistics 4.0

STAT 202 Business Statistics II 4.0

Natural Science Sequence

Select one of the following course sequences: 8.0-9.0

- CHEM 101 General Chemistry I
& CHEM 102 and General Chemistry II

- CHEM 111 General Chemistry I
& CHEM 112 and General Chemistry II

- BIO 107 Cells, Genetics & Physiology
& BIO 108 and Cells, Genetics and Physiology Laboratory
& BIO 109 and Biological Diversity, Ecology & Evolution
& BIO 110 and Biological Diversity, Ecology and Evolution Laboratory

- PHYS 101 Fundamentals of Physics I
& PHYS 102 and Fundamentals of Physics II

- PHYS 103 General Physics I
& PHYS 104 and General Physics II

- PHEV 145 Weather I: Climate and Global Change
& PHEV 146 and Weather II: Analysis and Forecasting

- BIO 100 Applied Cells, Genetics & Physiology
& CHEM 151 and Applied Chemistry
& PHYS 151 and Applied Physics

Behavioral and Social Science Requirements

PSY 101 General Psychology I 3.0

PSY 330 Cognitive Psychology 3.0

SOC 250 Research Methods I 3.0

Arts and Humanities Requirements

ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research 3.0

ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0

ENGL 103 Composition and Rhetoric III: Themes and Genres 3.0

COM 230 Techniques of Speaking 3.0

or COM 310 Technical Communication

PHIL 105 Critical Reasoning 3.0

PHIL 311 Computer Ethics 3.0

University and College Requirements

UNIV CI101 The Drexel Experience 2.0
or CI 120 CCI Transfer Student Seminar

or INFO 120 IST Seminar for Transfer Students

CIVC 101 Introduction to Civic Engagement 1.0

COOP 101 Career Management and Professional Development 0.0

Minor Requirements ** 24.0

Free Electives 28.0

Total Credits 188.0-189.0

* Choose any 3 INFO courses that are not otherwise required

** Students should consult their academic advisor regarding a minor that requires more than 24.0 credits

Sample Plan of Study

Term	Courses	Credits
Term 1		
	CI 101 Computing and Informatics Design I	2.0
	INFO 101 Introduction to Information Technology	3.0
	INFO 108 Foundations of Software	3.0
	MATH 101 Introduction to Analysis I or 121 Calculus I	4.0
	ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
	UNIV I101	1.0
	Term Credits	16.0
Term 2		
	CI 102 Computing and Informatics Design II	2.0
	INFO 105 Introduction to Informatics	3.0
	INFO 151 Web Systems and Services I	3.0
	MATH 102 Introduction to Analysis II or 122 Calculus II	4.0
	ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
	CIVC 101 Introduction to Civic Engagement	1.0
	COOP 101*** Career Management and Professional Development	0.0
	Term Credits	16.0
Term 3		
	CI 103 Computing and Informatics Design III	2.0
	INFO 110 Human-Computer Interaction I	3.0
	INFO 152 Web Systems and Services II	3.0
	MATH 180 Discrete Computational Structures	4.0
	ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
	UNIV I101	1.0
	Term Credits	16.0
Term 4		
	INFO 153 Applied Data Management	3.0
	INFO 200 Systems Analysis I	3.0
	INFO 333 Introduction to Information Security	3.0
	SOC 250 Research Methods I	3.0
	PSY 101 General Psychology I	3.0
	Term Credits	15.0
Term 5		
	INFO 210 Database Management Systems	3.0
	INFO 216 Issues in Information Policy	3.0
	INFO 240 Introduction to Data Science	3.0
	INFO 300 Information Retrieval Systems	3.0
	STAT 201 Introduction to Business Statistics	4.0
	Term Credits	16.0
Term 6		
	INFO 215 Social Aspects of Information Systems	3.0
	INFO 250 Information Visualization	3.0
	STAT 202 Business Statistics II	4.0

PHIL 105	Critical Reasoning	3.0
COM 230	Techniques of Speaking	3.0
Term Credits		16.0

Term 7

INFO 440	Social Media Trend Spotting	3.0
PSY 330	Cognitive Psychology	3.0
PHIL 311	Computer Ethics	3.0
Minor course		3.0
Free elective		3.0
Term Credits		15.0

Term 8

INFO 324	Team Process and Product	3.0
INFO 371	Data Mining with Machine Learning	3.0
Minor course		3.0
Science sequence		4.0
Free elective		3.0
Term Credits		16.0

Term 9

Free elective		3.0
INFO electives		6.0
Minor course		3.0
Science sequence		4.0
Term Credits		16.0

Term 10

CI 491 [WI (p. 190)]	Senior Project I	3.0
Minor courses		6.0
Free electives		7.0
Term Credits		16.0

Term 11

CI 492 [WI (p. 190)]	Senior Project II	3.0
INFO elective		3.0
Minor courses		6.0
Free elective		3.0
Term Credits		15.0

Term 12

CI 493 [WI (p. 190)]	Senior Project III	3.0
Minor course		3.0
Free electives		9.0
Term Credits		15.0

Total Credit: 188.0

*** COOP 101 is taken either winter or spring depending on co-op cycle.
Please consult your advisor for additional information.

Co-op/Career Opportunities

Co-Op Options

Two co-op options are available for this program:

- 5-year/3 co-op
- 4-year/1 co-op

- Accelerated Degree (BS & MS): 5-year/2 co-op

Career Opportunities

The new informatics major provides valuable skills that can be transported to a number of job settings. The demand for graduates with informatics knowledge is strong, and employers often want evidence of additional communication and problem-solving skills that can be applicable to specific disciplines. The program is also an excellent preparation for graduate study.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Accelerated Degrees

The College of Computing & Informatics offers several Accelerated Degree programs designed to allow students to complete both a bachelor's degree and a graduate degree along with cooperative educational experience in fewer years than would be typical if pursuing the degrees separately. Students accepted in this program can combine any of the College's bachelor's and master's degree programs as well as other options:

- Any CCI BS/any CCI MS Accelerated Degree (BS & MS in five years, including 2 Co-ops)
- Any CCI BS/MBA Accelerated Degree (BS/MBA)
- Any CCI BS/JD Accelerated Degree (BS/JD)

For more information on the criteria for entering this program, visit the BS/MS Accelerated Degree (<http://www.drexel.edu/undergrad/academics/accelerated-degrees>) page on Drexel's website.

Minor in Informatics

Note: Effective Fall Term 2015, students are no longer being accepted into this program.

Informatics is the science of information, the practice of information processing, and the engineering of information systems. The minor in informatics combines basic courses in information systems and technology with courses that address the cognitive issues and social contexts in which information systems and technologies are embedded.

Any student in any major can benefit from a minor in informatics. Graduates with such background knowledge are prepared to actively participate in the application of information technology within their major area of study.

The minor is available to all University students in good standing, with the exception of students majoring in informatics, information systems, or information technology.

Required Courses

INFO 101	Introduction to Information Technology	3.0
INFO 105	Introduction to Informatics	3.0
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 210	Database Management Systems	3.0
INFO 215	Social Aspects of Information Systems	3.0
Select two from the following list:		6.0
INFO 216	Issues in Information Policy	

INFO 220	Geographic Information Science
INFO 240	Introduction to Data Science
INFO 250	Information Visualization
INFO 440	Social Media Trend Spotting

Total Credits **24.0**

Informatics Faculty

Larry Alexander, PhD (<http://drexel.edu/cci/contact/Faculty/Alexander-Larry>) (*University of Pennsylvania*) Research Professor & Interim Senior Associate Dean for CCI Research and Scholarly Activities. Large scale modeling and simulation, pattern recognition, future of information technology

Yuan An, PhD (<http://drexel.edu/cci/contact/Faculty/An-Yuan>) (*University of Toronto, Canada*) Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web

Marcello Balduccini, PhD (<http://drexel.edu/cci/contact/Faculty/Balduccini-Marcello>) (*Texas Tech University*) Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

Ellen Bass, PhD (<http://drexel.edu/cci/contact/Faculty/Bass-Ellen>) (*Georgia Institute of Technology*) Professor (Joint Appointment with the College of Nursing and Health Professions). Human-centered systems engineering research and design, biomedical informatics, healthcare, quantitative modeling, human-automation interaction, computational modeling

Jennifer Booker, PhD (<http://drexel.edu/cci/contact/Faculty/Booker-Jennifer>) (*Drexel University*) Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

David Breen, PhD (<http://drexel.edu/cci/contact/Faculty/Breen-David>) (*Rensselaer Polytechnic Institute*) Associate Professor. Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Chaomei Chen, PhD (<http://drexel.edu/cci/contact/Faculty/Chen-Chaomei>) (*University of Liverpool*) Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction

Prudence W. Dalrymple, PhD (<http://drexel.edu/cci/contact/Faculty/Dalrymple-Prudence>) (*University of Wisconsin-Madison*) Director, Institute for Healthcare Informatics, Research and Teaching Professor. User-centered information behaviors, particularly in the health arena, health informatics, evidence based practice, education for the information professions and evaluation, and translation of research into practice

M. Carl Drott, PhD (<http://drexel.edu/cci/contact/Faculty/Drott-Carl>) (*University of Michigan*) Associate Professor. Systems analysis techniques, Web usage, competitive intelligence

Andrea Forte, PhD (<http://drexel.edu/cci/contact/Faculty/Forte-Andrea>) (*Georgia Institute of Technology*) Assistant Professor. Social computing,

human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy

Susan Gasson, PhD (<http://drexel.edu/cci/contact/Faculty/Gasson-Susan>) (*University of Warwick*) Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, Grounded Theory

Jane Greenberg, PhD (<http://drexel.edu/cci/contact/Faculty/Greenberg-Jane>) (*University of Pittsburgh*) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Peter Grillo, PhD (<http://drexel.edu/cci/contact/Faculty/Grillo-Peter>) (*Temple University*) Associate Teaching Professor. Strategic applications of technology within organizations

Tony H. Grubestic, PhD (<http://drexel.edu/cci/contact/Faculty/Grubestic-Tony>) (The Ohio State University) Professor (Joint appointment in the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Xiaohua Tony Hu, PhD (<http://drexel.edu/cci/contact/Faculty/Hu-Xiaohua-Tony>) (*University of Regina, Canada*) Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics

Michael Khoo, PhD (<http://drexel.edu/cci/contact/Faculty/Khoo-Michael>) (*University of Colorado at Boulder*) Assistant Professor. The understandings and practices that users bring to their interactions with information systems, with a focus on the evaluation of digital libraries and educational technologies

Xia Lin, PhD (<http://drexel.edu/cci/contact/Faculty/Lin-Xia>) (*University of Maryland*) Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, object-oriented programming, information retrieval, information architecture, information-seeking behaviors in digital environments

Alan T. Murray, PhD (<http://drexel.edu/cci/contact/Faculty/Murray-Alan>) (*University of California, Santa Barbara*) Professor. Geographic information science, urban, regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

William Regli, PhD (<http://drexel.edu/cci/contact/Faculty/Regli-William>) (*University of Maryland at College Park*) Professor. Artificial intelligence, computer graphics, engineering design and Internet computing

Lorraine Richards, PhD (<http://drexel.edu/cci/contact/Faculty/Richards-Lorraine>) (*University of North Carolina*) Assistant Professor. Archives, digital curation, electronic records management, information technology and digital collections, cloud computing and record keeping, management of information organizations

Michelle L. Rogers, PhD (<http://drexel.edu/cci/contact/Faculty/Rogers-Michelle>) (*University of Wisconsin-Madison*) Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety

Erin Solovey, PhD (<http://drexel.edu/cci/contact/Faculty/Solovey-Erin>) (*Tufts University*) Assistant Professor. Human-computer interaction,

brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Il-Yeol Song, PhD (<http://drexel.edu/cc/contact/Faculty/Song-Il-Yeol>) (*Louisiana State University*) PhD Program Director, Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration

Julia Stoyanovich, PhD (<http://drexel.edu/cc/contact/Faculty/Stoyanovich-Julia>) (*Columbia University*) Assistant Professor. Data and knowledge management, software development, database management, data-intensive workflow, social context search and ranking, information discovery

Rosina Weber, PhD (<http://drexel.edu/cc/contact/Faculty/Weber-Rosina>) (*Federal University of Santa Catarina*) Associate Professor. Knowledge-based systems; case-based reasoning; textual case-based reasoning; computational intelligence; knowledge discovery; uncertainty, mainly targeting knowledge management goals in different domains, e.g., software engineering, military, finance, law, bioinformatics and health sciences

Erija Yan, PhD (<http://drexel.edu/cc/contact/Faculty/Yan-Erija>) (*Indiana University*) Assistant Professor. Network Science, Information Analysis and Retrieval, Scholarly Communication Methods and Applications

Christopher C. Yang, PhD (<http://drexel.edu/cc/contact/Faculty/Yang-Christopher>) (*University of Arizona, Tucson*) Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Informatics degree is evaluated relative to the following Outcomes and Objectives.

Program Educational Objectives

Within three to five years of graduating, alumni of the program are expected to achieve one or more of the following milestones:

- Be a valued contributor to private or public organizations as demonstrated by promotions, increased responsibility, or other professional recognition
- Contribute to professional knowledge as demonstrated by published papers, technical reports, patents, or conference presentations
- Succeed in continuing professional development as demonstrated by completion of graduate studies or professional certifications
- Demonstrate commitment and leadership within their profession and community as demonstrated by professional and community activity or contributions towards society's greater good and prosperity

Student Outcomes

The program enables students to achieve, by the time of graduation:

- An ability to analyze a problem or information needs (of users or organizations) and identify and define the data needed to support decision making to resolve the problem or need.

- An ability to discover, create, evaluate and synthesize reliable data from large disparate sources of unstructured and messy data that occur in a variety of formats.
- An ability to transform large data sets through analysis into actionable information that individuals and organizations need.
- An ability to present data tailored to the information needs of different stakeholder groups using a variety of appropriate visualization techniques.
- An ability to secure, retain, and preserve data and information using the latest techniques and in accordance with data life cycle management practices and current information policies at the organizational, local, national and global levels.
- An ability to assess the value as well as legal and regulatory implications of using data and information for organizations, individuals, and society.

Information Systems

Major: Information Systems

Degree Awarded: Bachelor of Science Degree (BS)

Calendar Type: Quarter

Total Credit Hours: 188.0

Classification of Instructional Programs (CIP) code: 11.0401

Standard Occupational Classification (SOC) code: 11-3021

About the Program

The College of Computing & Informatics' Bachelor of Science in Information Systems (BSIS) prepares students to apply information technology for the benefit of individuals and organizations. Students develop the skills and knowledge to design, develop, and manage leading-edge information systems. Since many Information Systems students choose careers in business organizations, a minor in business is built in to the degree requirements.

The Information Systems curriculum prepares students for a wide range of information technology applications. Students learn how to determine client needs, design appropriate solutions, specify data architectures, and improve usability of systems.

The core courses in the program address topics including fundamentals of programming, system design, database management systems, networking, security and privacy, and social implications of information technology. These courses provide a foundation for more advanced courses in technical areas of interest to each student. The technical courses are supplemented by course in business, behavioral sciences, natural science, mathematics, and humanities to provide balance and useful supplemental materials for information systems careers.

The degrees in Computing and Security Technology (p. 182), Data Science (p. 187), and Information Systems share a common first year. This allows students to easily switch among the degrees early in their studies. In addition, some of the electives in each degree are accessible to students in the other two majors and this provides a deeper and broader set of advanced topics for students in all three majors.

Additional Information

For more information about this program, please visit the BS in Information Systems web page (<http://drexel.edu/cc/programs/>)

undergraduate-programs/bs-information-systems) on the College of Computing & Informatics' website.

Degree Requirements

Information Systems Requirements

INFO 101	Introduction to Information Technology	3.0
INFO 105	Introduction to Informatics	3.0
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 151	Web Systems and Services I	3.0
INFO 152	Web Systems and Services II	3.0
INFO 153	Applied Data Management	3.0
INFO 154	Software System Construction	3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0
INFO 215	Social Aspects of Information Systems	3.0
INFO 324	Team Process and Product	3.0
INFO 330	Computer Networking Technology I	4.0
INFO 333	Introduction to Information Security	3.0
INFO 355	Systems Analysis II	3.0
INFO 420 [WI (p. 194)]	Software Project Management	3.0
Information Systems Electives *		13.0

Computing and Informatics Requirements

CI 101	Computing and Informatics Design I	2.0
CI 102	Computing and Informatics Design II	2.0
CI 103	Computing and Informatics Design III	2.0
CI 491 [WI (p. 194)]	Senior Project I	3.0
CI 492 [WI (p. 194)]	Senior Project II	3.0
CI 493 [WI (p. 194)]	Senior Project III	3.0

Mathematics Requirements

Select one of the following sequences:		12.0
MATH 101 & MATH 102 & MATH 180	Introduction to Analysis I and Introduction to Analysis II and Discrete Computational Structures	
MATH 121 & MATH 122 & MATH 180	Calculus I and Calculus II and Discrete Computational Structures	

Natural Science Sequence

Select one of the following sequences:		8.0-9.0 *
CHEM 101 & CHEM 102	General Chemistry I and General Chemistry II	
CHEM 111 & CHEM 112	General Chemistry I and General Chemistry II	
PHYS 103 & PHYS 104	General Physics I and General Physics II	
PHYS 101 & PHYS 102	Fundamentals of Physics I and Fundamentals of Physics II	

BIO 107 & BIO 108 & BIO 109 & BIO 110	Cells, Genetics & Physiology and Cells, Genetics and Physiology Laboratory and Biological Diversity, Ecology & Evolution and Biological Diversity, Ecology and Evolution Laboratory	
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BIO 122 & BIO 124 & BIO 126	Cells and Genetics and Evolution & Organismal Diversity and Physiology and Ecology	
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PHEV 145 & PHEV 146	Weather I: Climate and Global Change and Weather II: Analysis and Forecasting	
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BIO 100 & CHEM 151 & PHYS 151	Applied Cells, Genetics & Physiology and Applied Chemistry and Applied Physics **	
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Behavioral Science Requirements

PSY 101	General Psychology I	3.0
PSY 330	Cognitive Psychology	3.0
SOC 101 or ANTH 101	Introduction to Sociology and Introduction to Cultural Diversity	3.0
SOC 250	Research Methods I	3.0
SOC 350	Research Methods II	3.0
Behavioral Science Electives †		6.0

Arts/Humanities Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 105	Critical Reasoning	3.0
PHIL 111	Symbolic Logic 1	3.0
COM 230	Techniques of Speaking	3.0
COM 310 [WI (p. 194)]	Technical Communication	3.0
Arts/Humanities elective **		3.0

University and College Requirements

CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0

Business Minor Requirements (See Minor Requirements below)

Students not selecting a business minor are still required to take STAT 201.

Free Electives 9.0-20.0

Total Credits 188.0

* Any non-required INFO course

** Any non-required course in COM, HIST, ENGL, GREC, PHIL, PSCI, ARTH, FMVD, VSST, and WRIT or any foreign language course.

† Any non-required course offered by the AFAS, ANTH, PSY, SOC or WMST departments.

Business Minor Requirement

In addition to taking STAT 201 (p. 212), students complete the requirements for one of the following business minors. *Please note:* MIS classes do not count towards the Business Administration Minor for

Information Systems students. Students must choose another option to fulfill the Business Administration Minor requirements.

- Accounting (p. 333)
- Business Administration
- Economics
- Entrepreneurship
- Finance
- International Economics (p. 389)
- Legal Studies (p. 355)
- Marketing (p. 361)
- Operations & Supply Chain Management (p. 365)

Sample Plan of Study

5 YR UG Co-op Concentration

Term 1		Credits
CI 101	Computing and Informatics Design I	2.0
INFO 101	Introduction to Information Technology	3.0
INFO 108	Foundations of Software	3.0
MATH 121 or 101	Calculus I Introduction to Analysis I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV CI101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		Credits
CI 102	Computing and Informatics Design II	2.0
INFO 105	Introduction to Informatics	3.0
INFO 151	Web Systems and Services I	3.0
MATH 122 or 102	Calculus II Introduction to Analysis II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101**	Career Management and Professional Development	0.0
Term Credits		16.0
Term 3		Credits
CI 103	Computing and Informatics Design III	2.0
INFO 110	Human-Computer Interaction I	3.0
INFO 152	Web Systems and Services II	3.0
MATH 180	Discrete Computational Structures	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV CI101	The Drexel Experience	1.0
Term Credits		16.0
Term 4		Credits
INFO 153	Applied Data Management	3.0
INFO 200	Systems Analysis I	3.0
INFO 333	Introduction to Information Security	3.0
SOC 250	Research Methods I	3.0
SOC 101 or ANTH 101	Introduction to Sociology Introduction to Cultural Diversity	3.0
Term Credits		15.0

Term 5		Credits
INFO 154	Software System Construction	3.0
INFO 210	Database Management Systems	3.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
SOC 350	Research Methods II	3.0
Term Credits		15.0
Term 6		Credits
INFO 324	Team Process and Product	3.0
INFO 355	Systems Analysis II	3.0
PHIL 111	Symbolic Logic 1	3.0
COM 230	Techniques of Speaking	3.0
Business Elective		4.0
Term Credits		16.0
Term 7		Credits
INFO 215	Social Aspects of Information Systems	3.0
INFO 330	Computer Networking Technology I	4.0
PSY 330	Cognitive Psychology	3.0
Information Systems (INFO) Elective		3.0
Business Elective		4.0
Term Credits		17.0
Term 8		Credits
COM 310 [WI (p. 194)]	Technical Communication	3.0
STAT 201	Introduction to Business Statistics	4.0
Free Elective		3.0
Information Systems (INFO) Elective		3.0
Science Sequence Course 1*		4.0
Term Credits		17.0
Term 9		Credits
Information Systems (INFO) Elective		4.0
Science Sequence Course 2*		4.0
Business Electives		8.0
Term Credits		16.0
Term 10		Credits
CI 491 [WI (p. 194)]	Senior Project I	3.0
INFO 420 [WI (p. 194)]	Software Project Management	3.0
Information Systems (INFO) Elective		3.0
Business Elective		4.0
Behavioral Science Elective		3.0
Term Credits		16.0
Term 11		Credits
INFO elective		3.0
CI 492 [WI (p. 194)]	Senior Project II	3.0
Behavioral Science Elective		3.0
Business Elective		4.0
Free Elective		3.0
Term Credits		16.0
Term 12		Credits

CI 493 [WI Senior Project III (p. 194)]	3.0
Arts and Humanities Elective	3.0
Free Electives	6.0
Term Credits	12.0

Total Credit: 188.0

* See degree requirements (p. 195).

** COOP 101 is taken either winter or spring depending on co-op cycle.
Please consult your advisor for additional information.

Co-op/Career Opportunities

Co-Op Options

Three co-op options are available for this program:

- 5-year/3 co-op
- 4-year/1 co-op
- Accelerated Degree (BS & MS): 5-year/2 co-op

The following list is a sample of recent co-op job titles and employers:

- *Applications Architect*, Aetna
- *e-Communications Intern*, Airgas
- *PC Network Support*, Aramark
- *Information Systems Intern*, Campbell's Soup
- *Distributed WAN Support Co-op*, Cigna
- *Network Services*, GlaxoSmithKline
- *Programmer/Analyst*, Independence Blue Cross
- *Information Management Co-op*, Johnson & Johnson
- *Database Developer*, Princeton Plasma Physics
- *Website Developer*, QVC
- *Shared Services Co-op*, Wyeth

Career Opportunities

The demand for information systems professionals is strong. Graduates find careers in a number of areas, including designing information systems, leading project teams, planning, developing, and marketing information systems. Most information systems students enter the professional world right after graduation, but some continue their studies in advanced information technology programs.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Accelerated Degrees

The College of Computing & Informatics offers several Accelerated Degree programs designed to allow students to complete both a bachelor's degree and a graduate degree along with cooperative educational experience in fewer years than would be typical if pursuing the degrees separately.

Students accepted in this program can combine any of the College's bachelor's and master's degree programs as well as other options:

- Any CCI BS/any CCI MS Accelerated Degree (BS & MS in five years, including 2 Co-ops)

- Any CCI BS/MBA Accelerated Degree (BS/MBA)
- Any CCI BS/JD Accelerated Degree (BS/JD)

For more information on the criteria for entering this program, visit the BS/MS Accelerated Degree (<http://www.drexel.edu/undergrad/academics/accelerated-degrees>) page on Drexel's website.

Minor in Information Systems

The information systems minor is available to all University students in good standing, with the exception of students already majoring in information systems, information technology or informatics.

Required Courses

INFO 101	Introduction to Information Technology	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0
INFO 330	Computer Networking Technology I	4.0
INFO 355	Systems Analysis II	3.0
Two information system electives *		6.0
Total Credits		25.0

* An additional 6 credits or more are to be chosen from other course offerings in information systems pertinent to the student's overall program of study. Guidance in selecting these electives will be provided by staff and faculty of the College of Information Science and Technology.

Information Systems Faculty

Larry Alexander, PhD (<http://drexel.edu/ccf/contact/Faculty/Alexander-Larry>) (*University of Pennsylvania*) Research Professor & Interim Senior Associate Dean for CCI Research and Scholarly Activities. Large scale modeling and simulation, pattern recognition, future of information technology

Yuan An, PhD (<http://drexel.edu/ccf/contact/Faculty/An-Yuan>) (*University of Toronto, Canada*) Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web

Marcello Balduccini, PhD (<http://drexel.edu/ccf/contact/Faculty/Balduccini-Marcello>) (*Texas Tech University*) Senior Research Scientist, Assistant Research Professor, Applied Informatics Group. Logic programming, declarative programming, answer set programming, knowledge representation, various types of reasoning

Ellen Bass, PhD (<http://drexel.edu/ccf/contact/Faculty/Bass-Ellen>) (*Georgia Institute of Technology*) Professor (Joint Appointment with the College of Nursing and Health Professions). Human-centered systems engineering research and design, biomedical informatics, healthcare, quantitative modeling, human-automation interaction, computational modeling

Jennifer Booker, PhD (<http://drexel.edu/ccf/contact/Faculty/Booker-Jennifer>) (*Drexel University*) Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

David Breen, PhD (<http://drexel.edu/cci/contact/Faculty/Breen-David>) (*Rensselaer Polytechnic Institute*) Associate Professor. Self-organization, biomedical image/video analysis, biological simulation, geometric modeling and visualization

Yuanfang Cai, PhD (<http://drexel.edu/cci/contact/Faculty/Cai-Yuanfang>) (*University of Virginia*) Associate Professor. Formal software design modeling and analysis, software economics, software evolution and modularity

Bruce Char, PhD (<http://drexel.edu/cci/contact/Faculty/Char-Bruce>) (*University of California, Berkeley*) Professor. Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments, parallel and distributed computation

Chaomei Chen, PhD (<http://drexel.edu/cci/contact/Faculty/Chen-Chaomei>) (*University of Liverpool*) Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction

Prudence W. Dalrymple, PhD (<http://drexel.edu/cci/contact/Faculty/Dalrymple-Prudence>) (*University of Wisconsin-Madison*) Director, Institute for Healthcare Informatics, Research and Teaching Professor. User-centered information behaviors, particularly in the health arena, health informatics, evidence based practice, education for the information professions and evaluation, and translation of research into practice

M. Carl Drott, PhD (<http://drexel.edu/cci/contact/Faculty/Drott-Carl>) (*University of Michigan*) Associate Professor. Systems analysis techniques, Web usage, competitive intelligence

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Peter Grillo, PhD (<http://drexel.edu/cci/contact/Faculty/Grillo-Peter>) (*Temple University*) Associate Teaching Professor. Strategic applications of technology within organizations

Tony H. Grubestic, PhD (<http://drexel.edu/cci/contact/Faculty/Grubestic-Tony>) (*The Ohio State University*) Professor (Joint appointment in the Department of Culture & Communication with the College of Arts and Sciences). Geographic information science, spatial analysis, development, telecommunication policy, location modeling

Gene Gualtieri (<http://drexel.edu/cci/contact/Faculty/Gualtieri-Gene>) (*Michigan State University*) Assistant Research Professor, Applied Informatics Group. Problems in medical imaging, MRI/PET/CT data

Xiaohua Tony Hu, PhD (<http://drexel.edu/cci/contact/Faculty/Hu-Xiaohua-Tony>) (*University of Regina, Canada*) Professor. Data mining, text mining,

Web searching and mining, information retrieval, bioinformatics and healthcare informatics

Gregory W. Hislop, PhD (<http://drexel.edu/cci/contact/Faculty/Hislop-Gregory>) (*Drexel University*) Senior Associate Dean for Informatics and CCI Academic Affairs, Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization

Jeremy Johnson, PhD (<http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy>) (*Ohio State University*) Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Michael Khoo, PhD (<http://drexel.edu/cci/contact/Faculty/Khoo-Michael>) (*University of Colorado at Boulder*) Assistant Professor. The understandings and practices that users bring to their interactions with information systems, with a focus on the evaluation of digital libraries and educational technologies

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Spiros Mancoridis, PhD (<http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros>) (*University of Toronto*) Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

Alan T. Murray, PhD (<http://drexel.edu/cci/contact/Faculty/Murray-Alan>) (*University of California, Santa Barbara*) Professor. Geographic information science, urban, regional and natural resource planning; location modeling, spatial decision support systems, land use decision making

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Lorraine Richards, PhD (<http://drexel.edu/cci/contact/Faculty/Richards-Lorraine>) (*University of North Carolina*) Assistant Professor. Archives, digital curation, electronic records management, information technology and digital collections, cloud computing and record keeping, management of information organizations

Michelle L. Rogers, PhD (<http://drexel.edu/cci/contact/Faculty/Rogers-Michelle>) (*University of Wisconsin-Madison*) Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety

Kurt Schmidt, MS (<http://drexel.edu/cci/contact/Faculty/Schmidt-Kurt>) (*Drexel University*) Associate Teaching Professor. Data structures, math foundation for computer science, programming tools, programming languages

Erin Solovey, PhD (<http://drexel.edu/cci/contact/Faculty/Solovey-Erin>) (*Tufts University*) Assistant Professor. Human-computer interaction, brain-computer interfaces, tangible interaction, machine learning, human interaction with complex and autonomous systems

Il-Yeol Song, PhD (<http://drexel.edu/cci/contact/Faculty/Song-Il-Yeol>) (*Louisiana State University*) PhD Program Director, Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-

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Brian Stuart, PhD (<http://drexel.edu/cci/contact/Faculty/Stuart-Brian>) (*Purdue University*) Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics

Filippos Vokolos, PhD (<http://drexel.edu/cci/contact/Faculty/Vokolos-Filippos>) (*Polytechnic University*) Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems

Rosina Weber, PhD (<http://drexel.edu/cci/contact/Faculty/Weber-Rosina>) (*Federal University of Santa Catarina*) Associate Professor. Knowledge-based systems; case-based reasoning; textual case-based reasoning; computational intelligence; knowledge discovery; uncertainty, mainly targeting knowledge management goals in different domains, e.g., software engineering, military, finance, law, bioinformatics and health sciences

Erija Yan, PhD (<http://drexel.edu/cci/contact/Faculty/Yan-Erija>) (*Indiana University*) Assistant Professor. Network Science, Information Analysis and Retrieval, Scholarly Communication Methods and Applications

Christopher C. Yang, PhD (<http://drexel.edu/cci/contact/Faculty/Yang-Christopher>) (*University of Arizona, Tucson*) Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Information Systems degree is evaluated relative to the following Objectives and Outcomes.

BS in Information Systems Program Educational Objectives

Within three to five years of graduating, alumni of the program are expected to achieve one or more of the following milestones:

- Be valued contributors to private or public organizations as demonstrated by promotions, increased responsibility, or other professional recognition
- Contribute to professional knowledge as demonstrated by published papers, technical reports, patents, or conference presentations
- Succeed in continuing professional development as demonstrated by completion of graduate studies or professional certifications

- Demonstrate commitment and leadership within their profession and community as demonstrated by professional and community activity or contributions towards society's greater good and prosperity

BS in Information Systems Student Outcomes

The program enables students to attain, by the time of graduation:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An understanding of professional, ethical, legal, security and social issues
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations, and society
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practice.
- An understanding of processes that support the delivery and management of information systems within a specific application environment

The BSIS is accredited by the Computing Accreditation Commission (CAC) of ABET, <http://www.abet.org>.

To view the latest BS in Information Systems program enrollment numbers, please click here (<http://drexel.edu/cci/programs/undergraduate-programs/Facts>).

Information Technology

Major: Information Technology

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 188.0

Classification of Instructional Programs (CIP) code: 11.0401

Standard Occupational Classification (SOC) Code: 11-3021; 15-1133

About the Program

Note: Effective Fall 2016, students will no longer be accepted into this program. Students are encouraged to apply for the BS in Computing & Security Technology (p. 182) program, which encompasses the content of the BS in Information Technology program plus a significant expansion in coverage of computer security technology.

The College of Computing & Informatics' Bachelor of Science in Information Technology (BSIT) prepares students to manage the infrastructure of the information revolution. With organizations and individuals increasingly dependent on information technology, there is great demand for expertise related to the servers, databases, networks, and software systems that provide the "pipes and wires" of the Internet world. BSIT students tend to be hands-on problem solvers who like

to apply their technical expertise to operate and manage information technology.

The Information Technology curriculum helps students develop expertise in the core information technologies of networking, databases, Web systems, programming, security, and human-computer interaction. BSIT students learn to install, operate, monitor, and upgrade these technologies to provide the technology environments required to deliver information products and services. BSIT students learn to approach the application of information technology from a user-centered perspective aimed at meeting the needs of users and organizations in a societal and global context.

The core courses in the program address the core information technologies mentioned above. These foundation courses are followed by advanced courses focusing on management and administration of the core technologies (including database administration, network administration, etc.).

Degree Requirements

Information Technology Requirements

INFO 101	Introduction to Information Technology	3.0
INFO 105	Introduction to Informatics	3.0
INFO 108	Foundations of Software	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 151	Web Systems and Services I	3.0
INFO 152	Web Systems and Services II	3.0
INFO 153	Applied Data Management	3.0
INFO 200	Systems Analysis I	3.0
INFO 210	Database Management Systems	3.0
INFO 215	Social Aspects of Information Systems	3.0
INFO 320	Server Technology I	4.0
INFO 324	Team Process and Product	3.0
INFO 330	Computer Networking Technology I	4.0
INFO 333	Introduction to Information Security	3.0
INFO 410	Information Technology Infrastructure	3.0
INFO 415	Information Technology Services	3.0
INFO 420 [WI (p. 199)]	Software Project Management	3.0
INFO electives****		6.0-9.0

Concentration Requirements

Select one of the following sequences:	9.0-12.0
Database Management	
INFO 300	Information Retrieval Systems
INFO 365	Database Administration I
INFO 366	Database Administration II
Server and Network Technology	
INFO 321	Server Technology II
INFO 322	Server Technology III
INFO 331	Computer Networking Technology II

Computing and Informatics Requirements

CI 101	Computing and Informatics Design I	2.0
CI 102	Computing and Informatics Design II	2.0
CI 103	Computing and Informatics Design III	2.0

CI 491 [WI (p. 199)]	Senior Project I	3.0
CI 492 [WI (p. 199)]	Senior Project II	3.0
CI 493 [WI (p. 199)]	Senior Project III	3.0

Mathematics Requirements

Select one of the following sequences: 12.0

MATH 101 Introduction to Analysis I
& MATH 102 and Introduction to Analysis II
& MATH 180 and Discrete Computational Structures

MATH 121 Calculus I
& MATH 122 and Calculus II
& MATH 180 and Discrete Computational Structures

Natural Science Sequence

Select one of the following sequences: 8.0-9.0

CHEM 101 General Chemistry I
& CHEM 102 and General Chemistry II

CHEM 111 General Chemistry I
& CHEM 112 and General Chemistry II

PHYS 103 General Physics I
& PHYS 104 and General Physics II

PHYS 101 Fundamentals of Physics I
& PHYS 102 and Fundamentals of Physics II

BIO 107 Cells, Genetics & Physiology
& BIO 108 and Cells, Genetics and Physiology Laboratory
& BIO 109 and Biological Diversity, Ecology & Evolution
& BIO 110 and Biological Diversity, Ecology and Evolution Laboratory

PHEV 145 Weather I: Climate and Global Change
& PHEV 146 and Weather II: Analysis and Forecasting

BIO 100 Applied Cells, Genetics & Physiology
& CHEM 151 and Applied Chemistry
& PHYS 151 and Applied Physics *

BIO 122 Cells and Genetics
& BIO 124 and Evolution & Organismal Diversity
& BIO 126 and Physiology and Ecology

Behavioral Science Requirements

PSY 101	General Psychology I	3.0
PSY 330	Cognitive Psychology	3.0
Behavioral science electives ***		6.0

Arts/Humanities Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0
COM 310 [WI (p. 199)]	Technical Communication	3.0
PHIL 105	Critical Reasoning	3.0
PHIL 111	Symbolic Logic 1	3.0
Arts/Humanities Elective **		3.0

Business Requirements

STAT 201	Introduction to Business Statistics	4.0
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Select two of the following courses:	8.0
ACCT 115 Financial Accounting Foundations	
ECON 201 Principles of Microeconomics	
ORGB 300 [WI Organizational Behavior (p. 199)]	

University and College Requirements

UNIV CI101 The Drexel Experience	2.0
or CI 120 CCI Transfer Student Seminar	
or INFO 120 IST Seminar for Transfer Students	
CIVC 101 Introduction to Civic Engagement	1.0
COOP 101 Career Management and Professional Development	0.0

Free Electives	27.0-34.0
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Total Credits	188.0
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* BIO 101 Applied Biological Diversity, Ecology & Evolution can be substituted for this course in this sequence.

** Any non-required course in COM, HIST, ENGL, GREC, PHIL, PSCI, ARTH, FMVD, VSST, and WRIT or any foreign language course.

*** Any non-required course offered by the AFAS, ANTH, PSY, SOC or WMST departments.

**** Any non-required INFO course

Sample Plan of Study**BS Information Technology****5 YR UG Co-op Concentration**

	Credits
Term 1	
CI 101 Computing and Informatics Design I	2.0
INFO 101 Introduction to Information Technology	3.0
INFO 108 Foundations of Software	3.0
MATH 121 Calculus I	4.0
or 101 Introduction to Analysis I	
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV CI101 The Drexel Experience	1.0
Term Credits	16.0
Term 2	
CI 102 Computing and Informatics Design II	2.0
INFO 105 Introduction to Informatics	3.0
INFO 151 Web Systems and Services I	3.0
MATH 122 Calculus II	4.0
or 102 Introduction to Analysis II	
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101 Introduction to Civic Engagement	1.0
COOP 101 [*] Career Management and Professional Development	0.0
Term Credits	16.0
Term 3	
CI 103 Computing and Informatics Design III	2.0
INFO 110 Human-Computer Interaction I	3.0
INFO 152 Web Systems and Services II	3.0
MATH 180 Discrete Computational Structures	4.0

ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
UNIV CI101 The Drexel Experience	1.0

Term Credits	16.0
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Term 4

INFO 153 Applied Data Management	3.0
INFO 200 Systems Analysis I	3.0
INFO 320 Server Technology I	4.0
COM 230 Techniques of Speaking	3.0
PSY 101 General Psychology I	3.0

Term Credits	16.0
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Term 5

INFO 210 Database Management Systems	3.0
PHIL 105 Critical Reasoning	3.0
PSY 330 Cognitive Psychology	3.0
IT elective	3.0
Free elective	3.0

Term Credits	15.0
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Term 6

INFO 333 Introduction to Information Security	3.0
PHIL 111 Symbolic Logic 1	3.0
IT Advanced Topic course	3.0
Natural Science Sequence course	4.0
Free elective	3.0

Term Credits	16.0
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Term 7

INFO 215 Social Aspects of Information Systems	3.0
INFO 324 Team Process and Product	3.0
INFO 330 Computer Networking Technology I	4.0
IT Advanced Topic course	3.0
Natural Science Sequence course	4.0

Term Credits	17.0
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Term 8

INFO 410 Information Technology Infrastructure	3.0
STAT 201 Introduction to Business Statistics	4.0
COM 310 [WI Technical Communication (p. 199)]	3.0
IT elective	3.0
Free elective	3.0

Term Credits	16.0
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Term 9

INFO 415 Information Technology Services	3.0
Select one of the following:	4.0
ACCT 115 Financial Accounting Foundations	
ECON 201 Principles of Microeconomics	
ORGB Organizational Behavior	
300 [WI (p. 199)]	

IT Advanced Topic course	3.0
IT elective	3.0
Free elective	3.0

Term Credits	16.0
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Term 10

CI 491 [WI Senior Project I (p. 199)]	3.0
INFO 420 [WI Software Project Management (p. 199)]	3.0
Select one of the following:	4.0
ORGB Organizational Behavior 300 [WI (p. 199)]	
ECON 201 Principles of Microeconomics	
ACCT 115 Financial Accounting Foundations	
Free elective	4.0
Term Credits	14.0
Term 11	
CI 492 [WI Senior Project II (p. 199)]	3.0
Behavioral Science elective	3.0
Arts and Humanities elective	3.0
Free electives	6.0
Term Credits	15.0
Term 12	
CI 493 [WI Senior Project III (p. 199)]	3.0
Behavioral Science elective	3.0
Free electives	9.0
Term Credits	15.0
Total Credit: 188.0	

* COOP 101 is taken either winter or spring depending on co-op cycle. Please consult your advisor for additional information.

Accelerated Degrees

The College of Computing & Informatics offers several accelerated degree programs designed to allow students to complete both a bachelor's degree and a graduate degree along with cooperative educational experience in fewer years than would be typical if pursuing the degrees separately.

Students accepted in this program can combine any of the College of Computing & Informatics' bachelor's and master's degree programs as well as other options:

- Any CCI BS/any CCI MS Accelerated Degree (BS & MS in five years, including 2 Co-ops)
- Any CCI BS /MBA Accelerated Degree (BS/MBA)
- Any CCI BS/JD Accelerated Degree (BS/JD)

For more information on the criteria for entering this program, visit the BS/MS Accelerated Degree (<http://www.drexel.edu/undergrad/academics/accelerated-degrees>) page on Drexel's website.

Co-op/Career Opportunities

Co-Op Options

Three co-op options are available for this program:

- 5-year/3 co-op
- 4-year/1 co-op

- Accelerated Degree (BS & MS): 5-year/2 co-op

The following list is a sample of recent co-op job titles and employers:

- *Collaborative Services Analyst*, GlaxoSmithKline
- *Information Technology & Computer Support Consultant*, University of Pennsylvania
- *Network Operations/Security Solutions Co-Op*, Susquehanna International Group
- *Operations Development*, PJM Interconnection
- *Portal Operations Analyst*, SAP America
- *PECO Technical Services*, Exelon Corporation

Career Opportunities

The demand for information technology professionals continues to be strong. Graduates find careers in a number of areas, including designing IT services, leading project teams, providing user support, operating and managing networks, and administrating servers and databases.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Information Technology Faculty

Jennifer Booker, PhD (<http://drexel.edu/cc/contact/Faculty/Booker-Jennifer>) (*Drexel University*) Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

Christopher Carroll, MS (<http://drexel.edu/cc/contact/Faculty/Carroll-Chris>) (*Drexel University*) Assistant Teaching Professor. Information security, computer networking and design, IT Infrastructure, server technology, information technology management

Jane Greenberg, PhD (<http://drexel.edu/cc/contact/Faculty/Greenberg-Jane>) (*University of Pittsburgh*) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Peter Grillo, PhD (<http://drexel.edu/cc/contact/Faculty/Grillo-Peter>) (*Temple University*) Associate Teaching Professor. Strategic applications of technology within organizations

Gregory W. Hislop, PhD (<http://drexel.edu/cc/contact/Faculty/Hislop-Gregory>) (*Drexel University*) Senior Associate Dean for Informatics and CCI Academic Affairs, Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization

Constantine Katsinis, PhD (<http://drexel.edu/cc/contact/Faculty/Katsinis-Constantine>) (*University of Rhode Island*) Associate Teaching Professor. Computer Security, network security, parallel computer architectures, mobile computing, information assurance, fault tolerant systems, image processing and pattern recognition

Weimao Ke, PhD (<http://drexel.edu/cc/contact/Faculty/Ke-Weimao>) (*University of North Carolina at Chapel Hill*) Assistant Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex

systems, machine learning, text/data mining, multi-agent systems, the notion of information

Scott White, PhD (<http://drexel.edu/cci/contact/Faculty/White-Scott>) (*University of Bristol*) Associate Teaching Professor. Homeland security, terrorism and intelligence analysis, and counter-terrorism & infrastructure protection

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Information Technology degree is evaluated relative to the following Objectives and Outcomes.

BS in Information Technology Program Educational Objectives

Within three to five years of graduating, alumni of the program are expected to achieve one or more of the following milestones:

- Be valued contributors to private or public organizations as demonstrated by promotions, increased responsibility, or other professional recognition
- Contribute to professional knowledge as demonstrated by published papers, technical reports, patents, or conference presentations
- Succeed in continuing professional development as demonstrated by completion of graduate studies or professional certifications
- Demonstrate commitment and leadership within their profession and community as demonstrated by professional and community activity or contributions towards society's greater good and prosperity

BS in Information Technology Student Outcomes

The program enables students to attain, by the time of graduation:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An understanding of professional, ethical, legal, security and social issues and responsibilities
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations, and society
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practice
- An ability to use and apply current technical concepts and practices in the core information technologies

- An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems
- An ability to effectively integrate IT-based solutions into the user environment
- An understanding of best practices and standards and their application
- An ability to assist in the creation of an effective project plan

The BS in Information Technology is accredited by the Computing Accreditation Commission (CAC) of ABET, <http://www.abet.org>.

To view the latest BS in Information Technology program enrollment numbers, please click here (<http://drexel.edu/cci/programs/undergraduate-programs/Facts>).

Minor in Security Technology

The demand for individuals with security related skills is increasing and essential in today's internet-dominated society. Computer and information systems managers are becoming more involved with the security of data, responsible for sophisticated and more efficient computer networks and increasingly more complex websites and intranets. The minor in Security Technology combines basic courses in security and technology required to help organizations keep their computer systems secure.

Any student in any major can benefit from a minor in Security Technology. Graduates with such background knowledge are prepared to actively participate in the application of security technology within the major area of study.

The minor is available to all University students in good standing, with the exception of students majoring in Computing and Security Technology.

CT 300	Security Technology Models and Architecture I	3.0
CT 312	Access Control and Intrusion Detection Technology	3.0
CT 325	Operating System Security Architecture I	3.0
CT 336	Internet Protocol Security and Virtual Private Network Technology	3.0
CT 400	Network Security	3.0
CT 402	Network Security II	3.0
CT 472	Security Defense Countermeasures	3.0
Select 1 of the following:		3.0
CT 212	Computer Forensics I: Fundamentals	
CT 222	Security and Information Warfare	
CT 295	Public Key Infrastructure Technology	
CT 315	Security Management Practice	
CT 326	Operating System Security Architecture II	
CT 355	Wireless Network Security Technology	
CT 362	Network Auditing Tools	
CT 382	Applied Cryptography	
CT 393	Information Technology Security Risk Assessment	
CT 412	Information Technology Security Policies	
CT 415	Disaster Recovery and Continuity Planning	
CT 422	Incident Response Best Practices	
CT 432	Information Technology Security Systems Audits	

CS 475	Computer and Network Security	
Total Credits		24.0

Software Engineering

Major: Software Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 188.0

Classification of Instructional Program (CIP) code: 14.0903

Standard Occupational Classification (SOC) code: 15-1132; 15-1133

About the Program

The College of Computing & Informatics' Bachelor of Science in Software Engineering (BSSE) prepares students to design and build software systems. Software is essential to the functioning of modern society but high quality software is very challenging to create. Software engineering focuses on the knowledge and skills to meet that challenge and create high quality software on schedule within budget.

The Software Engineering curriculum addresses a full range of software activities including gathering client requirements, designing and constructing software solutions, testing software, and modifying and extending existing systems. The curriculum also recognizes that most software is developed by teams, and students develop skills in project management and team operation. Graduates are well-prepared to function as software engineering team members and also move toward software engineering management.

The core courses address programming and use of software development tools, specification and design, software architecture, verification and validation, software evolution, and team projects. These courses are supplemented with courses drawn from computer science and Informatics that provide theoretical background and application knowledge. The full curriculum prepares BSSE students to apply processes, methods, and tools to the problem of building and maintaining software with a defined level of quality, at a predictable cost, on a predictable schedule.

Additional Information

For more information about this program, please visit the BS in Software Engineering web page (<http://drexel.edu/ci/programs/undergraduate-programs/bs-software-engineering>) on the College of Computing & Informatics' website.

Degree Requirements

Software Engineering Requirements

CS 164	Introduction to Computer Science	3.0
Select one of the following:		
CS 171 & CS 172	Computer Programming I and Computer Programming II	
CS 175	Computer Programming I-II	
SE 210	Software Specification and Design I	3.0
SE 211	Software Specification and Design II	3.0
SE 310	Software Architecture I	3.0
SE 311	Software Architecture II	3.0
SE 320	Software Verification and Validation	3.0
SE 410	Software Evolution	3.0

Computer Science Requirements

CS 260	Data Structures	3.0
CS 265	Advanced Programming Tools and Techniques	3.0
CS 281	Systems Architecture	4.0
CS 283	Systems Programming	3.0

Information Systems Requirements

INFO 210	Database Management Systems	3.0
INFO 310	Human-Computer Interaction II	3.0
INFO 420 [WI (p. 204)]	Software Project Management	3.0

Computing & Informatics Requirements

CI 101	Computing and Informatics Design I	2.0
CI 102	Computing and Informatics Design II	2.0
CI 103	Computing and Informatics Design III	2.0
CI 491 [WI (p. 204)]	Senior Project I	3.0
CI 492 [WI (p. 204)]	Senior Project II	3.0
CI 493 [WI (p. 204)]	Senior Project III	3.0

Computing & Informatics Electives

CS 472	Computer Networks: Theory, Applications and Programming	3.0-4.0
or INFO 330	Computer Networking Technology I	
Computing & Informatics electives (see below)		18.0

Mathematics Requirements

CS 270	Mathematical Foundations of Computer Science	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 221	Discrete Mathematics	3.0
STAT 201	Introduction to Business Statistics	4.0
STAT 202	Business Statistics II	4.0

Science Requirements

Select one of the following lab science sequences:

BIO 122 & BIO 124 & BIO 126	Cells and Genetics and Evolution & Organismal Diversity and Physiology and Ecology	
CHEM 101 & CHEM 102 & CHEM 103	General Chemistry I and General Chemistry II and General Chemistry III	
PHYS 101 & PHYS 102 & PHYS 201	Fundamentals of Physics I and Fundamentals of Physics II and Fundamentals of Physics III	

Science electives (see below)

Arts & Humanities Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 105	Critical Reasoning	3.0
PHIL 311	Computer Ethics	3.0
COM 230	Techniques of Speaking	3.0

COM 310 [WI (p. 204)]	Technical Communication	3.0
PSY 101	General Psychology I	3.0
PSY 330	Cognitive Psychology	3.0
Select two of the following:		8.0
ACCT 110	Accounting for Professionals	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
Arts & Humanities, Business, or Social Studies elective (see below)		3.0
University Requirements		
UNIV CI101	The Drexel Experience	2.0
or CI 120	CCI Transfer Student Seminar	
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0
Free Electives		14.0-18.0
Total Credits		188.0

Program Electives

- **Computing & Informatics electives:** any non-required CS, INFO, SE course numbered 300 or higher
- **Science electives:** any CHEM (except 111, 112, 113, 114, 151), BIO (except 161, 162, 163; cannot take both BIO 100 and 122), PHYS (except 050, 100, 103, 104, 105, 106, 121, 122, 151, 160, 305, 306, 307, 324, 405; cannot take both PHYS 131 & 181)
- **Business electives:** any ACCT, BLAW, BUSN, ECON, FIN, HRMT, INTB, MGMT, MKTG, OPM, OPR, ORGB, POM, STAT, TAX
- **Social Studies electives:** any AFAS, ANTH, HIST, IAS, JUDA, PSCI, PSY (except 330, 332, 337, 364, 365), SOC (except 364, 365), WGST
- **Arts & Humanities electives:** any ARTH, COM, DANC, EDEX, EDUC, ENGL (except 101, 102, 103, 105), ESTM, FASH, FMVD, INTR, LING, MUSC, PHIL, PHTO, THTR, VSCM, VSST, WRIT, and Foreign Language courses (<http://www.drexel.edu/culturecomm/academics/undergraduate/modernlang/languages>) as defined by the College of Arts and Sciences

Sample Plan of Study

5 YR UG Co-op Concentration

5 YR UG Co-op Concentration

Term 1		Credits
CS 164	Introduction to Computer Science	3.0
CI 101	Computing and Informatics Design I	2.0
MATH 121	Calculus I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV CI101	The Drexel Experience	1.0
Science lab		4.0
Term Credits		17.0
Term 2		
CS 171	Computer Programming I	3.0
CI 102	Computing and Informatics Design II	2.0
MATH 122	Calculus II	4.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0
Science lab		4.0
Term Credits		17.0
Term 3		
CS 172	Computer Programming II	3.0
CI 103	Computing and Informatics Design III	2.0
MATH 123	Calculus III	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV CI101	The Drexel Experience	1.0
Science lab		4.0
Term Credits		17.0

Term 4

SE 210	Software Specification and Design I	3.0
CS 265	Advanced Programming Tools and Techniques	3.0
CS 270	Mathematical Foundations of Computer Science	3.0
COM 230	Techniques of Speaking	3.0
Science elective		3.0
Term Credits		15.0

Term 5

SE 211	Software Specification and Design II	3.0
CS 260	Data Structures	3.0
INFO 210	Database Management Systems	3.0
MATH 221	Discrete Mathematics	3.0
Science elective		3.0
Term Credits		15.0

Term 6

SE 310	Software Architecture I	3.0
CS 281	Systems Architecture	4.0
STAT 201	Introduction to Business Statistics	4.0
PSY 101	General Psychology I	3.0
COM 310 [WI (p. 204)]	Technical Communication	3.0
Term Credits		17.0

Term 7

SE 311	Software Architecture II	3.0
CS 283	Systems Programming	3.0
STAT 202	Business Statistics II	4.0
Science elective		3.0
Free elective		3.0
Term Credits		16.0

Term 8

SE 320	Software Verification and Validation	3.0
INFO 420 [WI (p. 204)]	Software Project Management	3.0
PHIL 105	Critical Reasoning	3.0
Computing & Informatics elective		3.0
Free elective		3.0
Term Credits		15.0

Term 9

SE 410	Software Evolution	3.0
INFO 310	Human-Computer Interaction II	3.0
PHIL 311	Computer Ethics	3.0
	Computing & Informatics elective	3.0
	Free elective	3.0

Term Credits **15.0**

Term 10

CI 491 [WI (p. 204)]	Senior Project I	3.0
INFO 330 or CS 472	Computer Networking Technology I Computer Networks: Theory, Applications and Programming	4.0
	Select one of the following:	4.0
	ACCT 110 Accounting for Professionals	
	ECON 201 Principles of Microeconomics	
	ECON 202 Principles of Macroeconomics	
	Computing & Informatics elective	3.0
	Free elective	2.0

Term Credits **16.0**

Term 11

CI 492 [WI (p. 204)]	Senior Project II	3.0
PSY 330	Cognitive Psychology	3.0
	Select one of the following:	4.0
	ACCT 110 Accounting for Professionals	
	ECON 202 Principles of Macroeconomics	
	ECON 201 Principles of Microeconomics	
	Computing & Informatics electives	6.0

Term Credits **16.0**

Term 12

CI 493 [WI (p. 204)]	Senior Project III	3.0
	Computing & Informatics elective	3.0
	Arts & Humanities elective	3.0
	Free elective	3.0

Term Credits **12.0**

Total Credit: 188.0

Co-op/Career Opportunities

Co-Op Options

Three co-op options are available for this program:

- 5-year/3 co-op
- 4-year/1 co-op
- Accelerated Degree: 5-year/2 co-op

Career Opportunities

The demand for software engineering professionals is quite strong. Graduates can expect career opportunities in software design and development in a variety of application areas. Software engineering graduates are particularly well suited to work as members or leaders of

software project teams. They have knowledge and skills to help them develop quality software within schedule and cost constraints.

According to the U.S. Bureau of Labor Statistics' Occupational Outlook Handbook (<http://www.bls.gov/ooh>), software developer is among the fastest growing U.S. careers requiring at least a bachelor's degree, with an estimated 222,600 new jobs by 2022. Although they have jobs in most industries, many software developers work in computer systems design and related services firms or software publishers. The field's rapid growth is mainly due to the increase in demand for computer software, especially in healthcare.

Most software engineering students enter the professional world right after graduation, but some continue their studies in advanced software engineering programs.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Accelerated Degrees

The College of Computing & Informatics offers several accelerated degree programs designed to allow students to complete both a bachelor's degree and a graduate degree along with cooperative educational experience in fewer years than would be typical if pursuing the degrees separately.

Students accepted in this program can combine any of the Computing and Informatics bachelor's and master's degree programs as well as other options:

- Any CCI BS/any CCI MS Accelerated Degree (BS & MS in five years, including 2 Co-ops)
- Any CCI BS /MBA Accelerated Degree (BS/MBA) (BS & MBA in four years, including 1 Co-op option only)
- Any CCI BS/JD Accelerated Degree (BS/JD)

For more information on the criteria for entering this program, visit the BS/MS Accelerated Degree (<http://www.drexel.edu/undergrad/academics/accelerated-degrees>) page on the Drexel website.

Minor in Software Engineering

The Software Engineering minor is available to all University students in good standing, with the exception of Software Engineering majors.

Prerequisites

One of the following Mathematics sequences must be completed before entering the program:

- MATH 101 and MATH 102
- MATH 121 and MATH 122

Requirements

Select one of the following: 3.0-6.0

CS 171 & CS 172	Computer Programming I and Computer Programming II	
CS 175	Computer Programming I-II	
CS 260	Data Structures	3.0
CS 265	Advanced Programming Tools and Techniques	3.0
SE 210	Software Specification and Design I	3.0

SE 310	Software Architecture I	3.0	William Regli, PhD (http://drexel.edu/cci/contact/Faculty/Regli-William) (<i>University of Maryland at College Park</i>) Professor. Artificial intelligence, computer graphics, engineering design and Internet computing
or CS 350	Software Design		
SE 320	Software Verification and Validation	3.0	
Additional electives: Students who take CS 175 should select 2 courses below; all other students should select 1 course below.		3.0-6.0	Kurt Schmidt, MS (http://drexel.edu/cci/contact/Faculty/Schmidt-Kurt) (<i>Drexel University</i>) Associate Teaching Professor. Data structures, math foundation for computer science, programming tools, programming languages
SE 211	Software Specification and Design II		
SE 311	Software Architecture II		
SE 410	Software Evolution		
Total Credits		24.0	

Note: No more than 9.0 credits from a student's major may be used to fulfill the minor requirements. Students who, because of this rule, require additional credits to reach 24.0 total credits may select from the following courses as needed:

INFO 210	Database Management Systems	3.0
INFO 310	Human-Computer Interaction II	3.0
INFO 355	Systems Analysis II	3.0
INFO 420 [WI (p. 204)]	Software Project Management	3.0

Software Engineering Faculty

Ellen Bass, PhD (<http://drexel.edu/cci/contact/Faculty/Bass-Ellen>) (*Georgia Institute of Technology*) Professor (Joint Appointment with the College of Nursing and Health Professions). Human-centered systems engineering research and design, biomedical informatics, healthcare, quantitative modeling, human-automation interaction, computational modeling

Jennifer Booker, PhD (<http://drexel.edu/cci/contact/Faculty/Booker-Jennifer>) (*Drexel University*) Associate Teaching Professor. Software engineering, systems analysis and design, networking, statistics and measurement, process improvement, object-oriented analysis and design, bioinformatics, and modeling of biological systems

Yuanfang Cai, PhD (<http://drexel.edu/cci/contact/Faculty/Cai-Yuanfang>) (*University of Virginia*) Associate Professor. Formal software design modeling and analysis, software economics, software evolution and modularity

Bruce Char, PhD (<http://drexel.edu/cci/contact/Faculty/Char-Bruce>) (*University of California, Berkeley*) Professor. Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments, parallel and distributed computation

Gregory W. Hislop, PhD (<http://drexel.edu/cci/contact/Faculty/Hislop-Gregory>) (*Drexel University*) Senior Associate Dean for Informatics and CCI Academic Affairs, Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization

Jeremy Johnson, PhD (<http://drexel.edu/cci/contact/Faculty/Johnson-Jeremy>) (*Ohio State University*) Professor. Computer algebra, parallel computations, algebraic algorithms, scientific computing

Spiros Mancoridis, PhD (<http://drexel.edu/cci/contact/Faculty/Mancoridis-Spiros>) (*University of Toronto*) Senior Associate Dean of Computing & Academic Affairs, Professor. Software engineering, software security, code analysis, evolutionary computation

Brian Stuart, PhD (<http://drexel.edu/cci/contact/Faculty/Stuart-Brian>) (*Purdue University*) Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics

Filippos Vokolos, PhD (<http://drexel.edu/cci/contact/Faculty/Vokolos-Filippos>) (*Polytechnic University*) Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems

Rosina Weber, PhD (<http://drexel.edu/cci/contact/Faculty/Weber-Rosina>) (*Federal University of Santa Catarina*) Associate Professor. Knowledge-based systems; case-based reasoning; textual case-based reasoning; computational intelligence; knowledge discovery; uncertainty, mainly targeting knowledge management goals in different domains, e.g., software engineering, military, finance, law, bioinformatics and health sciences

Christopher C. Yang, PhD (<http://drexel.edu/cci/contact/Faculty/Yang-Christopher>) (*University of Arizona, Tucson*) Associate Professor. Web search and mining, security informatics, social media analytics, knowledge management, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library and electronic commerce

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the software engineering degree is evaluated relative to the following Objectives and Outcomes.

Program Educational Objectives

Within three to five years of graduating, alumni of the program are expected to achieve one or more of the following milestones:

- Graduates of the program obtain employment as software developers, where their software and communication skills eventually propel them toward technical and administrative leadership positions in industry and government.
- Graduates of the program demonstrate an ability to continue to learn throughout their career and to keep pace with changing technology as appropriate to their positions.
- Graduates of the program specialize and enhance their software engineering knowledge by enrolling and completing technical graduate courses and other technical education to position them to advance software engineering practice as senior technical staff members or managers.
- Graduates of the program specialize and enhance their software engineering knowledge by enrolling and graduating from MSc and

PhD degree programs to position them to contribute to the intellectual foundations of the discipline of software engineering as researchers in industrial and government laboratories as well as in academia.

- e. Graduates of the program advance toward becoming leaders in disciplines other than software engineering by enrolling and graduating from graduate-level degree programs in complimentary disciplines such as law and business, where the BSSE serves as an educational foundation.
- f. Graduates of the program will demonstrate an awareness of their professional and social responsibility as software engineers by participation in professional activities and application of their knowledge for the good of society.

Software Engineering Student Outcomes

The program enables students to attain, by the time of graduation:

- a. An ability to apply knowledge of mathematics, science and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Additional Information

The Software Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET (<http://www.abet.org>).

To view the latest BS in Software Engineering program enrollment numbers, please click here (<http://drexel.edu/cci/programs/undergraduate-programs/Facts>).

Minor in Emergency Management

Natural or man-made disasters can strike at anytime and anywhere. They take many forms—a hurricane, an earthquake, a tornado, a flood, a fire or a hazardous spill, an act of nature or an act of terrorism. Disasters can build over days or weeks, or hit suddenly, without warning. Every year, millions of people face disasters and their consequences.

This minor is designed to equip individuals with the fundamental competencies expected of professionals in the field of emergency management. It provides the knowledge, skills, and abilities necessary to be competent emergency managers.

Students interested in pursuing a minor in emergency management may include individuals majoring in architecture, civil engineering, construction management, criminal justice, political science, and professional studies.

The minor is available to all University students in good standing.

Core Requirements

EMER 210	Hazard Mitigation	3.0
EMER 215	Public Management in Times of Crisis	3.0
EMER 220	Emergency Incident Risk Management	3.0
EMER 225	Infrastructure Disaster Recovery	3.0
Select four of the following:		12.0
CT 222	Security and Information Warfare	
CT 225	Data Mining Technology for Security	
CT 315	Security Management Practice	
CT 393	Information Technology Security Risk Assessment	
CT 395	Information Technology Security I	
CT 412	Information Technology Security Policies	
CT 415	Disaster Recovery and Continuity Planning	
CT 420	Information Technology Security II	
CT 422	Incident Response Best Practices	
CT 432	Information Technology Security Systems Audits	
CT 472	Security Defense Countermeasures	
EMER 235	Public Information Strategies	
EMER 245	Search and Rescue	
EMS 307	Critical Incident Stress Management	
EMS 445	Organizing Community Response in Disasters	

Total Credits **24.0**

Minor in Human Centered Computing

Human-Centered Computing looks to improve the integration of computing in the lives of individuals and the collaboration within groups. The minor in Human-Centered Computing combines basic courses in areas including human computer interaction, collaborative work, and graphical user interfaces.

A student in any major can benefit from a minor in Human-Centered Computing. The minor is available to all University students in good standing.

INFO 110	Human-Computer Interaction I	3.0
INFO 150	Ubiquitous Information Technologies	3.0
INFO 216	Issues in Information Policy	3.0
INFO 310	Human-Computer Interaction II	3.0
INFO 405	Social and Collaborative Computing	3.0
INFO 440	Social Media Trend Spotting	3.0
Select 2 of the following:		6.0
CS 275	Web and Mobile App Development	
CS 338	Graphical User Interfaces	
CS 345	Computer Game Design and Development	
CS 432	Interactive Computer Graphics	
INFO 220	Geographic Information Science	
INFO 250	Information Visualization	

INFO 350	Visual Analytics
INFO 405	Social and Collaborative Computing
Total Credits	
24.0	

Certificate in Computing and Security Technology

Certificate Level: Post-Baccalaureate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate Certificate
Number of Credits to Completion: 24.0
Instructional Delivery: Online; Campus (part-time only)
Calendar Type: Quarter
Expected Time to Completion: 5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 11.1003
Standard Occupational Classification (SOC) Code: 15-1152

Note: Effective Fall 2014, students are no longer being accepted into this certificate program.

The certificate in computing & security technology is designed for computing technology professionals who have a BS degree in computing technology or considerable experience in the area, and who are seeking a career change or professional advancement with an additional focus on security.

The curriculum provides a deep understanding of the basic security-related issues and technologies as well as the flexibility to choose additional areas of study tailored to the needs of the individual student.

Required Courses

CT 300	Security Technology Models and Architecture I	3.0
CT 312	Access Control and Intrusion Detection Technology	3.0
CT 325	Operating System Security Architecture I	3.0
CT 336	Internet Protocol Security and Virtual Private Network Technology	3.0
CT 402	Network Security II	3.0
CT 472	Security Defense Countermeasures	3.0
Select two of the following:		6.0
CT 212	Computer Forensics I: Fundamentals	
CT 222	Security and Information Warfare	
CT 295	Public Key Infrastructure Technology	
CT 315	Security Management Practice	
CT 326	Operating System Security Architecture II	
CT 355	Wireless Network Security Technology	
CT 362	Network Auditing Tools	
CT 382	Applied Cryptography	
CT 393	Information Technology Security Risk Assessment	
CT 412	Information Technology Security Policies	
CT 415	Disaster Recovery and Continuity Planning	
CT 422	Incident Response Best Practices	
CT 432	Information Technology Security Systems Audits	
Total Credits		24.0

Certificate in Emergency Management

Certificate Level: Undergraduate
Admission Requirements: High school diploma
Certificate Type: Undergraduate Certificate
Number of Credits to Completion: 18.0
Instructional Delivery: Online; Campus (part-time only)
Calendar Type: Quarter
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0904
Standard Occupational Classification (SOC) Code: 29-2041

Note: Effective Fall 2014, students are no longer being accepted into this certificate program.

Natural or manmade disasters can strike at any time and anywhere. They take many forms—a hurricane, an earthquake, a tornado, a flood, a fire or a hazardous spill, an act of nature or an act of terrorism. Disasters can build over days or weeks, or hit suddenly, without warning. Every year, millions of people face disasters and their consequences.

The certificate program is designed to equip individuals with the fundamental competencies expected of professionals in the field of emergency management. The certificate provides the knowledge, skills, and abilities necessary to be competent emergency managers.

Individuals interested in pursuing this certificate may be employed in federal, state and municipal government positions, especially those involved in law enforcement, facilities, emergency medical personnel, fire personnel. The certificate is also designed to provide concerned citizens with knowledge in the field of emergency management.

Core Requirements

EMER 210	Hazard Mitigation	3.0
EMER 215	Public Management in Times of Crisis	3.0
EMER 220	Emergency Incident Risk Management	3.0
EMER 225	Infrastructure Disaster Recovery	3.0
Select two of the following:		6.0
EMER 235	Public Information Strategies	
EMER 245	Search and Rescue	
EMS 307	Critical Incident Stress Management	
EMS 445	Organizing Community Response in Disasters	

Total Credits **18.0**

Computer Science

Computer Security Concentration

In the past, computer systems have been thought of as a combination of computers and networks, where the primary role of technology was to handle information efficiently to realize one or more objectives (for example, a customer relations management system helping an organization support and manage customers to achieve increased sales). However, the world has moved from a clear separation between people and technology to a network of systems that provide critical resources to modern living. In fact, today's world is comprised of systems and systems of systems where we see interactions at local, regional and global levels. Unfortunately, this cyberspace also allows for the

connections among international organized crime, terrorists, hackers, foreign intelligence agencies, military and civilians including families and children. Furthermore, such connections enable threats to and invasions of privacy.

Specialists are needed who can work within cyberspace to help secure, defend against, respond to, and in some instance, even initiate preemptive attacks. These individuals must have detailed knowledge of the systems they protect, an understanding of the cyber-environment and physical environment in which they operate, and an understanding of the ethical expectations and legal surroundings of their field.

The Computer Science concentration in Computer Security is designed to supply graduates with the skills needed to prepare them for a wide range of opportunities. It gives students the ability to design and implement computing security and privacy processes, software and systems. Students use mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of such systems.

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Computer Science degree is evaluated relative to the following Objectives and Outcomes.

Student Outcomes

The Drexel Computer Science concentration in Computer Security enables students to attain, by the time of graduation:

- a. an ability to apply knowledge of computing and mathematics appropriate to security and privacy;
- b. an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- c. an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs in computing security;
- d. an ability to function effectively on teams to accomplish a common goal
- e. an understanding of professional, ethical, legal, security and social issues and responsibilities;
- f. an ability to communicate effectively with a range of audiences;
- g. an ability to analyze the local and global impact of computing on individuals, organizations, and society;
- h. recognition of the need for and an ability to engage in continuing professional development
- i. an ability to use current techniques, skills, and tools necessary for computing practice;
- j. an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- k. an ability to apply design and development principles in the construction of software systems of varying complexity;
- l. an understanding of people and processes affecting computer information security and privacy.

Additional Information

The Computer Science BS and BA programs are accredited by the Computing Accreditation Commission (CAC) of ABET (<http://www.abet.org>).

For more information about this concentration, contact the College of Computing & Informatics (<http://www.cci.drexel.edu>).

To view the latest Computer Science program enrollment numbers, please click here (<http://drexel.edu/cci/programs/undergraduate-programs/Facts>).

Computer Security Concentration Program Requirements

Students in the Computer Security Concentration should follow the below concentration requirements in addition to the core degree requirements for the BS in Computer Science program (p. 172). For any questions regarding your plan of study, please contact your Undergraduate Advisor (<http://drexel.edu/cci/resources/current-students/undergraduate/advising>).

The concentration in Computer Security follows the requirements of the B.S. in Computer Science (p. 172) except as noted below.

Computer Science Requirements	58.0-61.0
The following courses must be taken as the 6 CS track courses and 2 CS electives:	
CS 303	Algorithmic Number Theory and Cryptography
CS 361	Concurrent Programming
CS 370	Operating Systems
CS 465	Privacy and Trust
CS 467	Security and Human Behavior
CS 472	Computer Networks: Theory, Applications and Programming
CS 475	Computer and Network Security
CS 477	Advanced Software Security
Computing & Informatics Requirements	15.0
Mathematics Requirements	27.0
MATH 311 is required for the concentration.	
The following course must be taken as the Mathematics elective:	
MATH 200	Multivariate Calculus
Science Requirements	25.0
Arts & Humanities Requirements	45.0
The following course must be taken as the Social Studies elective:	
PSY 101	General Psychology I
The following course must be taken as the Business elective:	
ECON 201	Principles of Microeconomics
University Requirements	3.0
Free Electives	10.5-15.5
The following courses must be taken as free electives:	
INFO 110	Human-Computer Interaction I
ECON 250	Game Theory and Applications
CS 479	Advanced Network Security
Total Credits	188.0

Computer Security Concentration Sample Plan of Study

Term 1		Credits
CI 101	Computing and Informatics Design I	2.0
CS 164	Introduction to Computer Science	3.0

MATH 121	Calculus I	4.0	Arts & Humanities electives	6.0	
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	Term Credits	15.0	
UNIV 101	The Drexel Experience	1.0	Term 8		
Science lab		4.0	CS 303	Algorithmic Number Theory and Cryptography	3.0
Term Credits		17.0	CS 361	Concurrent Programming	3.0
Term 2			MATH 311	Probability and Statistics I	4.0
CI 102	Computing and Informatics Design II	2.0	INFO 110	Human-Computer Interaction I	3.0
CS 171	Computer Programming I	3.0	PHIL 311	Computer Ethics	3.0
MATH 122	Calculus II	4.0	Term Credits	16.0	
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	Term 9		
CIVC 101	Introduction to Civic Engagement	1.0	CS 451	Software Engineering	3.0
COOP 101	Career Management and Professional Development	0.0	CS 370	Operating Systems	3.0
Science lab		4.0	CS 465	Privacy and Trust	3.0
Term Credits		17.0	ECON 250	Game Theory and Applications	4.0
Term 3			Arts & Humanities elective	3.0	
CI 103	Computing and Informatics Design III	2.0	Term Credits	16.0	
CS 172	Computer Programming II	3.0	Term 10		
MATH 123	Calculus III	4.0	CI 491 [WI (p. 209)]	Senior Project I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	CS 467	Security and Human Behavior	3.0
UNIV 101	The Drexel Experience	1.0	CS 472	Computer Networks: Theory, Applications and Programming	3.0
Science lab		4.0	Writing & Communications elective	3.0	
Term Credits		17.0	Arts & Humanities elective	3.0	
Term 4			Term Credits	15.0	
CS 265	Advanced Programming Tools and Techniques	3.0	Term 11		
CS 270	Mathematical Foundations of Computer Science	3.0	CI 492 [WI (p. 209)]	Senior Project II	3.0
MATH 200	Multivariate Calculus	4.0	CS 475	Computer and Network Security	3.0
PSY 101	General Psychology I	3.0	Science elective	4.0	
Science elective		3.0	Writing & Communications elective	3.0	
Term Credits		16.0	Arts & Humanities elective	3.0	
Term 5			Term Credits	16.0	
CS 260	Data Structures	3.0	Term 12		
CS 275	Web and Mobile App Development	3.0	CI 493 [WI (p. 209)]	Senior Project III	3.0
MATH 221	Discrete Mathematics	3.0	CS 477	Advanced Software Security	3.0
ECON 201	Principles of Microeconomics	4.0	CS 479	Advanced Network Security	3.0
Science elective		3.0	Free elective	1.0	
Term Credits		16.0	Term Credits	10.0	
Term 6			Total Credit: 188.0		
CS 281	Systems Architecture	4.0			
CS 350 [WI (p. 209)]	Software Design	3.0			
MATH 201	Linear Algebra	4.0			
COM 230	Techniques of Speaking	3.0			
Arts & Humanities elective		3.0			
Term Credits		17.0			
Term 7					
CS 283	Systems Programming	3.0			
CS 360	Programming Language Concepts	3.0			
Science elective		3.0			

Co-op and Career Opportunities

Co-op Opportunities

Students following the concentration in computer security will have access to all the co-op opportunities available to the computer science students and additional opportunities in organizations in the area such as hospitals and defense companies, and governments organizations including the U.S. Government's National Security Agency (NSA).

Career Opportunities

The U.S. Bureau of Labor Statistics confirmed the need for a larger and more dynamic network security workforce. In its Occupational Outlook

Handbook (<http://www.bls.gov/ooh/home.htm>), the agency predicts that the demand for cybersecurity experts, including Computer Network Architects, is expected to be very high as the world responds to imminent security threats.

The government needs to hire at least 10,000 experts in the near future and the private sector needs four times that number. While government might have the most immediate need, market observers see tremendous growth in other organizations for cybersecurity professionals where they can have a variety of rules working on vulnerability research, antivirus software design, reverse engineering, and mobile code analysis and design.

Infrastructure security is another area requiring experts in computer security. As information technology has become more available, critical infrastructures increasingly rely on it and have become so interconnected that intrusions and disruptions in one infrastructure can potentially cause failures to others. Critical infrastructure includes airports, rail transport, hospitals, bridges, network communications, the electricity grid and power plants, seaports, oil refineries, and water systems. Infrastructure security experts work to limit the vulnerability of these systems to sabotage, terrorism, information warfare, and natural disasters.

Industries with high cybersecurity demand include:

- Computer systems design services
- Research and development in the physical, engineering, and life sciences
- Instrument manufacturing
- Consulting services
- Engineering services
- Computer and computer peripheral equipment and software merchant wholesalers
- Custom computer programming services

College of Engineering

The College of Engineering curriculum is designed to provide students a thorough understanding of scientific, mathematical, and engineering fundamentals--as well as the ability to apply these areas of knowledge creatively to a wide variety of engineering problems.

Majors

- Architectural Engineering (p. 215)
- Chemical Engineering (p. 222)
- Civil Engineering (p. 226)
- Computer Engineering (p. 230)
- Construction Management (p. 238)
 - Real Estate Concentration (p. 241)
- Electrical Engineering (p. 242)
- Engineering (p. 251)
- Engineering Technology (p. 253)
 - Biomedical Engineering Technology (p. 255)
 - Electrical Engineering Technology (p. 257)
 - Industrial Engineering Technology (p. 259)
 - Mechanical Engineering Technology (p. 261)
- Environmental Engineering (p. 264)
- Materials Science and Engineering (p. 269)
- Mechanical Engineering (p. 276)
- Property Management (p. 284)

Minors

- Architectural Engineering (p. 221)
- Computer Engineering (p. 234)
- Construction Management (p. 242)
- Electrical Engineering (p. 246)
- Engineering Management (p. 263)
- Engineering Policy Analysis (p. 264)
- Entertainment Engineering (p. 268)
- Environmental Engineering (p. 267)
- Global Engineering (p. 268)
- Materials Science and Engineering (p. 273)
- Mechanical Engineering (p. 279)
- Nuclear Engineering (p. 283)
- Project Management (p. 283)
- Property Management (p. 285)
- Real Estate (p. 286)
- Systems Engineering (p. 286)

Certificates

- Construction Management (I, II, III, IV) (p. 287)
- Fundamentals of Property Management (p. 288)
- Residential Property Management (p. 288)

About the College

Drexel University's College of Engineering has emphasized its strengths in engineering, science and technology to train students to become

the leaders of the future. In little over a century, Drexel University has transformed itself into a large, comprehensive institution committed to excellence in education, research and service to the engineering society and to the broader community. Although much has changed, the original mission of the University still rings true today.

The College of Engineering offers students a diverse academic learning and research environment embodying the highest standards of knowledge and preparing them to impact society's greatest challenges. Through entrepreneurial risk-taking and exploration, students are encouraged to find innovative solutions that promote economic development and improve life.

In addition to the traditional engineering curriculum, the college offers Project Management (<http://www.drexel.edu/engmrgmt/program-areas/project-management>), Engineering Technology (p. 253), Construction Management (p. 287) and Property Management (p. 288).

Objectives of the traditional Undergraduate Engineering Program

The profession of engineering is concerned with turning the natural elements and energies to the service of mankind. The objectives of the undergraduate program in the College of Engineering (<http://www.drexel.edu/coe>) are:

- *To offer an education that will give graduates the flexibility to adjust to future changes in technology*
- *To develop a sense of professionalism and entrepreneurship*
- *To provide a framework for concentrated study in a professional area*

To implement those objectives the curricula of the College of Engineering are designed to provide a firm grounding in basic science and liberal arts, along with broad-based engineering sciences and professional engineering subjects.

Cooperative Education

In five-year cooperative programs, engineering majors spend a total of 12 terms in school and six terms on co-op assignment. Freshmen attend classes for three terms. During their sophomore, pre-junior, and junior years, students generally attend class for two terms and are assigned a cooperative employment position for two terms each year.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

About the Traditional Engineering Curriculum

Degree Requirements

The degree of Bachelor of Science in the engineering specialties requires a minimum of 192 credits of academic work and six terms of co-op or engineering experience for the five-year program. For the four-year program, only two terms of co-op are required. Transfer students must complete a minimum of two terms of co-op or engineering experience in order to earn a cooperative engineering degree accredited by ABET (<http://www.abet.org>).

Engineering student must maintain an overall grade point average of 2.0 in all required courses in their major.

The Bachelor of Science in Engineering (BSE) program is a customizable undergraduate engineering degree program offered in the College of Engineering. The program is designed for students who are seeking an interdisciplinary education rooted in engineering. The degree is structured so students achieve a strong foundation in science, math and engineering. Upper level engineering electives can be chosen to fit the student's individual interests and career objectives. The BS in Engineering program allows the student to create their own engineering curriculum path with the assistance of their BSE advisors. The program is also flexible enough so that students can complete up to two minors in areas which may include but are not limited to environmental studies, finance, entrepreneurship, music, legal studies or pre-med. To learn more about the Bachelor of Science in Engineering program, please visit the Program Overview webpage (<http://www.drexel.edu/engineering/programs/undergrad/Engineering/BSE/ProgramOverview>).

Curricular Organization

Students in the traditional engineering programs study the same subjects during the three terms in the first year. During the two terms of the sophomore year, students begin taking department specific coursework.

The first five terms are devoted to those subjects that form the foundation of the engineering curriculum. Courses in the core engineering curriculum are organized and taught to provide an integrated view of the basic sciences and an introduction to the art of engineering through group projects that deal with open-ended problems characteristic of the practice of engineering. Students also learn to use the modern tools of engineering both on the computer and in the laboratory.

The college considers it essential that students entering the Drexel Engineering Curriculum be placed in courses that take advantage of their abilities and prior training. Student preparation level is determined by a review committee that evaluates the student's high school record, standardized test scores, and placement tests administered during freshman orientation.

Students who demonstrate the preparation and skills to succeed in our integrated engineering calculus course immediately will be placed in the course starting in the fall term. Students who are not prepared for this sequence may participate in a special "pre-engineering" program before the fall term. These students may also have a modified fall schedule and may need summer school during the following summer.

In the second year, two professional subjects are introduced, and all the first-level professional courses are completed by the junior year. The senior year in all curricula contains at least one elective sequence so that students can study some aspect of engineering more deeply. In addition, all curricula provide a design experience in the senior year. Recognizing the importance of general education studies in the education of an engineer, all curricula require that courses be taken in this area. These requirements are described in more detail in the General Education Requirements (p. 214).

The Common Curriculum

University Requirements

CIVC 101	Introduction to Civic Engagement	1.0
UNIV E101	The Drexel Experience	2.0

Foundation Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0

PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 141	Essential Biology	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0

In addition, engineering students complete thirty (30) credits of General Education Requirements (p. 214).

Electives

In addition to the electives in the General Education electives there are two types of elective sequences in the engineering curricula: technical electives and free electives. Technical electives are courses in engineering, science, or management that build on the required professional courses and lead to a specific technical specialization. Possible elective sequences should be discussed with and approved by advisors before the end of the junior year. Free electives are any courses for which students are eligible and that are not remedial in nature for engineering students.

Withdrawal from the College of Engineering

It is the policy of the College of Engineering that an engineering student who withdraws from the University cannot petition for readmission to the College of Engineering until at least one complete term has elapsed.

General Education Requirements

The General Education Program is designed to give engineering students an opportunity to take a set of courses that complement their technical studies and satisfy their intellectual and/or career interests. All engineering majors must take thirty (30) credits. Nine (9) of the thirty credits are designated as follows and must be completed by all majors:

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: The Craft of Persuasion	3.0
ENGL 103	Composition and Rhetoric III: Thematic Analysis Across Genres	3.0

General Education requirements for specific majors can be found in the degree requirements for each major. The remaining credits can be chosen from the disciplines listed below.

Course Subjects

This following list is a sampling of subject codes for courses that can be taken to fulfill General Education requirements; other courses may be accepted upon advisor approval.

Accounting (ACCT), Africana Studies (AFAS), Anthropology (ANTH), Arabic (ARBC), Architecture (ARCH), Art History (ARTH), Business Law (BLAW), Chinese (CHIN), Communication (COM), Criminology & Justice Studies (CJS), Culinary Arts (CULA), Customer Operations (CUST), Dance (DANC), Economics (ECON), Education (EDUC), English (ENGL, except 101, 102, 103 & 105), Entertainment & Arts Management (EAM), Entrepreneurship (ENTP), Film Studies (FMST), Finance (FIN), French (FREN), General Business (BUSN), German (GER), Greek, (GREC), History (HIST), Hotel & Restaurant Management (HRM), Humanities (HUM, except 106, 107, & 108), Interior Design (INTR), International Area Studies (IAS), International Business (INTB), Italian (ITAL), Japanese (JAPN), Judaic Studies (JUDA), Korean (KOR), Language (LANG), Leadership (LEAD), Management (MGMT), Marketing (MKTG), Military Science (MLSC), Music (MUSC), Music Industry Program (MIP), Operations Management (OPM), Operations Research (OPR), Organizational Behavior (ORGB), Philosophy (PHIL), Photography (PHTO), Production Operations Management (POM), Portuguese (PORT), Product Design (PROD) Project Management (PROJ), Political Science (PSCI), Psychology (PSY, except 330 & 337), Real Estate (REAL), Russian (RUSS), Screenwriting & Playwriting (SCRIP), Sociology (SOC, except 364 & 365), Spanish (SPAN), Sports Management (SMT), Taxation (TAX), Theatre (THTR), WEST Studies (WEST), Women's and Gender Studies (WGST), and Writing (WRIT).

General Education electives must be non-technical. All Computer, Math, Engineering & Science related courses will NOT count as General Education electives.

Special Programs

Accelerated Programs/ Bachelor's/Master's Dual Degree Program

The Accelerated Program of the College of Engineering provides opportunities for highly talented and strongly motivated students to progress toward their educational goals essentially at their own pace. Primarily through advanced placement, credit by examination, flexibility of scheduling, and independent study, the program makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum. Students enrolled in this program may take advantage of the five-year Bachelor's/Master's Dual Degree Program described on the College of Engineering's Special Programs and Opportunities (<http://drexel.edu/engineering/programs/special-programs>) web page.

Lincoln University/Drexel 3-3 Plan

Drexel participates in a program with Lincoln University under which a student may attend Lincoln University for three years, taking liberal arts subjects and pre-engineering courses in mathematics, science, and related areas; transfer to Drexel; and receive a degree in engineering after three additional years at Drexel. This is similar to the conventional 3-2 program in which other colleges and universities participate; the extra year is necessitated by Drexel's co-operative education plan.

Facilities

Core Engineering Facilities

The Freshman Engineering Design Laboratories encompass three laboratories. They include two newly renovated spaces: a double laboratory room in the Bossone Research Center, which accommodates two lab sections, and another laboratory room that accommodates a single lab section in the LeBow Engineering Center.

Freshman Design courses taken by all new freshmen are held exclusively in these newly renovated rooms, which were completed in the fall of 2011. A team of Drexel faculty and staff designed these rooms to promote open communication within and across groups of students. Each room is equipped with Media:Scape tables manufactured by SteelCase. Each table has two 32-inch monitors that are connected to a MacMini computer, which is housed in the furniture, contributing to the overall clean look and feel of the classroom. The classroom design fosters and supports teamwork.

The Freshman Engineering Design Laboratories are a great example of Drexel's commitment to undergraduate education, by providing up-to-date, high-quality technology to facilitate the kind of experiential learning that keeps Drexel at the cutting edge.

Department Facilities

Departments within the College of Engineering have laboratory equipment appropriate for required lab coursework within curriculum. Most engineering department webpages describe their specialized facilities in detail.

Architectural Engineering

Major: Architectural Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 193.0

Classification of Instructional Programs (CIP) code: 14.0401

Standard Occupational Classification (SOC) code: 11-9041

About the Program

The architectural engineering major prepares graduates for professional work in the analysis, design, construction, and operation of residential, commercial, institutional, and industrial buildings. The program develops engineers familiar with all aspects of safe and economical construction. Students study the principles of structural support and external cladding, building environmental systems, and project management and develop depth in at least one area.

The program integrates building disciplines, including coordination with architects, construction managers, civil, mechanical, and electrical engineers, and others. Students use computer-aided design tools to understand system interactions, perform analysis, design, scheduling, and cost analysis, and present their work.

The first two years of the curriculum cover fundamentals necessary for all engineers. The pre-junior and junior years emphasize building systems and the principles governing their performance. In addition to the core engineering and science, students learn architectural approaches through studio design. Seniors focus on either structural or building environmental systems design, as well as a full-year realistic design project. The

academic program is complemented by exposure to professional practice in the co-op experience.

A special feature of the major is senior design. A group of students works with a faculty advisor to develop a significant design project selected by the group. All architectural engineering students participate in a design project.

Mission Statement

The civil and architectural engineering faculty are responsible for delivering an outstanding curriculum that equips our graduates with the broad technical knowledge, design proficiency, professionalism, and communications skills required for them to make substantial contributions to society and to enjoy rewarding careers.

Program Educational Objectives

Architectural engineering graduates will become professionals who analyze, design, construct, manage, or operate residential, commercial, institutional and industrial buildings and systems, or advance knowledge of the field.

Student Outcomes

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;
- e) an ability to identify, formulate, and solve engineering problems;
- f) an understanding of professional and ethical responsibility;
- g) an ability to communicate effectively;
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) a recognition of the need for, and an ability to engage in life-long learning;
- j) a knowledge of contemporary issues;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for architectural engineering practice.

Concentration Options

Mechanical Concentration (HVAC)

Students who choose the mechanical concentration (HVAC) prepare for careers dealing with the building environment. As co-ops and graduates, they will be involved in the many design aspects of building environmental control, including:

- building load definitions
- equipment selection and design
- distribution system design
- control systems design
- energy analysis and system optimization
- building operation for safety, economy and maximum performance

Structural Concentration

Students who choose the structural concentration prepare for careers dealing with the building structure. As co-ops and graduates, they will be involved in the design of the many aspects of building structure including:

- building load definitions
- structural system design
- foundation system design

Digital Building Concentration

Students who choose the digital building concentration prepare for careers dealing with the role of computer technology in building design, construction and operation. As co-ops and graduates, they will be involved in:

- development and use of Building Information Models (BIM) and databases
- configuration and operation of building sensor and actuator networks and monitoring systems
- developing and maintaining construction schedules, databases and monitoring systems

Additional Information

The Architectural Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

For more information about this major, contact the program director:

Michael Waring, PhD

Assistant Professor

Civil, Architectural & Environmental Engineering

[mws59@drexel.edu](mailto:mw59@drexel.edu)

Degree Requirements

General Education/Liberal Studies Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV E101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0

General Education requirements * 12.0

Foundation Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5

CHEM 102	General Chemistry II	4.5
BIO 141	Essential Biology	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0

Major Requirements

AE 220	Introduction to HVAC	3.5
AE 340	Architectural Illumination and Electrical Systems	3.0
AE 390	Architectural Engineering Design I	4.0
AE 391	Architectural Engineering Design II	4.0
AE 544	Building Envelope Systems	3.0
ARCH 141	Architecture and Society I	3.0
ARCH 142	Architecture and Society II	3.0
ARCH 143	Architecture and Society III	3.0
ARCH 191	Studio 1-AE	3.0
ARCH 192	Studio 2-AE	3.0
CAE 491 [WI (p. 215)]	Senior Design Project I	3.0
CAE 492 [WI (p. 215)]	Senior Design Project II	3.0
CAE 493 [WI (p. 215)]	Senior Design Project III	3.0
CAEE 201	Introduction to Infrastructure Engineering	3.0
CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0
CAEE 211	Measurements in Civil, Architectural and Environmental Engineering II	4.0
CIVE 240 [WI (p. 215)]	Engineering Economic Analysis	3.0
CIVE 250	Construction Materials	4.0
CIVE 330	Hydraulics	4.0
CIVE 320	Introduction to Fluid Flow	3.0
MEM 202	Statics	3.0
MEM 230	Mechanics of Materials I	4.0
ENGR 361	Statistical Analysis of Engineering Systems	3.0

Concentration Courses 29.0**Students select one of the following concentrations for a total of 29.0 credits:****Mechanical Concentration**

AE 430	Control Systems for HVAC	
CIVE 370	Introduction to Structural Analysis	
CIVE 371	Introduction to Structural Design	
CIVE 372	Structural Laboratory	
MEM 345	Heat Transfer	

MEM 413	HVAC Loads	
MEM 414	HVAC Equipment	
Three professional electives		

Structural Concentration

CIVE 300	Structural Analysis I	
CIVE 301	Structural Design I	
CIVE 310	Soil Mechanics I	
CIVE 400	First Principles of Structural Design	
CIVE 401	Structural Design II	
CIVE 402	Structural Design III	
CIVE 410	Foundation Engineering	

Two professional electives

Digital Building Concentration

AE 510	Intelligent Buildings	
CIVE 370	Introduction to Structural Analysis	
CIVE 371	Introduction to Structural Design	
CIVE 372	Structural Laboratory	
CMGT 361	Contracts And Specifications I	
CMGT 467	Techniques of Project Control	
INFO 210	Database Management Systems	
INFO 203	Information Technology for Engineers	

Two professional electives

Total Credits 193.0

* General Education Requirements. (p. 214)

Sample Plan of Study**BS Architectural Engineering, Mechanical Engineering****5 YR UG Co-op Concentration/Mechanical Engineering**

Term 1		Credits
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
CHEM 102	General Chemistry II	4.5
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
PHYS 101	Fundamentals of Physics I	4.0

MATH 122	Calculus II	4.0
Term Credits		19.5
Term 3		
BIO 141	Essential Biology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
Term Credits		17.5
Term 4		
CAEE 201	Introduction to Infrastructure Engineering	3.0
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		17.0
Term 5		
ARCH 191	Studio 1-AE	3.0
CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0
ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0
Term Credits		18.0
Term 6		
AE 340	Architectural Illumination and Electrical Systems	3.0
ARCH 141	Architecture and Society I	3.0
ARCH 192	Studio 2-AE	3.0
CIVE 320	Introduction to Fluid Flow	3.0
MEM 230	Mechanics of Materials I	4.0
Term Credits		16.0
Term 7		
AE 220	Introduction to HVAC	3.5
ARCH 142	Architecture and Society II	3.0
CAEE 211	Measurements in Civil, Architectural and Environmental Engineering II	4.0
CIVE 250	Construction Materials	4.0
CIVE 330	Hydraulics	4.0
Term Credits		18.5
Term 8		
AE 390	Architectural Engineering Design I	4.0
ARCH 143	Architecture and Society III	3.0
CIVE 240 [WI (p. 215)]	Engineering Economic Analysis	3.0
CIVE 370	Introduction to Structural Analysis	3.0
MEM 345	Heat Transfer	4.0
Term Credits		17.0
Term 9		
AE 391	Architectural Engineering Design II	4.0
CIVE 371	Introduction to Structural Design	3.0
CIVE 372	Structural Laboratory	1.0

Professional elective *		3.0
General Education elective *		3.0
Term Credits		14.0
Term 10		
AE 544	Building Envelope Systems	3.0
CAE 491 [WI (p. 215)]	Senior Design Project I	3.0
ENGR 361	Statistical Analysis of Engineering Systems	3.0
MEM 413	HVAC Loads	3.0
General Education elective *		3.0
Term Credits		15.0
Term 11		
CAE 492 [WI (p. 215)]	Senior Design Project II	3.0
MEM 414	HVAC Equipment	3.0
Professional elective *		3.0
General Education elective *		3.0
Term Credits		12.0
Term 12		
AE 430	Control Systems for HVAC	3.0
CAE 493 [WI (p. 215)]	Senior Design Project III	3.0
Professional elective *		3.0
General Education elective *		3.0
Term Credits		12.0
Total Credit: 193.0		

* See degree requirements (p. 216).

BS Architectural Engineering, Structural 5 YR UG Co-op Concentration/Structural

		Credits
Term 1		
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0

UNIV E101	The Drexel Experience	0.5
Term Credits		19.0
Term 3		
BIO 141	Essential Biology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		18.0
Term 4		
CAEE 201	Introduction to Infrastructure Engineering	3.0
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		17.0
Term 5		
ARCH 191	Studio 1-AE	3.0
CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0
ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0
Term Credits		18.0
Term 6		
AE 340	Architectural Illumination and Electrical Systems	3.0
ARCH 141	Architecture and Society I	3.0
ARCH 192	Studio 2-AE	3.0
CIVE 320	Introduction to Fluid Flow	3.0
MEM 230	Mechanics of Materials I	4.0
Term Credits		16.0
Term 7		
AE 220	Introduction to HVAC	3.5
ARCH 142	Architecture and Society II	3.0
CAEE 211	Measurements in Civil, Architectural and Environmental Engineering II	4.0
CIVE 250	Construction Materials	4.0
CIVE 330	Hydraulics	4.0
Term Credits		18.5
Term 8		
AE 390	Architectural Engineering Design I	4.0
ARCH 143	Architecture and Society III	3.0
CIVE 240 [WI (p. 215)]	Engineering Economic Analysis	3.0
CIVE 300	Structural Analysis I	3.0
CIVE 310	Soil Mechanics I	4.0
Term Credits		17.0
Term 9		
AE 391	Architectural Engineering Design II	4.0
CIVE 301	Structural Design I	4.0

Professional elective *		3.0
General Education elective *		3.0
Term Credits		14.0
Term 10		
AE 544	Building Envelope Systems	3.0
CAE 491 [WI (p. 215)]	Senior Design Project I	3.0
CIVE 400	First Principles of Structural Design	3.0
ENGR 361	Statistical Analysis of Engineering Systems	3.0
General Education elective *		3.0
Term Credits		15.0
Term 11		
CAE 492 [WI (p. 215)]	Senior Design Project II	3.0
CIVE 401	Structural Design II	3.0
CIVE 410	Foundation Engineering	3.0
General Education elective *		3.0
Term Credits		12.0
Term 12		
CAE 493 [WI (p. 215)]	Senior Design Project III	3.0
CIVE 402	Structural Design III	3.0
Professional elective *		3.0
General Education elective *		3.0
Term Credits		12.0

Total Credit: 193.0

* See degree requirements (p. 216).

BS Architectural Engineering, Digital Building 5 YR UG Co-op Concentration/Digital Building

		Credits
Term 1		
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
PHYS 101	Fundamentals of Physics I	4.0
MATH 122	Calculus II	4.0

UNIV E101	The Drexel Experience	0.5
Term Credits		19.0
Term 3		
BIO 141	Essential Biology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		18.0
Term 4		
CAEE 201	Introduction to Infrastructure Engineering	3.0
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		17.0
Term 5		
ARCH 191	Studio 1-AE	3.0
CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0
ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0
Term Credits		18.0
Term 6		
AE 340	Architectural Illumination and Electrical Systems	3.0
ARCH 141	Architecture and Society I	3.0
ARCH 192	Studio 2-AE	3.0
CIVE 320	Introduction to Fluid Flow	3.0
MEM 230	Mechanics of Materials I	4.0
Term Credits		16.0
Term 7		
AE 220	Introduction to HVAC	3.5
ARCH 142	Architecture and Society II	3.0
CAEE 211	Measurements in Civil, Architectural and Environmental Engineering II	4.0
CIVE 250	Construction Materials	4.0
CIVE 330	Hydraulics	4.0
Term Credits		18.5
Term 8		
AE 390	Architectural Engineering Design I	4.0
ARCH 143	Architecture and Society III	3.0
CIVE 240 [WI (p. 215)]	Engineering Economic Analysis	3.0
CIVE 370	Introduction to Structural Analysis	3.0
Professional Elective**		3.0
Term Credits		16.0
Term 9		
AE 391	Architectural Engineering Design II	4.0
CIVE 371	Introduction to Structural Design	3.0

CIVE 372	Structural Laboratory	1.0
INFO 210	Database Management Systems	3.0
General Education Elective*		3.0
Term Credits		14.0
Term 10		
AE 544	Building Envelope Systems	3.0
CAE 491 [WI (p. 215)]	Senior Design Project I	3.0
ENGR 361	Statistical Analysis of Engineering Systems	3.0
INFO 203	Information Technology for Engineers	3.0
General Education Elective*		3.0
Term Credits		15.0
Term 11		
AE 510	Intelligent Buildings	3.0
CAE 492 [WI (p. 215)]	Senior Design Project II	3.0
CMGT 467	Techniques of Project Control	4.0
General Education Elective*		3.0
Term Credits		13.0
Term 12		
CAE 493 [WI (p. 215)]	Senior Design Project III	3.0
CMGT 361	Contracts And Specifications I	3.0
General Education Elective*		3.0
Professional Elective**		3.0
Term Credits		12.0
Total Credit: 193.0		

* See degree requirements (p. 216).

** Students are asked to speak with their program advisor before registering for the INFO elective.

Co-op/Career Opportunities

The major in architectural engineering prepares students for professional work in residential, commercial, institutional, and industrial building systems, in cooperation with architects and other engineers.

Sample Co-op Experiences

When students complete their co-op jobs, they are asked to write an overview of their experiences. These brief quotes are taken from some recent student reports:

Project technician, major university: "Studied and surveyed existing buildings and facilities for: their compliance with the Americans with Disabilities Act, heating and air conditioning equipment sizing, electrical loads, and their planning and usage of space. Designed improvements from the field surveys taken, and developed construction drawings. Worked closely with the workforce in implementing these changes."

CAD technician, private engineering firm: "Prepared computer generated construction plans for various water and sewer reconstruction projects. . . Was able to expand my knowledge of Auto CAD to include Advanced Design Modules."

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Dual/Accelerated Degree

The Accelerated Program of the College of Engineering provides opportunities for highly talented and strongly motivated students to progress toward their educational goals essentially at their own pace. Primarily through advanced placement, credit by examination, flexibility of scheduling, and independent study, the program makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum.

Dual Degree Bachelor's Programs

A student completing the Bachelor of Science degree program in architectural engineering may complete additional courses (specified by the department) to earn the Bachelor of Science degree in civil engineering. (The reverse is difficult because of prerequisites in the sequence of architectural studio design courses, which begins in the sophomore year.)

Required Courses for Dual Degree in Civil Engineering

CIVE 430	Hydrology	3.0
CIVE 477 [WI (p. 215)]	Seminar	2.0
CIVE 478 [WI (p. 215)]	Seminar	1.0
ENVE 300	Introduction to Environmental Engineering	3.0
Technical Elective (200-level or above) *		3.0

Required Courses for Mechanical Concentration

CIVE 310	Soil Mechanics I	4.0
CIVE 410	Foundation Engineering	3.0

Required Courses for Structural Concentration

CIVE 375	Structural Material Behavior	3.0
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* Check with the Department for Technical elective options.

Bachelor's/Master's Dual Degree Program

Exceptional students can also pursue a master of science degree in the same period as the bachelor of science. Exceptional students can also pursue a master of science degree in the same period as the bachelor of science. For more information about this program, visit the Department's BS/MS Dual Degree Program (http://www.cae.drexel.edu/dual_degree.asp) page.

Minor in Architectural Engineering

The minor in architectural engineering, designed to broaden the professional capabilities of students, offers the building systems portion of the architectural engineering curriculum with enough attention to structural components for completeness. Pursuing a minor in architectural engineering can be of interest to mechanical engineering students who wish to learn the application of HVAC systems within the building context; to civil engineering students who require knowledge of large-scale infrastructure systems; and to chemical engineering students who wish to understand the energy and distribution aspects of process plant design.

The minor consists of a minimum of 24.0 credits total, with five required core courses. Students take a minimum of eight additional credits taken from a list of optional courses.

While this minor is primarily designed to provide technical knowledge and skills to other engineers, with the appropriate prerequisites students from other disciplines—such as architecture—can also complete this minor.

Prerequisites

The common engineering core curriculum prerequisites are required of all students in the College of Engineering. Students from other colleges will need the appropriate background prerequisite courses in physics, mathematics and thermodynamics.

Required Courses

CAEE 201	Introduction to Infrastructure Engineering	3.0
AE 220	Introduction to HVAC	3.5
AE 340 or ARCH 263	Architectural Illumination and Electrical Systems Environmental Systems III	3.0
AE 390	Architectural Engineering Design I	4.0
CIVE 370	Introduction to Structural Analysis	3.0
Select two of the following:		8.0
CIVE 250	Construction Materials	
CIVE 371	Introduction to Structural Design	
MEM 413	HVAC Loads	
MEM 310	Thermodynamic Analysis I	
ARCH 191 or ARCH 101	Studio 1-AE Studio 1-A	
AE 391	Architectural Engineering Design II	
CIVE 240 [WI (p. 215)]	Engineering Economic Analysis	
Total Credits		24.5

Facilities

The Department is well equipped with state-of-the-art facilities:

- The department computer labs are in operation: a computer-assisted design (CAD) and computerized instructional lab; and a graduate-level lab (advanced undergraduates can become involved in graduate-level work).
- External labs are used for surveying, building diagnostics, and surface and ground-water measurements.

Civil, Architectural and Environmental Engineering Faculty

Emin A. Aktan, PhD (*University of Illinois at Urbana-Champaign*) John Roebling Professor of Infrastructure Studies. Professor. Structural engineering; infrastructure; evaluation; intelligent systems.

Ivan Bartoli, PhD (*University of California, San Diego*). Assistant Professor. Non-destructive evaluation and structural health monitoring; dynamic identification, stress wave propagation modeling.

Robert Brehm, PhD (*Drexel University*). Associate Teaching Professor. International infrastructure delivery; response to natural catastrophes; risk assessment and mitigation strategies; project management techniques.

S.C. Jonathan Cheng, PhD (*West Virginia University*). Associate Professor. Soil mechanics; geosynthetics; probabilistic design; landfill containments.

Louis DaSaro, MS (*University of Delaware*). Associate Teaching Professor. Failure analysis and restoration of existing structures, blast resistant structures, green structures, engineering education.

Patricia Gallagher, PhD (*Virginia Polytechnic Institute*). Associate Professor. Soil mechanics; geoenvironmental; ground improvement; sustainability.

Patrick Gurian, PhD (*Carnegie-Mellon University*). Associate Professor. Risk analysis of environmental and infrastructure systems, novel adsorbent materials, environmental standard setting, Bayesian statistical modeling, community outreach and environmental health.

Charles N. Haas, PhD (*University of Illinois-Urbana*) *L. D. Betz Professor and Department Head, Civil, Architectural and Environmental Engineering*. Professor. Control of human exposures to and risk assessment of pathogenic organisms; water and waste treatment; homeland security.

Ahmad Hamid, PhD (*McMaster University*). Professor. Engineered masonry; building; cladding; prestressed concrete.

Y. Grace Hsuan, PhD (*Imperial College*). Professor. Polymeric and cementitious materials; geosynthetic reliability and durability.

Joseph B. Hughes, PhD (*University of Iowa*) *Dean of the College of Engineering and Distinguished Professor*. Biological processes and applications of nanotechnology in environmental systems.

Joseph P. Martin, PhD (*Colorado State University*). Professor. Geoenvironmental engineering; urban environmental hydrology; transportation.

James E. Mitchell, MArch (*University of Pennsylvania*). Associate Professor. Architectural engineering design; building systems.

Franco Montalto, PhD (*Cornell University*). Associate Professor. Effects of built infrastructure on societal water needs, ecohydrologic patterns and processes, ecological restoration, green design, water interventions.

Franklin Moon, PhD (*Georgia Institute of Technology*). Associate Professor. Full-scale structural testing, structural dynamics, evaluation and rehabilitation of existing structures.

Joseph V. Mullin, PhD (*Pennsylvania State University*). Senior Lecturer. Structural material behavior, engineering economy and design.

Mira S. Olson, PhD (*University of Virginia*). Associate Professor. Groundwater; environmental fluid mechanics; hydrology.

Anu Pradhan, PhD (*Carnegie Mellon University*). Assistant Professor. Infrastructure management, construction engineering, transportation engineering, sensing system, geographic information system, statistical machine learning.

Yared Shifferaw, PhD (*Johns Hopkins University*). Assistant Professor. Computational and experimental mechanics, structural stability, optimization, health monitoring and hazard mitigation, sustainable structures, emerging materials, thin-walled structures and metallic structures.

Kurt Sjoblom, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Laboratory testing of geomaterials, geotechnical engineering, foundation engineering.

Sabrina Spatari, PhD (*University of Toronto*). Assistant Professor. Research in industrial ecology; development and application of life cycle assessment (LCA) and material flow analysis (MFA) methods for guiding engineering and policy decisions; specific interest in biomass and bioenergy, biofuels, and urban infrastructure.

Michael Waring, PhD (*University of Texas-Austin*). Assistant Professor. Indoor air quality and building sustainability; indoor particulate matter fate and transport; indoor chemistry and particle formation; secondary impacts of control technologies and strategies.

Jin Wen, PhD (*University of Iowa*). Associate Professor. Architectural engineering, building control systems, indoor air quality.

Aspasia Zerva, PhD (*University of Illinois*). Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Interdepartmental Faculty

Eugenia Ellis, PhD (*Virginia Polytechnic State University*). Associate Professor. Registered architect; interior design, extended-care facilities design, research on spatial visualization, perception and imagination.

Bakhtier Farouk, PhD (*University of Delaware*) *Billings Professor of Mechanical Engineering*. Professor. Heat transfer; combustion; numerical methods; turbulence modeling; materials processing.

Emeritus Faculty

Harry G. Harris, PhD (*Cornell University*). Professor Emeritus. Structural models, dynamics of structures, plates and shells, industrialized building construction.

Robert M. Koerner, PhD (*Duke University*). Harry Bownam Professor Emeritus. Geosynthetic engineering; soil mechanics; water resources.

Richard Weggel, PhD (*University of Illinois*) *Samuel S. Baxter Professor Emeritus; Civil and Environmental Engineering*. Professor Emeritus. Coastal engineering; hydraulics engineering; hydrology.

Richard Woodring, PhD (*University of Illinois*) *Dean of Engineering Emeritus*. Professor Emeritus. Structural engineering, reinforced concrete.

Chemical Engineering

Major: Chemical Engineering

Degree Awarded: Bachelor of Science in Chemical Engineering (BSCHE)

Calendar Type: Quarter

Total Credit Hours: 192.5

Classification of Instructional Programs (CIP) code: 14.0701

Standard Occupational Classification (SOC) code: 17-2041

About the Program

The department of Chemical and Biological Engineering's chemical engineering curriculum is structured so that students progress through sequences in the fundamental physical sciences, humanities, engineering sciences, and engineering design.

Chemical engineers are concerned primarily with process engineering, the conversion of raw materials into valuable products. The products can

include pharmaceuticals, specialized plastics, petrochemicals, materials for biomedical applications, and energy. The processes, which usually start out at a small laboratory scale, must be developed for production at a large chemical plant scale. The large change in scale requires careful engineering to minimize environmental contamination and to ensure public safety.

The Department of Chemical and Biological Engineering is responsible for equipping our graduates with the broad technical knowledge and teamwork skills required for them to make substantial contributions to society.

Sample Senior Design Projects

A special feature of the major is senior design. A student — or group of students — works with a faculty advisor to develop a significant design project. Some recent examples include:

- Design of a process to make petrochemical intermediates
- Plastics recycling design
- Process design for antibiotic products

Program Educational Objectives

The chemical engineering major has four goals for its students:

- Our graduates will succeed in careers requiring strong skills in engineering, science, communication, and teamwork.
- Our graduates will continue to upgrade their technological skills through life-long learning involving self- or group-study.
- Our graduates will conduct their work with an understanding of its global impact and ethical consequences.
- Our graduates will contribute to research and development at the forefront of chemical engineering and related fields.

To help students reach these goals, the curriculum is structured so that they progress through sequences in the fundamental physical sciences, humanities, engineering sciences, and design.

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- an ability to apply knowledge of mathematics, science, and engineering;
- an ability to design and conduct experiments, as well as to analyze and interpret data;
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- an ability to function on multidisciplinary teams;
- an ability to identify, formulate, and solve engineering problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;

i) a recognition of the need for, and an ability to engage in life-long learning;

j) a knowledge of contemporary issues;

k) an ability to use the techniques, skills, and modern engineering tools necessary for chemical engineering practice.

Additional Information

The Chemical Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

For more information about this program, visit Drexel University's Department of Chemical and Biological Engineering (<http://www.chemeng.drexel.edu>) web page.

Degree Requirements

General Education/Liberal Studies Requirements

HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 315	Engineering Ethics	3.0
UNIV E101	The Drexel Experience	2.0
General Education Requirements *		15.0
Free Electives		3.0

Foundation Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 141	Essential Biology	4.5
CS 121	Computation Laboratory I	1.0
CS 122	Computation Laboratory II	1.0
CS 123	Computation Laboratory III	1.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0

Sophomore Engineering Elective Options

Select one of the following:		3.0
BIO 214	Principles of Cell Biology	
CHEM 230	Quantitative Analysis	
ENVS 260	Environmental Science and Society	

MATH 221	Discrete Mathematics	
PHYS 202	Fundamentals of Physics IV	
Professional Requirements		
CHE 201	Process Material Balances	3.0
CHE 202	Process Energy Balances	3.0
CHE 206	Basic Chemical Engineering Thermodynamics	3.0
CHE 301	Process Thermodynamics	3.0
CHE 302	Process Fluid Mechanics	4.0
CHE 303	Process Heat Transfer	3.0
CHE 304	Process Mass Transfer	4.0
CHE 305	Process Separations	4.0
CHE 307	Process Modeling I	4.0
CHE 308	Process Modeling II	4.0
CHE 332 [WI (p. 222)]	Chemical Engineering Laboratory	2.0
CHE 333 [WI (p. 222)]	Chemical Engineering Laboratory II	2.0
CHE 334 [WI (p. 222)]	Chemical Engineering Laboratory III	2.0
CHE 335	Statistics and Design of Experiments	3.0
CHE 420	Process Systems Engineering	3.0
CHE 424	Chemical Kinetics and Reactor Design	4.0
CHE 481	Process Design I	3.0
CHE 482 [WI (p. 222)]	Process Design II	3.0
CHE 483 [WI (p. 222)]	Process Design III	3.0
CHEC 352	Physical Chemistry and Applications II	4.0
CHEC 353	Physical Chemistry and Applications III	4.0
CHEM 241	Organic Chemistry I	4.0
CHEM 242	Organic Chemistry II	4.0
CHEM 356	Physical Chemistry Laboratory	2.0
Concentration Electives		14.0
Total Credits		192.5

* General Education Requirements (p. 214).

Graduate-Level Electives

CHE 502	Mathematical Methods in Chemical Engineering	3.0
CHE 513	Chemical Engineering Thermodynamics	3.0
CHE 525	Transport Phenomena I	3.0
CHE 543	Kinetics & Catalysis I	3.0
CHE 554	Process Systems Engineering	3.0
CHE 562	Bioreactor Engineering	3.0
CHE 564	Unit Operations in Bioprocess Systems	3.0
CHE 614	Chemical Engineering Thermodynamics II	3.0

Sample Plan of Study

5 YR UG Co-op Concentration

Term 1		Credits
CHEM 101	General Chemistry I	3.5

COOP 101	Career Management and Professional Development	0.0
CS 121	Computation Laboratory I	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
MATH 121	Calculus I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		15.5

Term 2		
CHEM 102	General Chemistry II	4.5
CS 122	Computation Laboratory II	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		19.0

Term 3		
BIO 141	Essential Biology	4.5
CS 123	Computation Laboratory III	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		19.0

Term 4		
CHE 201	Process Material Balances	3.0
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		17.0

Term 5		
CHE 202	Process Energy Balances	3.0
CHE 206	Basic Chemical Engineering Thermodynamics	3.0
ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 232	Dynamic Engineering Systems	3.0
Sophomore Engineering Elective*		3.0
Term Credits		15.0

Term 6		
CHE 301	Process Thermodynamics	3.0
CHE 307	Process Modeling I	4.0
CHEM 241	Organic Chemistry I	4.0
CHEM 356	Physical Chemistry Laboratory	2.0
HIST 285	Technology in Historical Perspective	3.0
Term Credits		16.0

Term 7		
CHE 302	Process Fluid Mechanics	4.0

CHE 332 [WI (p. 222)]	Chemical Engineering Laboratory	2.0
CHE 335	Statistics and Design of Experiments	3.0
CHEM 242	Organic Chemistry II	4.0
PHIL 315	Engineering Ethics	3.0
Term Credits		16.0

Term 8

CHE 303	Process Heat Transfer	3.0
CHE 305	Process Separations	4.0
CHE 333 [WI (p. 222)]	Chemical Engineering Laboratory II	2.0
CHEC 352	Physical Chemistry and Applications II	4.0
General Education Elective*		3.0
Term Credits		16.0

Term 9

CHE 304	Process Mass Transfer	4.0
CHE 334 [WI (p. 222)]	Chemical Engineering Laboratory III	2.0
CHE 308	Process Modeling II	4.0
CHEC 353	Physical Chemistry and Applications III	4.0
General Education Elective*		3.0
Term Credits		17.0

Term 10

CHE 420	Process Systems Engineering	3.0
CHE 424	Chemical Kinetics and Reactor Design	4.0
CHE 481	Process Design I	3.0
General Education Elective*		3.0
Term Credits		13.0

Term 11

CHE 482 [WI (p. 222)]	Process Design II	3.0
Free Elective		3.0
CHE Concentration Electives		7.0
General Education Elective*		3.0
Term Credits		16.0

Term 12

CHE 483 [WI (p. 222)]	Process Design III	3.0
CHE Concentration Electives		7.0
General Education Elective*		3.0
Term Credits		13.0

Total Credit: 192.5

* See degree requirements (p. 223).

Co-op/Career Opportunities

Chemical engineers tend to work for large corporations with such job assignments as process engineering, design engineering, plant operation, research and development, sales, and management. They also work for federal and state government agencies on projects related to environmental problems, defense, energy, and health-related research.

Some major employers of Drexel's chemical engineering graduates are DuPont, Merck, BASF, ExxonMobil, Rohm & Haas, and Air Products. A number of graduates go on to pursue master's and/or doctoral degrees. Graduate schools that Drexel's chemical engineers have attended include the University of California at Berkeley and Massachusetts Institute of Technology, among others.

Co-Op Experiences

Drexel is located in downtown Philadelphia with easy access to major pharmaceutical, chemical, and petroleum companies. When students complete their co-op jobs, they are asked to write an overview of their experiences. These brief quotes are taken from some recent student reports:

Research assistant, chemicals manufacturer: "Conducted research in a developmental polyamide process. Aspects included scale-up from bench-scale to batch demonstration, installation and calibration of on-line composition sensors, off-line analytical techniques to assess product quality, and interfacing with plant sites to define and standardize a critical quality lab procedure. Documented results in technical memos and in a plant presentation . . . I had a lot of freedom and responsibility. It was great interacting with other researchers and technicians. Everyone was so helpful."

Co-op engineer, chemicals manufacturer: "Created material safety data sheets, which involved chemical composition, hazard communication, occupational safety and health, emergency response, and regulatory issues for numerous products and wastes. Handled domestic and international regulatory reviews. Determined hazardous waste reporting requirements, handling and disposal procedures. Evaluated toxicological and ecological data for assessment of hazard ratings. Provided input on product safety technical reports."

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Facilities

The Department of Chemical and Biological Engineering occupies the 2nd, 3rd, and 4th floors of the Center for Automation Technology. Approximately 35,000 square feet (gross) are available for the department.

Two thousand square feet of laboratory facilities are designated for the pre-junior and junior year laboratory courses. Experiments in these laboratory courses (CHE 332 [WI (p. 222)], CHE 333 [WI (p. 222)], CHE 334 [WI (p. 222)]) focus on applying concepts in thermodynamics, fluid mechanics, heat and mass transfer, separations, and reaction engineering. Laboratory courses are run with class sizes of 18 or less.

The department also has two computer laboratories. The senior design laboratory features nine booths designed for team projects. Each booth contains a work station loaded with the latest process simulation software produced by Aspen, Simulation Sciences, and HYSYS. Seniors use the room heavily during their capstone design experience (CHE 481, CHE 482 [WI (p. 222)], CHE 483 [WI (p. 222)]), although pre-junior courses in separations and transport also include projects requiring use of the process simulation software. A second computer lab contains over 30 individual work stations with general and engineering-specific software.

Many undergraduate students participate in research projects in faculty laboratories as part of independent study coursework or BS/MS thesis work. Chemical engineering faculty are engaged in a wide range of

research activities in areas including energy and the environment, polymer science and engineering, biological engineering, and multiscale modeling and process systems engineering. Further details can be found at <http://www.chemeng.drexel.edu/research>.

Dual/Accelerated Degree

Accelerated Program

The Accelerated Program of the College of Engineering provides opportunities for highly-talented and strongly-motivated students to progress toward their educational goals essentially at their own pace. Through advanced placement, credit by examination, flexibility of scheduling, and independent study, the program makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum.

Bachelor's/Master's Dual Degree Program

Drexel offers a combined MS/BS degree program for our top engineering students who want to obtain both degrees in the same time period as most students obtain a Bachelor's degree. In chemical engineering, the course sequence for MS/BS students involves additional graduate courses and electives.

Chemical and Biological Engineering Faculty

Cameron F. Abrams, PhD (*University of California, Berkeley*). Professor. Molecular simulations in biophysics and materials; receptors for insulin and growth factors; and HIV-1 envelope structure and function.

Jason Baxter, PhD (*University of California, Santa Barbara*). Associate Professor. Solar cells, semiconductor nanomaterials, ultrafast spectroscopy.

Richard A. Cairncross, PhD (*University of Minnesota*). Associate Professor. Effects of microstructure on transport and properties of polymers; moisture transport and degradation on biodegradation on biodegradable polymers; production of biofuel.

Nily R. Dan, PhD (*University of Minnesota*). Associate Professor. Design of synthetic gene and drug carriers; design of polymeric drug carriers; metal cluster formation in polymeric matrices; colloidal absorption in patterned surfaces.

Yossef A. Elabd, PhD (*Johns Hopkins University*). Professor. Fuel cells; polymer membranes; diffusion in polymers.

Vibha Kalra, PhD (*Cornell University*). Assistant Professor. Nanotechnology, polymer nanocomposites.

Kenneth K.S. Lau, PhD (*Massachusetts Institute of Technology*). Associate Professor. Surface science; nanotechnology; polymer thin films and coatings; chemical vapor deposition.

Raj Mutharasan, PhD (*Drexel University*) *Frank A. Fletcher Professor*. Biochemical engineering; cellular metabolism in bioreactors; biosensors.

Giuseppe R. Palmese, PhD (*University of Delaware*) *Department Head, Chemical and Biological Engineering*. Professor. Reacting polymer systems; nanostructured polymers; radiation processing of materials; composites and interfaces.

George F. Rowell, PhD (*University of Pennsylvania*). Associate Teaching Professor. Undergraduate laboratory supervising.

Masoud Soroush, PhD (*University of Michigan*). Professor. Process systems engineering; polymer engineering.

John H. Speidel, BSHE, MCHE (*University of Delaware; Illinois Institute of Technology*). Teaching Professor.

Stephen P. Wrenn, PhD (*University of Delaware*) *Assistant Dean of Graduate Affairs, College of Engineering*. Associate Professor. Biomedical engineering; biological colloids; membrane phase behavior and cholesterol transport.

Emeritus Faculty

Charles B. Weinberger, PhD (*University of Michigan*). Professor Emeritus. Suspension rheology; fluid mechanics of multi-phase systems.

Civil Engineering

Major: Civil Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 190.5

Classification of Instructional Programs (CIP) code: 14.0801

Standard Occupational Classification (SOC) code: 17-2051

About the Program

The civil engineering major prepares students in the fundamental principles necessary to practice this profession in any of its branches, including construction management, water resources, structural, transportation, environmental, geotechnical, and public facilities engineering.

Civil engineers are active in the planning, design, construction, research and development, operation, maintenance, and rehabilitation of large engineering systems. A particular focus is the reconstruction of the nation's infrastructure through solutions that minimize the disruption of social and natural environments.

Civil engineering graduates are grounded in the fundamental principles necessary for the practice of this profession in any of its modern branches, including construction management, water resources engineering, structural engineering, geotechnical engineering, transportation engineering, and environmental engineering.

Seven of the required courses in the discipline include integral laboratories or field projects for both educational illustration and professional practice exposure.

Careful selection of the electives specified in the curriculum can lead to a wide variety of career objectives. For instance, students with an interest in water resources engineering may elect advanced courses in hydrology, ecology, and chemistry; select senior professional electives in the geotechnical and water resources areas; and choose appropriate topics for senior design and senior seminar. Seniors, with the approval of the department head, can elect certain graduate courses.

A special feature of the major is senior design. A group of students works with a faculty advisor to develop a significant design project selected by the group. All civil engineering students participate in a design project.

Mission Statement

The civil and architectural engineering faculty are responsible for delivering an outstanding curriculum that equips our graduates with the broad technical knowledge, design proficiency, professionalism, and communications skills required for them to make substantial contributions to society and to enjoy rewarding careers.

Program Educational Objectives

Civil engineering graduates will become professionals who analyze, design, construct, manage or operate physical infrastructure and systems, or advance knowledge of the field.

Student Outcomes

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;
- e) an ability to identify, formulate, and solve engineering problems;
- f) an understanding of professional and ethical responsibility;
- g) an ability to communicate effectively;
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) a recognition of the need for, and an ability to engage in life-long learning;
- j) a knowledge of contemporary issues;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for civil engineering practice.

Additional Information

The Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

For more information about this major, contact the Department of Civil, Architectural and Environmental Engineering (<http://www.cae.drexel.edu>).

Degree Requirements

General Education/Liberal Studies Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV E101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0

General Education Requirements *		21.0
Free Electives		6.0
Foundation Requirements		
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 141	Essential Biology	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
ENGR 361	Statistical Analysis of Engineering Systems	3.0
Major Requirements		
CAE 491 [WI (p. 226)]	Senior Design Project I	3.0
CAE 492 [WI (p. 226)]	Senior Design Project II	3.0
CAE 493 [WI (p. 226)]	Senior Design Project III	3.0
CAEE 201	Introduction to Infrastructure Engineering	3.0
CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0
CAEE 211	Measurements in Civil, Architectural and Environmental Engineering II	4.0
CIVE 240 [WI (p. 226)]	Engineering Economic Analysis	3.0
CIVE 250	Construction Materials	4.0
CIVE 310	Soil Mechanics I	4.0
CIVE 320	Introduction to Fluid Flow	3.0
CIVE 330	Hydraulics	4.0
CIVE 375	Structural Material Behavior	3.0
CIVE 410	Foundation Engineering	3.0
CIVE 430	Hydrology	3.0
CIVE 477 [WI (p. 226)]	Seminar	2.0
CIVE 478 [WI (p. 226)]	Seminar	1.0
ENVE 300	Introduction to Environmental Engineering	3.0
MEM 202	Statics	3.0
MEM 230	Mechanics of Materials I	4.0

Senior Professional Electives **	18.0
Select one of the following:	3.0
CIVE 370 Introduction to Structural Analysis	
CIVE 300 Structural Analysis I	
Based on whether or not students are pursuing a structural or non-structural concentration, students select one of the following options:er:	4.0
CIVE 301 Structural Design I	
CIVE 371 Introduction to Structural Design & CIVE 372 and Structural Laboratory	
Total Credits	190.5

* General Education Requirements (p. 214).

** A sequence of three courses in a major area of study is required, with a total of six 3-credit professional electives.

Sample Plan of Study

BS Civil Engineering

5 YR UG Co-op Concentration

	Credits
Term 1	
CHEM 101 General Chemistry I	3.5
COOP 101 Career Management and Professional Development	0.0
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100 Beginning Computer Aided Drafting for Design	1.0
ENGR 101 Engineering Design Laboratory I	2.0
ENGR 121 Computation Lab I	2.0
MATH 121 Calculus I	4.0
UNIV E101 The Drexel Experience	1.0
Term Credits	16.5
Term 2	
CHEM 102 General Chemistry II	4.5
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102 Engineering Design Laboratory II	2.0
ENGR 122 Computation Lab II	1.0
MATH 122 Calculus II	4.0
PHYS 101 Fundamentals of Physics I	4.0
CIVC 101 Introduction to Civic Engagement	1.0
Term Credits	19.5
Term 3	
BIO 141 Essential Biology	4.5
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103 Engineering Design Laboratory III	2.0
MATH 200 Multivariate Calculus	4.0
PHYS 102 Fundamentals of Physics II	4.0
Term Credits	17.5
Term 4	
CAEE 201 Introduction to Infrastructure Engineering	3.0
ENGR 201 Evaluation Presentation of Experimental Data I	3.0
ENGR 220 Fundamentals of Materials	4.0

ENGR 231 Linear Engineering Systems	3.0
PHYS 201 Fundamentals of Physics III	4.0
Term Credits	17.0
Term 5	
CAEE 210 Measurements in Civil, Architectural and Environmental Engineering I	3.0
ENGR 202 Evaluation Presentation of Experimental Data II	3.0
ENGR 210 Introduction to Thermodynamics	3.0
ENGR 232 Dynamic Engineering Systems	3.0
MEM 202 Statics	3.0
Term Credits	15.0
Term 6	
CIVE 320 Introduction to Fluid Flow	3.0
ENGR 361 Statistical Analysis of Engineering Systems	3.0
ENVE 300 Introduction to Environmental Engineering	3.0
MEM 230 Mechanics of Materials I	4.0
General Education Elective *	3.0
Term Credits	16.0
Term 7	
CAEE 211 Measurements in Civil, Architectural and Environmental Engineering II	4.0
CIVE 240 [WI Engineering Economic Analysis (p. 226)]	3.0
CIVE 250 Construction Materials	4.0
CIVE 330 Hydraulics	4.0
General Education Elective *	3.0
Term Credits	18.0
Term 8	
CIVE 310 Soil Mechanics I	4.0
CIVE 430 Hydrology	3.0
CIVE 370 Introduction to Structural Analysis or 300 Structural Analysis I	3.0
General Education Elective *	3.0
Free Elective	3.0
Term Credits	16.0
Term 9	
CIVE 375 Structural Material Behavior	3.0
CIVE 410 Foundation Engineering	3.0
General Education Electives *	3.0
CIVE 301 Structural Design I (Non-structural concentration takes CIVE 371 & CIVE 372)	4.0
Term Credits	13.0
Term 10	
CAE 491 [WI Senior Design Project I (p. 226)]	3.0
CIVE 477 [WI Seminar (p. 226)]	2.0
Professional Electives *	6.0
General Education Elective *	3.0
Term Credits	14.0
Term 11	

CAE 492 [WI Senior Design Project II (p. 226)]	3.0
CIVE 478 [WI Seminar (p. 226)]	1.0
Professional Electives *	6.0
General Education Elective *	3.0
Term Credits	13.0
Term 12	
CAE 493 [WI Senior Design Project III (p. 226)]	3.0
Free Elective	3.0
Professional Electives *	6.0
General Education Elective *	3.0
Term Credits	15.0
Total Credit: 190.5	

* See degree requirements (p. 227).

Co-op/Career Opportunities

When students complete their co-op jobs, they are asked to write an overview of their experiences. These brief quotes are taken from some recent student reports:

Engineering construction inspector, state department of transportation: Supervised daily activities involved in the roadway construction of the [interstate] bypass. Recorded daily visual inspection reports for soil sub-base and materials placed on site. Aided senior roadway engineers in approving grade prior to asphalt placement. Used various instruments to check temperature and depths for asphalt placement. Took part in on-site discussions with contractor to clear up any daily construction problems that would hinder quality of construction. "

Construction inspector, municipal department of public property: "Inspected work performed by private contractors on city public works construction and rehabilitation projects for adherence to contract plans and specifications. Projects included health centers, police and fire stations, libraries, city hall, transit concourses, and prisons. Responsible for daily inspection reports and overall coordination for each respective project. Also responsible for reviewing bills and writing contract modifications and amendments. . .the variety of work was excellent. "

Environmental co-op, chemicals manufacturer: "Compiled data and wrote monthly regulatory reports, in charge of hazardous waste management and small projects as needed. . . . I had my own responsibilities that had an impact on the entire company. Employer was really interested in my opinion and gave me a chance to demonstrate my abilities, but also knew when to step in. Everybody was willing to answer any questions I may have had. "

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Dual/Accelerated Degree Accelerated program

The Accelerated Program of the College of Engineering provides opportunities for highly talented and strongly motivated students to

progress toward their educational goals essentially at their own pace. Primarily through advanced placement, credit by examination, flexibility of scheduling, and independent study, the program makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum.

Dual Degree Bachelor's Programs

A student completing the Bachelor of Science degree program in architectural engineering may complete additional courses (specified by the department) to earn the Bachelor of Science degree in civil engineering. (The reverse is difficult because of prerequisites in the sequence of architectural studio design courses, which begins in the sophomore year.)

Civil Engineering students can also complete a dual degree with the Bachelor of Science in Environmental Engineering.

Bachelor's/Master's Dual Degree Program

Exceptional students can also pursue a master of science degree in the same period as the bachelor of science.

For more information about this program, visit the Department's BS / MS Dual Degree Program (<http://www.drexel.edu/cae/academics/bs-environmental-engineering/Accelerated%20and%20Dual%20Degree%20Programs%20CAEE>) web page.

Facilities

The Department is well equipped with state-of-the-art facilities:

- The department computer labs are in operation: a computer-assisted design (CAD) and computerized instructional lab; and a graduate-level lab (advanced undergraduates can become involved in graduate-level work).
- External labs are used for surveying, building diagnostics, and surface and ground-water measurements.
- A \$4.5-million instruction and research lab renovation was funded by the National Science Foundation, alumni, and corporations.

Civil, Architectural and Environmental Engineering Faculty

Emin A. Aktan, PhD (*University of Illinois at Urbana-Champaign*) *John Roebling Professor of Infrastructure Studies*. Professor. Structural engineering; infrastructure; evaluation; intelligent systems.

Ivan Bartoli, PhD (*University of California, San Diego*). Assistant Professor. Non-destructive evaluation and structural health monitoring; dynamic identification, stress wave propagation modeling.

Robert Brehm, PhD (*Drexel University*). Associate Teaching Professor. International infrastructure delivery; response to natural catastrophes; risk assessment and mitigation strategies; project management techniques.

S.C. Jonathan Cheng, PhD (*West Virginia University*). Associate Professor. Soil mechanics; geosynthetics; probabilistic design; landfill containments.

Louis DaSaro, MS (*University of Delaware*). Associate Teaching Professor. Failure analysis and restoration of existing structures, blast resistant structures, green structures, engineering education.

Patricia Gallagher, PhD (*Virginia Polytechnic Institute*). Associate Professor. Soil mechanics; geoenvironmental; ground improvement; sustainability.

Patrick Gurian, PhD (*Carnegie-Mellon University*). Associate Professor. Risk analysis of environmental and infrastructure systems, novel adsorbent materials, environmental standard setting, Bayesian statistical modeling, community outreach and environmental health.

Charles N. Haas, PhD (*University of Illinois-Urbana*) *L. D. Betz Professor and Department Head, Civil, Architectural and Environmental Engineering*. Professor. Control of human exposures to and risk assessment of pathogenic organisms; water and waste treatment; homeland security.

Ahmad Hamid, PhD (*McMaster University*). Professor. Engineered masonry; building; cladding; prestressed concrete.

Y. Grace Hsuan, PhD (*Imperial College*). Professor. Polymeric and cementitious materials; geosynthetic reliability and durability.

Joseph B. Hughes, PhD (*University of Iowa*) *Dean of the College of Engineering and Distinguished Professor*. Biological processes and applications of nanotechnology in environmental systems.

Joseph P. Martin, PhD (*Colorado State University*). Professor. Geoenvironmental engineering; urban environmental hydrology; transportation.

James E. Mitchell, MArch (*University of Pennsylvania*). Associate Professor. Architectural engineering design; building systems.

Franco Montalto, PhD (*Cornell University*). Associate Professor. Effects of built infrastructure on societal water needs, ecohydrologic patterns and processes, ecological restoration, green design, water interventions.

Franklin Moon, PhD (*Georgia Institute of Technology*). Associate Professor. Full-scale structural testing, structural dynamics, evaluation and rehabilitation of existing structures.

Joseph V. Mullin, PhD (*Pennsylvania State University*). Senior Lecturer. Structural material behavior, engineering economy and design.

Mira S. Olson, PhD (*University of Virginia*). Associate Professor. Groundwater; environmental fluid mechanics; hydrology.

Anu Pradhan, PhD (*Carnegie Mellon University*). Assistant Professor. Infrastructure management, construction engineering, transportation engineering, sensing system, geographic information system, statistical machine learning.

Yared Shifferaw, PhD (*Johns Hopkins University*). Assistant Professor. Computational and experimental mechanics, structural stability, optimization, health monitoring and hazard mitigation, sustainable structures, emerging materials, thin-walled structures and metallic structures.

Kurt Sjoblom, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Laboratory testing of geomaterials, geotechnical engineering, foundation engineering.

Sabrina Spatari, PhD (*University of Toronto*). Assistant Professor. Research in industrial ecology; development and application of life cycle assessment (LCA) and material flow analysis (MFA) methods for

guiding engineering and policy decisions; specific interest in biomass and bioenergy, biofuels, and urban infrastructure.

Michael Waring, PhD (*University of Texas-Austin*). Assistant Professor. Indoor air quality and building sustainability; indoor particulate matter fate and transport; indoor chemistry and particle formation; secondary impacts of control technologies and strategies.

Jin Wen, PhD (*University of Iowa*). Associate Professor. Architectural engineering, building control systems, indoor air quality.

Aspasia Zerva, PhD (*University of Illinois*). Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Interdepartmental Faculty

Eugenia Ellis, PhD (*Virginia Polytechnic State University*). Associate Professor. Registered architect; interior design, extended-care facilities design, research on spatial visualization, perception and imagination.

Bakhtier Farouk, PhD (*University of Delaware*) *Billings Professor of Mechanical Engineering*. Professor. Heat transfer; combustion; numerical methods; turbulence modeling; materials processing.

Emeritus Faculty

Harry G. Harris, PhD (*Cornell University*). Professor Emeritus. Structural models, dynamics of structures, plates and shells, industrialized building construction.

Robert M. Koerner, PhD (*Duke University*). Harry Bownam Professor Emeritus. Geosynthetic engineering; soil mechanics; water resources.

Richard Weggel, PhD (*University of Illinois*) *Samuel S. Baxter Professor Emeritus; Civil and Environmental Engineering*. Professor Emeritus. Coastal engineering; hydraulics engineering; hydrology.

Richard Woodring, PhD (*University of Illinois*) *Dean of Engineering Emeritus*. Professor Emeritus. Structural engineering, reinforced concrete.

Computer Engineering

Major: Computer Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 192.0

Classification of Instructional Programs (CIP) code: 14.0901

Standard Occupational Classification (SOC) code: 15-1132; 15-1133; 15-1143; 17-2031

About the Program

The major provides a broad focus on digital circuit design, computer hardware and organization, programming and computer software, algorithms, and networks.

Computer engineers design smaller, faster, and more reliable computers and digital systems, embed microprocessors in larger systems (e.g., anti-lock brake systems), work in theoretical issues in computing, use object-oriented programming languages, and design large-scale software systems and computer networks. Computer engineers may work in positions that apply computers in control systems, digital signal processing, telecommunications, and power systems, and may design very large-scale integration (VLSI) integrated circuits and systems.

The computer engineering degree program is designed to provide our students with breadth in engineering, the sciences, mathematics, and the humanities, as well as depth in both software and hardware disciplines appropriate for a computer engineer. It embodies the philosophy and style of the Drexel Engineering Curriculum, and will develop the student's design and analytical skills. In combination with the co-op experience, it opens to the student opportunities in engineering practice, advanced training in engineering or in other professions, and an entry to business and administration.

The computer engineering program's courses in ECE are supplemented with courses from the departments of Mathematics and Computer Science. Students gain the depth of knowledge of computer hardware and software essential for the computer engineer.

Mission Statement

The ECE Department at Drexel University (<http://catalog.drexel.edu/undergraduate/collegeofengineering/computerengineering/www.drexel.edu>) serves the public and the university community by providing superior career-integrated education in electrical and computer engineering; by conducting research in these fields, to generate new knowledge and technologies; and by promoting among all its constituents professionalism, social responsibility, civic engagement and leadership.

Program Educational Objectives

The Electrical and Computer Engineering Program Educational Objectives are such that its alumni, in their early years after graduation can:

1. Secure positions and continue as valued, creative, dependable, and proficient employees in a wide variety of fields and industries, in particular as electrical and computer engineers;
2. Succeed in graduate and professional studies, such as engineering, science, law, medicine and business;
3. Pursue professional development through lifelong learning opportunities for a successful and rewarding career;
4. Provide leadership in their profession, in their communities, and in the global society;
5. Contribute to their professional disciplines body of knowledge;
6. Function as responsible members of society with an awareness of the social and ethical ramifications of their work.

Student Outcomes

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;

- e) an ability to identify, formulate, and solve engineering problems;
- f) an understanding of professional and ethical responsibility;
- g) an ability to communicate effectively;
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) a recognition of the need for, and an ability to engage in life-long learning;
- j) a knowledge of contemporary issues;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for computer engineering practice.

Additional Information

The Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

Additional information about the major is available on the ECE Department website (http://www.ece.drexel.edu/Undergraduate_Programs2.html).

For advising questions, please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu).

To make an appointment, please call 215.895.2837.

Drop-in hours: Please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu) for up-to-date drop-in availability.

Advising

Jeffrey Birou

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Dr. Jaudelice de Oliveira

Associate Department Head for Undergraduate Affairs

Bossone Research Center, Room 313

E-mail: jau@coe.drexel.edu (%20jau@coe.drexel.edu)

Degree Requirements

Students must take ENGL 101

General Education/Liberal Studies Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 315	Engineering Ethics	3.0
UNIV E101	The Drexel Experience	1.0
General Education Requirements *		18.0

Foundation Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 141	Essential Biology	4.5
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ECE 200	Digital Logic Design	3.0
ECE 201	Foundations of Electric Circuits	3.0
ECE 203	Programming for Engineers	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
Professional Requirements		
CS 260	Data Structures	3.0
CS 265	Advanced Programming Tools and Techniques	3.0
ECE 391	Introduction to Engineering Design Methods	1.0
ECE 491 [WI (p. 230)]	Senior Design Project I	2.0
ECE 492 [WI (p. 230)]	Senior Design Project II	2.0
ECE 493	Senior Design Project III	4.0
ECEC 301	Advanced Programming for Engineers	3.0
ECEC 302	Digital Systems Projects	4.0
ECEC 304	Design with Microcontrollers	4.0
ECEC 353	Systems Programming	3.0
ECEC 355	Computer Organization & Architecture	4.0
ECEC 356	Embedded Systems	4.0
ECEC 357	Introduction to Computer Networks	4.0
ECEL 301 [WI (p. 230)]	Electrical Engineering Laboratory	2.0
ECEL 302	ECE Laboratory II	2.0
ECEL 303	ECE Laboratory III	2.0
ECEL 304	ECE Laboratory IV	2.0
MATH 221	Discrete Mathematics	3.0
ECES 301	Transform Methods and Filtering	4.0
ECE 361	Probability for Engineers	3.0
or ECE 362	Engineering Statistics	
or ENGR 361	Statistical Analysis of Engineering Systems	
Six Computer Engineering Courses		18.0
Free Electives		11.5
Total Credits		192.0

* General Education Requirements (p. 214).

Sample Plan of Study

5 YR Ug Co-op Concentration

Term 1		Credits
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
MATH 121	Calculus I	4.0
UNIV E101	The Drexel Experience	1.0
ENGR 121	Computation Lab I	2.0
Term Credits		16.5
Term 2		Credits
CHEM 102	General Chemistry II	4.5
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
Term Credits		19.5
Term 3		Credits
BIO 141	Essential Biology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
Term Credits		17.5
Term 4		Credits
ECE 200	Digital Logic Design	3.0
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		17.0
Term 5		Credits
ECE 201	Foundations of Electric Circuits	3.0
ECE 203	Programming for Engineers	3.0
ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MATH 221	Discrete Mathematics	3.0
Term Credits		15.0
Term 6		Credits
ECEC 301	Advanced Programming for Engineers	3.0
ECEC 302	Digital Systems Projects	4.0

ECEL 301 [WI (p. 230)]	Electrical Engineering Laboratory	2.0
ECES 301	Transform Methods and Filtering	4.0
	General Education elective *	3.0

Term Credits 16.0

Term 7

ECEC 304	Design with Microcontrollers	4.0
ECEC 355	Computer Organization Architecture	4.0
ECEL 302	ECE Laboratory II	2.0
PHIL 315	Engineering Ethics	3.0
	Free elective	3.0

Term Credits 16.0

Term 8

CS 265	Advanced Programming Tools and Techniques	3.0
ECEC 357	Introduction to Computer Networks	4.0
ECEL 303	ECE Laboratory III	2.0
	General Education elective *	3.0

Term Credits 12.0

Term 9

CS 260	Data Structures	3.0
ECE 391	Introduction to Engineering Design Methods (Also offered spring term.)	1.0
ECEC 356	Embedded Systems	4.0
ECEC 353	Systems Programming	3.0
ECEL 304	ECE Laboratory IV	2.0
ECE 361, 362, or ENGR 361	Probability for Engineers Engineering Statistics Statistical Analysis of Engineering Systems	3.0
	General Education elective *	3.0

Term Credits 19.0

Term 10

ECE 491 [WI (p. 230)]	Senior Design Project I	2.0
	Two Computer Engineering electives	6.0
	General Education elective *	3.0
	Free Elective	3.0

Term Credits 14.0

Term 11

ECE 492 [WI (p. 230)]	Senior Design Project II	2.0
	Two Computer Engineering electives	6.0
	General Education elective *	3.0
	Free elective	3.5

Term Credits 14.5

Term 12

ECE 493	Senior Design Project III	4.0
	Two Computer Engineering electives	6.0
	General Education elective *	2.0

Free elective	3.0
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Term Credits 15.0

Total Credit: 192.0

* See degree requirements (p. 231).

Co-op/Career Opportunities

Drexel University's co-op program has an 80 year history and is one of the oldest and largest co-op programs in the world. Students graduate with 6-18 months of full time employment experience, depending on their choice of a 4-year or 5-year program. The majority of Computer Engineering students in ECE choose the 5-year program and graduate with 18 months of full-time work experience, and often receive a job offer from their third co-op employer or from a connection made from one of their co-op experiences.

Computer engineers work for computer and microprocessor manufacturers; manufacturers of digital devices for telecommunications, peripherals, electronics, control, and robotics; software engineering; the computer network industry; and related fields. A degree in computer engineering can also serve as an excellent foundation to pursue graduate professional careers in medicine, law, business, and government.

Graduates are also pursuing advanced studies in electrical and computer engineering, aerospace engineering, and mechanical engineering at such schools as MIT, Stanford, Princeton, Georgia Institute of Technology, University of California at Berkeley, University of Pennsylvania, and University of Maryland.

The Steinbright Career Development Center had a co-op placement rate of approximately 99% for electrical and computer engineering majors.

Co-op employers for computer engineering majors include:

- Comcast Corporation
- Independence Blue Cross
- Lockheed Martin
- Micron Technology, Inc
- National Board of Medical Examiners
- PJM Interconnection, LLC
- SAP America
- Susquehanna International Group LLC
- UNISYS Corporation
- Woodward McCoach, Inc.
- Amazon, Inc.
- Microsoft's Explore Internship Program
- South Korea KAIST Hubo lab

For more information about the co-op process, please contact the Steinbright Career Development Center (<http://drexel.edu/scdc>).

Dual/Accelerated Degree

Accelerated Program

The accelerated programs of the College of Engineering provide opportunities for highly talented and strongly motivated students to progress toward their educational goals essentially at their own pace. These options include opportunities for accelerated studies, dual degrees, and combined bachelor's/master's programs.

Primarily through advanced placement, credit by examination, flexibility of scheduling, and independent study, the "fast track" makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum.

Dual Degree Bachelor's Programs

With careful planning, students can complete both a Computer Engineering and an Electrical Engineering degree in the time usually required to complete one degree. For detailed information the student should contact the ECE advisor (<http://drexel.edu/ece/academics/undergrad/advising>).

Bachelor's/Master's Dual Degree Program

Exceptional students can also pursue a master of science degree in the same period as the bachelor of science.

For more information on these and other options, visit the Department of Electrical and Computer Engineering BS/MS (<http://drexel.edu/ece/academics/undergrad/bs-ms>) page.

Minor in Computer Engineering

The computer engineering minor is designed to provide students from other computer-intensive majors—such as computer science or other engineering majors—with a foundation of knowledge in the hardware portion of computer systems. The minor consists of a minimum of seven ECE courses. There are four required courses and an additional 12.0 credits of elective courses. Students majoring in Electrical Engineering and minoring in Computer Engineering may only choose CE minor electives from the ECEC courses.

Prerequisites

The minor assumes that students will have a background in mathematics, physics, and computer programming equivalent to that covered in the first two years of engineering.

Calculus prerequisites should include MATH 121 (p. 230), MATH 122 (p. 230) and MATH 200 (p. 230). Physics requirements are PHYS 101 (p. 230), PHYS 102 (p. 230) and PHYS 201 (p. 230). Programming experience must include ENGR 121/ENGR 122 or CS 171 (p. 230) at the minimum. CS 172 (p. 230), CS 260 (p. 230) and CS 265 (p. 230) are also recommended, and are required for some upper level ECEC courses. Courses taken to meet these requirements will not count toward the minor.

Required Courses

ECE 200	Digital Logic Design	3.0
ECEC 302	Digital Systems Projects	4.0
ECEC 355	Computer Organization & Architecture	4.0
ECEL 304	ECE Laboratory IV (prerequisite waived for minor)	2.0
Electives*		12.0
Total Credits		25.0

* Students should choose an additional 12 credits from 300- and/or 400-level Computer Engineering (ECEC) courses. All prerequisites must be satisfied.

Additional Information

Additional information about this minor is available on the ECE Department website (http://www.ece.drexel.edu/Undergraduate_Programs2.html).

For advising questions, please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu).

To make an appointment, please call 215.895.2241
Drop-in hours: Please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu) for up-to-date drop-in availability.

Facilities

Drexel University and the Electrical and Computer Engineering Department are nationally recognized for a strong history of developing innovative research. Research programs in the ECE Department prepare students for careers in research and development, and aim to endow graduates with the ability to identify, analyze, and address new technical and scientific challenges. The ECE Department is well equipped with state-of-the-art facilities in each of the following ECE Research laboratories:

Research Laboratories at the ECE Department

Adaptive Signal Processing and Information Theory Research Group

The Adaptive Signal Processing and Information Theory Research Group (<http://www.ece.drexel.edu/walsh/aspitrgr/home.html>) conducts research in the area of signal processing and information theory. Our main interests are belief/expectation propagation, turbo decoding and composite adaptive system theory. We are currently doing projects on the following topics:

- i) Delay mitigating codes for network coded systems,
- ii) Distributed estimation in sensor networks via expectation propagation,
- iii) Turbo speaker identification,
- iv) Performance and convergence of expectation propagation,
- v) Investigating bounds for SINR performance of autocorrelation based channel shorteners.

Applied Networking Research Lab

Applied Networking Research Lab (ANRL) projects focus on modeling and simulation as well as experimentation in wired, wireless and sensor networks. ANRL is the home of MuTANT, a Multi-Protocol Label Switched Traffic Engineering and Analysis Testbed composed of 10 high-end Cisco routers and several PC-routers, also used to study other protocols in data networks as well as automated network configuration and management. The lab also houses a sensor network testbed.

Bioimage Laboratory

Uses computer gaming hardware for enhanced and affordable 3-D visualization, along with techniques from information theory and machine learning to combine the exquisite capabilities of the human visual system with computational sensing techniques for analyzing vast quantities of image sequence data.

Data Fusion Laboratory

The Data Fusion Laboratory investigates problems in multisensory detection and estimation, with applications in robotics, digital communications, radar, and target tracking. Among the projects

in progress: computationally efficient parallel distributed detection architectures, data fusion for robot navigation, modulation recognition and RF scene analysis in time-varying environments, pattern recognition in biological data sequences and large arrays, and hardware realizations of data fusion architectures for target detection and target tracking.

Drexel Network Modeling Laboratory

The Drexel Network Modeling Laboratory investigates problems in the mathematical modeling of communication networks, with specific focus on wireless ad hoc networks, wireless sensor networks, and supporting guaranteed delivery service models on best effort and multipath routed networks. Typical methodologies employed in our research include mathematical modeling, computer simulation, and performance optimization, often with the end goal of obtaining meaningful insights into network design principles and fundamental performance tradeoffs.

Drexel Power-Aware Computing Laboratory

The Power-Aware Computing Lab (<http://dpac.ece.drexel.edu>) investigates methods to increase energy efficiency across the boundaries of circuits, architecture, and systems. Our recent accomplishments include the Sigil profiling tool, scalable modeling infrastructure for accelerator implementations, microarchitecture-aware VDD gating algorithms, an accelerator architecture for ultrasound imaging, evaluation of hardware reference counting, hardware and operating system support for power-agile computing, and memory systems for accelerator-based architectures.

Drexel University Nuclear Engineering Education Laboratory

The field of nuclear engineering encompasses a wide spectrum of occupations, including nuclear reactor design, medical imaging, homeland security, and oil exploration. The Drexel University Nuclear Engineering Education Laboratory (DUNEEL) provides fundamental hands on understanding for power plant design and radiation detection and analysis. Software based study for power plant design, as well as physical laboratory equipment for radiation detection, strengthen the underlying concepts used in nuclear engineering such that the student will comprehend and appreciate the basic concepts and terminology used in various nuclear engineering professions. Additionally, students use the laboratory to develop methods for delivering remote, live time radiation detection and analysis. The goal of DUNEEL is to prepare students for potential employment in the nuclear engineering arena.

Drexel VLSI Laboratory

The Drexel VLSI Laboratory (http://ece.drexel.edu/faculty/taskin/wiki/vsilab/index.php/Main_Page) investigates problems in the design, analysis, optimization and manufacturing of high performance (low power, high throughput) integrated circuits in contemporary CMOS and emerging technologies. Suited with industrial design tools for integrated circuits, simulation tools and measurement beds, the VLSI group is involved with digital and mixed-signal circuit design to verify the functionality of the discovered novel circuit and physical design principles. The Drexel VLSI laboratory develops design methodologies and automation tools in these areas, particularly in novel clocking techniques, featuring resonant clocking, and interconnects, featuring wireless interconnects.

Drexel Wireless Systems Laboratory

The Drexel Wireless Systems Laboratory (DWSL) contains an extensive suite of equipment for constructing, debugging, and testing prototype

wireless communications systems. Major equipment within DWSL includes:

- three software defined radio network testbeds (HYDRA, USRP, and WARP) for rapidly prototyping radio, optical and ultrasonic communications systems,
- a TDK RF anechoic chamber and EMSCAN desktop antenna pattern measurement system,
- a materials printer and printed circuit board milling machine for fabricating conformal antennas and
- wireless protocol conformance testing equipment from Aeroflex.

The lab is also equipped with network analyzers, high speed signal generators, oscilloscopes, and spectrum analyzers as well as several Zigbee development platforms for rapidly prototyping sensor networks.

DWSL personnel also collaborate to create wearable, fabric based transceivers through collaboration with the Shima Seiki Haute Laboratory in the Drexel ExCITe Center. The knitting equipment at Drexel includes sixteen SDS-ONE APEX3 workstations and four state-of-the-art knitting machines. The workstations accurately simulate fabric construction and provide researchers and designers the opportunity to program, create and simulate textile prototypes, import CAD specifications of final products, and produce made-to-measure or mass-produced pieces on Shima Seiki knitting machines. For testing smart textiles for biomedical, DWSL personnel also have collaborators in the Center for Interdisciplinary Clinical Simulation and Practice (CICSP) in the Drexel College of Medicine which provides access to medical mannequin simulators.

Ecological and Evolutionary Signal-processing and Informatics Laboratory

The Ecological and Evolutionary Signal-processing and Informatics Laboratory (EESI) (<http://www.ece.drexel.edu/gailr/EESI>) seeks to solve problems in high-throughput genomics and engineer better solutions for biochemical applications. The lab's primary thrust is to enhance the use of high-throughput DNA sequencing technologies with pattern recognition and signal processing techniques. Applications include assessing the organism content of an environmental sample, recognizing/classifying potential and functional genes, inferring environmental factors and interspecies relationships, and inferring microbial evolutionary relationships from short-read DNA/RNA fragments. The lab also investigates higher-level biological systems such as modeling and controlling chemotaxis, the movement of cells.

Electric Power Engineering Center

This newly established facility makes possible state-of-the-art research in a wide variety of areas, ranging from detailed theoretical model study to experimental investigation in its high voltage laboratories. The mission is to advance and apply scientific and engineering knowledge associated with the generation, transmission, distribution, use, and conservation of electric power. In pursuing these goals, this center works with electric utilities, state and federal agencies, private industries, nonprofit organizations and other universities on a wide spectrum of projects. Research efforts, both theoretical and experimental, focus on the solution of those problems currently faced by the electric power industry. Advanced concepts for electric power generation are also under investigation to ensure that electric power needs will be met at the present and in the future.

Electronic Design Automation Facility

Industrial-grade electronic design automation software suite and integrated design environment for digital, analog and mixed-signal systems development. Field Programmable Gate Array (FPGA) development hardware. Most up-to-date FPGA/embedded system development hardware kits. Printed circuit board production facility. Also see Drexel VLSI Laboratory.

Microwave-Photonics Device Laboratories

The laboratory is equipped with test and measurement equipment for high-speed analog and digital electronics and fiber optic systems. The test equipment includes network analyzers from Agilent (100kHz- 1.3 GHz and 45 Mhz-40 GHz), and Anritsu (45 MHz-6 GHz); spectrum analyzers from Tektronix, HP, and Agilent with measurement capability of DC to 40 GHz and up to 90 GHz using external mixers; signal generators and communication channel modulators from HP, Rhode-Schwartz, Systron Donner, and Agilent; microwave power meter and sensor heads, assortment of passive and active microwave components up to 40 GHz ; data pattern generator and BER tester up to 3Gb/s; optical spectrum analyzer from Anritsu and power meters from HP; single and multimode fiber optic based optical transmitter and receiver boards covering ITU channels at data rates up to 10Gb/s; passive optical components such as isolator, filter, couplers, optical connectors and fusion splicer; LPKF milling machine for fabrication of printed circuit boards; wire-bonding and Cascade probe stations; Intercontinental test fixtures for testing of MMIC circuits and solid-state transistors; state-of-the-art microwave and electromagnetic CAD packages such as Agilent ADS, ANSYS HFSS, and COMSOL multi-physics module.

Music and Entertainment Technology Laboratory

The Music and Entertainment Technology Laboratory (MET-lab) is devoted to research in digital media technologies that will shape the future of entertainment, especially in the areas of sound and music. We employ digital signal processing and machine learning to pursue novel applications in music information retrieval, music production and processing technology, and new music interfaces. The MET-lab is also heavily involved in outreach programs for K-12 students and hosts the Summer Music Technology program, a one-week learning experience for high school students. Lab facilities include a sound isolation booth for audio and music recording, a digital audio workstation running ProTools, two large multi-touch display interfaces of our own design, and a small computing cluster for distributed processing.

NanoPhotonics+ Lab (<http://drexelnanophotonics.com>)

Our research is primarily in the area of nanophotonics with a focus on the nanoscale interaction of light with matter. Interests include: liquid crystal/polymer composites for gratings, lenses and HOEs; liquid crystal interactions with surfaces and in confined nanospaces; alternative energy generation through novel photon interactions; ink-jet printed conducting materials for RF and photonic applications; and the creation and development of smart textiles technologies including soft interconnects, sensors, and wireless implementations.

Opto-Electro-Mechanical Laboratory

This lab concentrates on the system integration on optics, electronics, and mechanical components and systems, for applications in imaging, communication, and biomedical research. Research areas include: Programmable Imaging with Optical Micro-electrical-mechanical systems (MEMS), in which microscopic mirrors are used to image light into a single

photodetector; Pre-Cancerous Detection using White Light Spectroscopy, which performs a cellular size analysis of nuclei in tissue; Free-space Optical Communication using Space Time Coding, which consists of diffused light for computer-to-computer communications, and also tiny lasers and detectors for chip-to-chip communication; Magnetic Particle Locomotion, which showed that particles could swim in a uniform field; and Transparent Antennas using Polymer, which enables antennas to be printed through an ink-jet printer.

Plasma and Magnetics Laboratory

Research is focused on applications of electrical and magnetic technologies to biology and medicine. This includes the subjects of non-thermal atmospheric pressure plasma for medicine, magnetic manipulation of particles for drug delivery and bio-separation, development of miniature NMR sensors for cellular imaging and carbon nanotube cellular probes.

Power Electronics Research Laboratory

The Power Electronics Research Laboratory (PERL) is involved in circuit and design simulation, device modeling and simulation, and experimental testing and fabrication of power electronic circuits. The research and development activities include electrical terminations, power quality, solar photovoltaic systems, GTO modeling, protection and relay coordination, and solid-state circuit breakers. The analysis tools include EMPT, SPICE, and others, which have been modified to incorporate models of such controllable solid-state switches as SCRs, GTOs, and MOSFETs. These programs have a wide variety and range of modeling capabilities used to model electromagnetics and electromechanical transients ranging from microseconds to seconds in duration. The PERL is a fully equipped laboratory with 42 kVA AC and 70 kVA DC power sources and data acquisition systems, which have the ability to display and store data for detailed analysis. Some of the equipment available is a distribution and HV transformer and three phase rectifiers for power sources and digital oscilloscopes for data measuring and experimental analysis. Some of the recent studies performed by the PERL include static VAR compensators, power quality of motor controllers, solid-state circuit breakers, and power device modeling which have been supported by PECO, GE, Gould, and EPRI.

RE Touch Lab

The RE Touch Lab is investigating the perceptual and mechanical basis of active touch perception, or haptics, and the development of new technologies for stimulating the sense of touch, allowing people to touch, feel, and interact with digital content as seamlessly as we do with objects in the real world. We study the scientific foundations of haptic perception and action, and the neuroscientific and biomechanical basis of touch, with a long-term goal of uncovering the fundamental perceptual and mechanical computations that enable haptic interaction. We also create new technologies for rendering artificial touch sensations that simulate those that are experienced when interacting with real objects, inspired by new findings on haptic perception.

Testbed for Power-Performance Management of Enterprise Computing Systems

This computing testbed is used to validate techniques and algorithms aimed at managing the performance and power consumption of enterprise computing systems. The testbed comprises a rack of Dell 2950 and Dell 1950 PowerEdge servers, as well as assorted desktop machines, networked via a gigabit switch. Virtualization of this cluster is enabled by VMWare's ESX Server running the Linux RedHat kernel. It also comprises of a rack of ten Apple Xserve machines networked via a gigabit switch.

These servers run the OS X Leopard operating systems and have access to a RAID with TBs of total disk capacity.

Electrical and Computer Engineering Faculty

Fernand Cohen, PhD (*Brown University*). Professor. Surface modeling; tissue characterization and modeling; face modeling; recognition and tracking.

Kapil Dandekar, PhD (*University of Texas-Austin*) *Director of the Drexel Wireless Systems Laboratory (DWSL); Associate Dean of Research, College of Engineering*. Professor. Cellular/mobile communications and wireless LAN; smart antenna/MIMO for wireless communications; applied computational electromagnetics; microwave antenna and receiver development; free space optical communication; ultrasonic communication; sensor networks for homeland security; ultrawideband communication.

Afshin Daryoush, ScD (*Drexel University*). Professor. Digital and microwave photonics; nonlinear microwave circuits; RFIC; medical imaging.

Bruce A. Eisenstein, PhD (*University of Pennsylvania*) *Interim Dean, College of Engineering*. Professor. Pattern recognition; estimation; decision theory.

Adam K. Fontecchio, PhD (*Brown University*) *Electrical and Computer Engineering*. Professor. Electro-optics; remote sensing; active optical elements; liquid crystal devices.

Gary Friedman, PhD (*University of Maryland-College Park*). Professor. Biological and biomedical applications of nanoscale magnetic systems.

Eli Fromm, PhD (*Jefferson Medical College*) *Roy A. Brothers University Professor / Director for Center of Educational Research*. Professor. Engineering education; academic research policy; bioinstrumentation; physiologic systems.

Edwin L. Gerber, PhD (*University of Pennsylvania*) *Assistant Department Head for Evening Programs*. Professor. Computerized instruments and measurements; undergraduate engineering education.

Allon Guez, PhD (*University of Florida*). Professor. Intelligent control systems; robotics, biomedical, automation and manufacturing; business systems engineering.

Mark Hempstead, PhD (*Harvard University*) *Junior Colehower Chair*. Assistant Professor. Computer engineering; power-aware computing; computer architecture; low power VLSI Design; wireless sensor networks.

Peter R. Herczfeld, PhD (*University of Minnesota*) *Lester A. Kraus Professor/Director, Center for Microwave/Lightwave Engineering*. Professor. Lightwave technology; microwaves; millimeter waves; fiberoptic and integrated optic devices.

Leonid Hrebien, PhD (*Drexel University*) *Graduate Advisor and Assistant Department Head for Graduate Affairs*. Professor. Tissue excitability; acceleration effects on physiology; bioinformatics.

Paul R. Kalata, PhD (*Illinois Institute of Technology*). Associate Professor. Stochastic and adaptive control theory; identification and decision theory; Kalman filters.

Moshe Kam, PhD (*Drexel University*) *Robert G. Quinn Professor of Electrical and Computer Engineering and Department Head*. Professor. Decision fusion and sensor fusion; mobile robots (especially robot navigation); pattern recognition (especially in handwriting applications); optimization and control.

Nagarajan Kandasamy, PhD (*University of Michigan*). Associate Professor. Embedded systems, self-managing systems, reliable and fault-tolerant computing, distributed systems, computer architecture, and testing and verification of digital systems.

Bruce Katz, PhD (*University of Illinois*). Adjunct Professor. Speech communication and computer science; artificial intelligence.

Youngmoo Kim, PhD (*MIT*). Associate Professor. Audio and music signal processing, voice analysis and synthesis, music information retrieval, machine learning.

Timothy P. Kurzweg, PhD (*University of Pittsburgh*). Associate Professor. Optical MEM modeling and simulation; system-level simulation; computer architecture.

Karen Miu, PhD (*Cornell University*). Professor. Power systems; distribution networks; distribution automation; optimization; system analysis.

Bahram Nabet, PhD (*University of Washington*) *Associate Dean for Special Projects, College of Engineering; Electrical and Computer Engineering*. Professor. Optoelectronics; fabrication and modeling; fiber optic devices; nanoelectronics; nanowires.

Prawat Nagvajara, Ph.D. (*Boston University*). Associate Professor. System on a chip; embedded systems; power grid computation; testing of computer hardware; fault-tolerant computing; VLSI systems; error control coding.

Dagmar Niebur, Ph.D. (*Swiss Federal Institute of Technology*). Associate Professor. Intelligent systems; dynamical systems; power system monitoring and control.

Chika Nwankpa, PhD (*Illinois Institute of Technology*). Professor. Power system dynamics; power electronic switching systems; optically controlled high power switches.

Karkal S. Prahbu, PhD (*Harvard University*). Auxiliary Professor. Computer and software engineering; advanced microprocessors and distributed operating systems.

Gail L. Rosen, PhD (*Georgia Institute of Technology*). Associate Professor. Signal processing, signal processing for biological analysis and modeling, bio-inspired designs, source localization and tracking.

Kevin J. Scoles, PhD (*Dartmouth College*) *Associate Dean, College of Engineering, Office of Student Services*. Associate Professor. Microelectronics; electric vehicles; solar energy; biomedical electronics.

Harish Sethu, PhD (*Lehigh University*). Associate Professor. Protocols, architectures and algorithms in computer networks; computer security; mobile ad hoc networks; large-scale complex adaptive networks and systems.

P. Mohana Shankar, PhD (*Indian Institute of Technology*) *Allen Rothwarf Professor of Electrical and Computer Engineering*. Professor. Wireless communications; biomedical ultrasonics; fiberoptic bio-sensors.

Baris Taskin, PhD (*University of Pittsburgh*). Associate Professor. Electronic design automation (EDA) of integrated circuits, high-performance VLSI circuits and systems, sequential circuit timing and synchronization, system-on-chip (SOC) design, operational research, VLSI computer-aided design.

Lazar Trachtenberg, DSc (*Israel Institute of Technology*). Professor. Fault tolerance; multi-level logic synthesis; signal processing; suboptimal filtering.

Oleh Tretiak, ScD (*MIT*) *Robert C. Disque Professor of Electrical and Computer Engineering*. Professor. Image processing; tomography; image registration; pattern recognition.

John MacLaren Walsh, PhD (*Cornell University*). Assistant Professor. Performance and convergence of belief/expectation propagation and turbo decoding/equalization/synchronization, permeation models for ion channels, composite adaptive systems theory.

Steven Weber, PhD (*University of Texas-Austin*) *Assistant Department Head for Graduate Affairs, Electrical and Computer Engineering*. Associate Professor. Mathematical modeling of computer and communication networks, specifically streaming multimedia and ad hoc networks.

Jaudelice Cavalcante de Oliveira, PhD (*Georgia Institute of Technology*). Associate Professor. Next generation Internet; quality of service in computer communication networks; wireless networks.

Interdepartmental Faculty

Dov Jaron, PhD (*University of Pennsylvania*) *Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Jeremy R. Johnson, PhD (*Ohio State University*). Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

John Lacontora, PhD (*New Jersey Institute of Technology*). Associate Research Professor. Service engineering; industrial engineering.

Ryszard Lec, PhD (*University of Warsaw Engineering College*). Professor. Biomedical applications of viscoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Spiros Mancoridis, PhD (*University of Toronto*) *Interim Department Head, Computer Science*. Professor. Software engineering; software security; code analysis; evolutionary computation.

Karen Moxon, PhD (*University of Colorado*). Associate Professor. Corticothalamic interactions; neurobiological perspectives on design of humanoid robots.

Paul Y. Oh, PhD (*Columbia University*) *Associate Department Head for External Affairs, Department of Mechanical Engineering and Mechanics*. Professor. Smart sensors servomechanisms; machine vision and embedded microcomputers for robotics and mechatronics.

Banu Onaral, Ph.D. (*University of Pennsylvania*) *H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD (*Rensselaer Polytechnic University*). Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

William C. Regli, PhD (*University of Maryland-College Park*). Professor. Artificial intelligence; computer graphics; engineering design and Internet computing.

Arye Rosen, PhD (*Drexel University*) *Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Jonathan E. Spanier, PhD (*Columbia University*) *Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Aydin Tozereen, PhD (*Columbia University*) *Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Aspasia Zerva, PhD (*University of Illinois*). Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Emeritus Faculty

Richard L. Coren, PhD (*Polytechnic Institute of Brooklyn*). Professor Emeritus. Electromagnetic fields, antennas, shielding, RFI, cybernetics of evolving systems.

Robert Fischl, PhD (*University of Michigan*) *John Jarem Professor Emeritus / Director, Center for Electric Power Engineering*. Professor Emeritus. Power: systems, networks, controls, computer-aided design, power systems, solar energy.

Vernon L. Newhouse, PhD (*University of Leeds*) *Disque Professor Emeritus*. Professor Emeritus. Biomedical and electrophysics: ultrasonic flow measurement, imaging and texture analysis in medicine, ultrasonic nondestructive testing and robot sensing, clinical engineering.

Hun H. Sun, PhD (*Cornell University*) *Ernest O. Lange Professor Emeritus*. Professor Emeritus. Systems and signals in biomedical control systems.

Construction Management

Major: Construction Management

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 184.5

Classification of Instructional Programs (CIP) code: 52.2001

Standard Occupational Classification (SOC) code: 11-9021

About the Program

Construction management is a dynamic profession that is a combination of art and science. While an understanding of the technical aspects of construction is extremely important, it is also essential that construction professionals have knowledge of the business and management aspects of the profession. While construction has traditionally been a very conservative industry, the increasing rate of technological development

and competition in the industry serves to accelerate the development of new construction methods, equipment, materials, and management techniques. As a result of these forces, there is an increasing need for innovative and professionally competent construction professionals.

The Construction Management major prepares students for all phases of operation and management of the construction organization including cost estimating, project scheduling, and planning. Students are able to choose from a wide range of subjects in the social sciences and humanities to satisfy electives in the liberal arts and free elective requirements. Pursuing part-time, degree completion on average takes six years.

Students in Drexel's Construction Management program receive broad academic, technical, business, and construction management courses that are designed to produce well-rounded construction professionals. Students interested in extending their construction management studies into real estate development should consider the concentration in real estate. This concentration in real estate is designed for students to attain the knowledge and skills required to create and maintain built environments for living, working and entertainment purposes, as well as to explore issues in the real estate development process and the industry as a whole.

Program Delivery Options

Program delivery options for the Construction Management program include:

- A traditional 5-year with co-op
- A part-time study option
- The Drexel University and Burlington County College (BCC) option (Available for currently enrolled, full-time Drexel at BCC Construction Management Students): Drexel University and Burlington County College (BCC) joined together to create a unique educational opportunity: Drexel at BCC. This partnership enabled BCC students to earn a bachelor's degree from Drexel University while remaining on BCC's Mount Laurel campus. ***Drexel University has elected to phase out its Drexel at BCC on-site program and will no longer be accepting students.***

Additional Information

For additional information, visit the Construction Management website or contact:

James Tsafos, PhD
215.895.6024
tsafosjm@drexel.edu (tsafosjm@drexel.edu%20)

Degree Requirements

English/Communication

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0
COM 270 [WI (p. 238)]	Business Communication	3.0
COM 310 [WI (p. 238)]	Technical Communication	3.0
COM 330	Professional Presentations	3.0

Mathematics

MATH 110	Precalculus	3.0
MATH 121	Calculus I	4.0

Science

CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
ENVS 260	Environmental Science and Society	3.0
GEO 101	Physical Geology	4.0
PHYS 182	Applied Physics I	3.0

Business

ACCT 115	Financial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
HRMT 323	Principles of Human Resource Administration	4.0
ORGB 300 [WI (p. 238)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0

Humanities and Social Science

PHIL 301	Business Ethics	3.0
Three Humanities and Social Science Electives		9.0

Professional Core - Construction Science

CMGT 161	Building Materials and Construction Methods I	3.0
CMGT 162	Building Materials and Construction Methods II	3.0
CMGT 163	Building Materials and Construction Methods III	3.0
CMGT 251	Construction Surveying	3.0
CMGT 263	Understanding Construction Drawings	3.0
CMGT 266	Building Systems I	3.0
CMGT 267	Building Systems II	3.0
CMGT 365	Soil Mechanics in Construction	4.0
CMGT 371	Structural Aspects in Construction I	3.0
CMGT 372	Structural Aspects in Construction II	3.0

Professional Core - Construction

CMGT 101	Introduction to Construction Management	3.0
CMGT 240	Economic Planning for Construction	3.0
CMGT 261	Construction Safety	3.0
CMGT 262	Building Codes	3.0
CMGT 361	Contracts And Specifications I	3.0
CMGT 362	Contracts and Specifications II	3.0
CMGT 363	Estimating I	3.0
CMGT 364	Estimating II	3.0
CMGT 450	Management of Field Operations	3.0
CMGT 461	Construction Project & Company Management	3.0
CMGT 463	Value Engineering	3.0
CMGT 467	Techniques of Project Control	4.0

Construction Electives

Select four of the following:		12.0
CMGT 265	Information Technologies in Construction	
CMGT 355	Introduction to Sustainability in Construction	
CMGT 451	Heavy Construction Principles & Practices	
CMGT 465	Marketing Construction Services	

CMGT 468	Real Estate	
CMGT 469	Construction Seminar: Contemporary Issues	
CMGT 470	Productivity in Construction	
Other Approved CMGT Elective *		
Construction Capstone		
CMGT I499	Independent Study in CMGT	3.0
University Requirements		
UNIV G101	The Drexel Experience	2.0
Free Electives		12.0
Total Credits		184.5

* Students may choose another construction elective but the permission of the Program is required.

Sample Plan of Study

	Credits	
Term 1		
CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
CMGT 101	Introduction to Construction Management	3.0
CMGT 161	Building Materials and Construction Methods I	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 110	Precalculus	3.0
UNIV G101	The Drexel Experience	1.0
Term Credits		18.5
Term 2		
ACCT 115	Financial Accounting Foundations	4.0
CMGT 162	Building Materials and Construction Methods II	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 121	Calculus I	4.0
UNIV G101	The Drexel Experience	1.0
Term Credits		15.0
Term 3		
CMGT 163	Building Materials and Construction Methods III	3.0
CMGT 263	Understanding Construction Drawings	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHYS 182	Applied Physics I	3.0
Term Credits		16.0
Term 4		
CMGT 261	Construction Safety	3.0
COM 230	Techniques of Speaking	3.0
ECON 202	Principles of Macroeconomics	4.0
Free elective		3.0
Term Credits		13.0
Term 5		
CMGT 262	Building Codes	3.0
COM 270 [WI (p. 238)]	Business Communication	3.0
GEO 101	Physical Geology	4.0
PHIL 301	Business Ethics	3.0

Humanities/Social science elective		3.0
Term Credits		16.0
Term 6		
CMGT 240	Economic Planning for Construction	3.0
CMGT 266	Building Systems I	3.0
CMGT 371	Structural Aspects in Construction I	3.0
COM 310 [WI (p. 238)]	Technical Communication	3.0
ORGB 300 [WI (p. 238)]	Organizational Behavior	4.0
Term Credits		16.0
Term 7		
BLAW 201	Business Law I	4.0
CMGT 267	Building Systems II	3.0
CMGT 371	Structural Aspects in Construction I	3.0
COM 330	Professional Presentations	3.0
Free elective		3.0
Term Credits		16.0
Term 8		
CMGT 251	Construction Surveying	3.0
CMGT 361	Contracts And Specifications I	3.0
CMGT 363	Estimating I	3.0
ENVS 260	Environmental Science and Society	3.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		16.0
Term 9		
CMGT 362	Contracts and Specifications II	3.0
CMGT 364	Estimating II	3.0
HRMT 323	Principles of Human Resource Administration	4.0
Construction Management elective *		3.0
Humanities/Social science elective		3.0
Term Credits		16.0
Term 10		
CMGT 365	Soil Mechanics in Construction	4.0
CMGT 450	Management of Field Operations	3.0
CMGT 467	Techniques of Project Control	4.0
FIN 301	Introduction to Finance	4.0
Term Credits		15.0
Term 11		
CMGT 461	Construction Project Company Management	3.0
Two Construction Management electives *		6.0
Humanities/Social science elective		3.0
Free elective		3.0
Term Credits		15.0
Term 12		
CMGT 463	Value Engineering	3.0
CMGT I499	Independent Study in CMGT	3.0
Construction Management elective *		3.0

Free elective	3.0
Term Credits	12.0

Total Credit: 184.5

* See degree requirements (p.).

Real Estate Concentration

The concentration in real estate provides students with training in issues such as project finance, real estate as investment, design and construction, operations, development law, environmental remediation, public policy, market analysis, and architecture. For this specialization, students take the same Construction Management (CMGT) core requirements, replacing some electives with the concentration-specific courses.

English/Communication

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0
COM 270 [WI (p. 238)]	Business Communication	3.0
COM 310 [WI (p. 238)]	Technical Communication	3.0
COM 330	Professional Presentations	3.0

Mathematics

MATH 110	Precalculus	3.0
MATH 121	Calculus I	4.0

Science

ENVS 260	Environmental Science and Society	3.0
ENVS 272	Physical Geology	4.0
CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
PHYS 182	Applied Physics I	3.0

Business

ACCT 115	Financial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
HRMT 323	Principles of Human Resource Administration	4.0
ORGB 300 [WI (p. 238)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0

Humanities and Social Science

PHIL 301	Business Ethics	3.0
Three Humanities and Social Science Electives		9.0

Professional Core - Construction Science

CMGT 161	Building Materials and Construction Methods I	3.0
CMGT 162	Building Materials and Construction Methods II	3.0
CMGT 163	Building Materials and Construction Methods III	3.0
CMGT 251	Construction Surveying	3.0

CMGT 263	Understanding Construction Drawings	3.0
CMGT 266	Building Systems I	3.0
CMGT 267	Building Systems II	3.0
CMGT 365	Soil Mechanics in Construction	4.0
CMGT 371	Structural Aspects in Construction I	3.0
CMGT 372	Structural Aspects in Construction II	3.0

Professional Core - Construction

CMGT 240	Economic Planning for Construction	3.0
CMGT 101	Introduction to Construction Management	3.0
CMGT 261	Construction Safety	3.0
CMGT 262	Building Codes	3.0
CMGT 361	Contracts And Specifications I	3.0
CMGT 362	Contracts and Specifications II	3.0
CMGT 363	Estimating I	3.0
CMGT 364	Estimating II	3.0
CMGT 450	Management of Field Operations	3.0
CMGT 461	Construction Project & Company Management	3.0
CMGT 463	Value Engineering	3.0
CMGT 467	Techniques of Project Control	4.0

Concentration in Real Estate

ARCH 432	The Development Process	3.0
CMGT 468	Real Estate	3.0
REAL 310	Introduction to Real Estate	3.0
REAL 320	Real Estate Law - Principle & Practice	3.0
REAL 330	Facilities & Property Management	3.0
REAL 470	Real Estate Investments - Market & Feasibility Analysis	3.0

University Requirements

UNIV 101	The Drexel Experience	2.0
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Free Electives 9.0

Total Credits 184.5

Career Opportunities

The graduates of the construction management program have secured positions as project managers, estimators, schedulers, and field superintendents for general contractors, subcontractors, and construction managers. Many are employed as owner representatives working for architectural firms, consulting engineering firms, commercial companies and institutions that have needs for building or other construction projects. Some have risen to executive positions within companies while others own their own firms. Graduates have also returned to the program after obtaining positions in the field to teach and share expertise.

The College of Engineering offers a Bachelor of Science in Construction Management as well as a Certificate Program in Construction Management. Depending on student goals, each option provides a strong educational foundation for successful performance and/or entrance into the construction industry.

Employers

Some of the companies that have hired Drexel students as co-op or full-time employees:

- Gilbane Building Company
- L.F. Driscoll Construction Company

- American Infrastructure
- Pennoni Associates
- Brandywine Realty Trust
- Turner Construction Company
- Intech Construction Managers
- Urban Engineers, Inc.

Potential Careers

Construction Manager: Coordinates a venture from its initial development through final construction. Develops a schedule and ensures the project is completed on time and within budget. Obtains necessary licenses and permits and oversees the progress of the project.

Cost Estimator: Prepares information about costs that are necessary for a business to bid on a contract or to determine the profitability of a proposed product. Assembles information about factors that can influence costs such as materials, labor, location, and special machinery requirements, including computer hardware and software.

Project Manager: Develops requirements, budgets, and timetables for a firm's construction plans to ensure that the projects are successful. Determines the tasks to complete, assigns responsibilities to team members, and sees the project through from conception to completion.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more information on career opportunities.

Minor in Construction Management

Students in civil engineering, architectural engineering and architecture may select to pursue construction management as a minor area of study. Because construction is inherently related to design in these disciplines, the construction management minor can be a natural extension of each field of study.

The requirements for the minor include:

- Completion of a minimum of 24.0 credits.
- Courses used to fulfill general education requirements may not be counted toward an academic minor.
- Up to nine credits earned within the student's major may be counted toward the minor with minor department approval.
- Prerequisite courses may be counted toward the minor if recommended by the minor department.

Required Courses

CMGT 161	Building Materials and Construction Methods I	3.0
CMGT 162	Building Materials and Construction Methods II	3.0
CMGT 361	Contracts And Specifications I	3.0
CMGT 362	Contracts and Specifications II	3.0
CMGT 363	Estimating I	3.0
CMGT 467	Techniques of Project Control	4.0
Select two of the following: *		6.0
CMGT 261	Construction Safety	
CMGT 263	Understanding Construction Drawings	
CMGT 364	Estimating II	
CMGT 461	Construction Project & Company Management	

CMGT 463	Value Engineering
CMGT 465	Marketing Construction Services

- * Choice of electives must be approved by the department based on the student's major field and prior experience.

Certain courses within the student's major may also be used to meet the minor requirements. These include:

ARCH 261	Environmental Systems I	3.0
ARCH 262	Environmental Systems II	3.0
CIVE 240 [WI (p. 238)]	Engineering Economic Analysis	3.0
ARCH 161	Architectural Construction *	3.0
Total Credits		12.0

- * ARCH 161 can be substituted for CMGT 161 for Architects. An elective may be substituted for CMGT 162.

Construction Management Faculty

Charles Cook, PhD (*New York University*). Assistant Clinical Professor. Construction management; project management; leadership and teambuilding; oral and written communication.

Robert Muir Jr., PhD (*Drexel University*). Assistant Clinical Professor. Construction management; value engineering; management of field operations; planning and scheduling; project management; heavy and industrial construction.

Richard Sievert, PhD (*Northwestern University*). Associate Clinical Professor. Project management and construction management; value engineering; cost reduction and waste minimization; facilities planning and management; marketing and selling professional services; quality management, engineering and construction business administration.

Electrical Engineering

Major: Electrical Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 192.0

Classification of Instructional Programs (CIP) code: 14.1001

Standard Occupational Classification (SOC) code: 17-2071

About the Program

The electrical engineering major emphasizes the fundamentals of electrical engineering, hands-on learning, and flexibility in course selection to satisfy diverse career goals. Students choose one or more areas of study beginning in their pre-junior year.

State-of-the-art interdisciplinary courses have been developed to prepare the Drexel engineer for the technical challenges and the business atmosphere of the 21st century. Strong emphasis is given to the role of the engineer in the global competitive economy, and to the need to work closely with experts and practitioners in many fields.

Students can choose courses in various areas of study, including telecommunications, digital signal processing, electronics, power and systems and control.

Mission Statement

The ECE Department at Drexel University serves the public and the university community by providing superior career-integrated education in electrical and computer engineering; by conducting research in these fields, to generate new knowledge and technologies; and by promoting among all its constituents professionalism, social responsibility, civic engagement and leadership.

Program Educational Objectives

The Electrical and Computer Engineering Program Educational Objectives are that its alumni in their early years after graduation:

1. Secure positions and continue as valued, creative, dependable, and proficient employees in a wide variety of fields and industries, in particular as electrical and computer engineers;
2. Succeed in graduate and professional studies, such as engineering, science, law, medicine and business;
3. Pursue professional development through lifelong learning opportunities for a successful and rewarding career;
4. Provide leadership in their profession, in their communities, and in the global society;
5. Contribute to their professional disciplines body of knowledge;
6. Function as responsible members of society with an awareness of the social and ethical ramifications of their work.

Student Outcomes

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;
- e) ability to identify, formulate, and solve engineering problems;
- f) an understanding of professional and ethical responsibility;
- g) an ability to communicate effectively;
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) a recognition of the need for, and an ability to engage in life-long learning;
- j) a knowledge of contemporary issues;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.

Areas of Study

Telecommunications and Digital Signal Processing (DSP)

Telecommunications and digital signal processing (DSP) are two of the fastest-growing fields of electrical engineering. The telecommunications and DSP areas of study prepare students for mastery of fundamental and applied knowledge in the theory and the technology of the transmission and processing of information-bearing signals such as voice, audio, data, images, and video. The curriculum includes core courses in electromagnetic propagation, communication devices and media, signal processing, analog and digital communication. Complementary electives can be taken in computers, electronics, control systems, and electric power systems.

Career opportunities include design and development of digital communications systems and telephony, speech recognition systems, fiber-optic networks, digital radio, medical diagnostic image processing, high-definition television, cellular and wireless communications, satellite communications, networked multimedia communications, and personal communication systems.

Electronics

The electronics area of study constitutes the study of electronic and optical semiconductor devices; analog and digital electronic circuits; and generation, transmission, and reception of information both in optical and microwave frequency ranges and guided or free-space conditions.

Career opportunities include jobs in telecommunications (optical, wireless, wired, satellite, and radar), VLSI (analog and digital), aerospace, remote sensing and instrumentation, computer circuitry interface, biomedical instrumentation, semiconductor device fabrication, and transportation.

Power and Systems/Control

Power and Systems/Control has at its core the areas of controls engineering and electric power engineering, the classic core of electrical engineering, and exploits the synergies between these two areas. These areas of study explores subjects such as modeling, analysis and control of dynamic systems including power systems, planning and optimization, electromechanical energy conversion, motor operation and control, transformers, power electronics, sensors and actuators, and the electrical and economic structure of the power industry. These areas of study offer access to two state-of-the-art laboratories. In the Interconnected Power System Laboratory, students can operate and control a small power system through the fusing of computer software and hardware technology with high-voltage, high-power technology. The Ortlip Systems Laboratory houses various experiments in sensing, feedback, and control. Both laboratories stress the use of modeling software, especially MATLAB, and the integrated use of computers and hardware.

Career opportunities include options ranging from manufacturing, the power industry (generation, transmission, distribution, marketing, and consumption), robotics, and transportation to Wall Street.

Additional Information

The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

Additional information about the major is available on the ECE Department website (http://www.ece.drexel.edu/Undergraduate_Programs2.html).

For advising questions, please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu).

To make an appointment, please call 215.895.2837.

Drop-in hours: Please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu) for up-to-date drop-in availability.

Advising

Jeffrey Birou

Associate Director of Undergraduate Advising

Bossone Research Center, Room 313

E-mail: jbirou@coe.drexel.edu (%20jbirou@coe.drexel.edu)

Dr. Jaudelice de Oliveira

Associate Department Head for Undergraduate Affairs

Bossone Research Center, Room 313

E-mail: jau@coe.drexel.edu (%20jau@coe.drexel.edu)

Degree Requirements

In addition to completing 192.0 credits, students majoring in electrical engineering student must have a 2.0 cumulative overall GPA and a 2.0 cumulative GPA in their Electrical Engineering courses.

General Education/Liberal Studies Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 315	Engineering Ethics	3.0
UNIV E101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
General Education Courses *		18.0

Foundation Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
BIO 141	Essential Biology	4.5
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ECE 200	Digital Logic Design	3.0
ECE 201	Foundations of Electric Circuits	3.0
ECE 203	Programming for Engineers	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0

ENGR 103	Engineering Design Laboratory III	2.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0

Sophomore Engineering Elective Options

Select one of the following:		3.0-4.0
ENGR 210	Introduction to Thermodynamics	
MATH 221	Discrete Mathematics	
PHYS 202	Fundamentals of Physics IV	

Professional Requirements

ECEL 301 [WI (p. 242)]	Electrical Engineering Laboratory	2.0
ECEL 302	ECE Laboratory II	2.0
ECEL 303	ECE Laboratory III	2.0
ECEL 304	ECE Laboratory IV	2.0
ECE 361	Probability for Engineers	3.0
or ECE 362	Engineering Statistics	
or ENGR 361	Statistical Analysis of Engineering Systems	
ECES 301	Transform Methods and Filtering	4.0
ECES 303	Transform Methods II	3.0
ECE 391	Introduction to Engineering Design Methods	1.0
ECE 491 [WI (p. 242)]	Senior Design Project I	2.0
ECE 492 [WI (p. 242)]	Senior Design Project II	2.0
ECE 493	Senior Design Project III	4.0
13 ECE Electives		42.0
Math Elective **		3.0
Free Electives		13.5

Total Credits **192.0-193.0**

* General Education Courses (<https://nextcatalog.drexel.edu/undergraduate/collegeofengineering/#generaleducationrequirements>).

** The math elective is a 3.0-4.5 credit course from MATH at a 200-level or higher. MATH 291 (Complex & Vector Analysis) is encouraged for EE majors.

Sample Plan of Study

5 YR UG Co-op Concentration

Term 1		Credits
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
ENGR 121	Computation Lab I	2.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
MATH 121	Calculus I	4.0

UNIV E101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 122	Computation Lab II	1.0
ENGR 102	Engineering Design Laboratory II	2.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		19.5
Term 3		
BIO 141	Essential Biology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		18.0
Term 4		
ECE 200	Digital Logic Design	3.0
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		17.0
Term 5		
ECE 201	Foundations of Electric Circuits	3.0
ECE 203	Programming for Engineers	3.0
ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 232	Dynamic Engineering Systems	3.0
Sophomore Engineering elective*		3.0
Term Credits		15.0
Term 6		
ECEL 301 [WI (p. 242)]	Electrical Engineering Laboratory	2.0
ECES 301	Transform Methods and Filtering	4.0
Two ECE Electives*		6.0
Math elective		3.0
Term Credits		15.0
Term 7		
ECE 361, 362, or ENGR 361	Probability for Engineers Engineering Statistics Statistical Analysis of Engineering Systems	3.0
ECEL 302	ECE Laboratory II	2.0
ECES 303	Transform Methods II	3.0
One ECE Elective*		3.0
PHIL 315	Engineering Ethics	3.0
Free elective		3.0
Term Credits		17.0

Term 8		
Two ECE Electives*		6.0
ECEL 303	ECE Laboratory III	2.0
General Education elective*		3.0
Free elective		4.0
Term Credits		15.0
Term 9		
ECE 391	Introduction to Engineering Design Methods (Also offered spring term.)	1.0
ECEL 304	ECE Laboratory IV	2.0
Two ECE Electives*		6.0
General Education elective*		3.0
Free elective		3.0
Term Credits		15.0
Term 10		
ECE 491 [WI (p. 242)]	Senior Design Project I	2.0
Two ECE Electives*		6.0
Two General Education electives*		6.0
Term Credits		14.0
Term 11		
ECE 492 [WI (p. 242)]	Senior Design Project II	2.0
Two ECE Electives*		7.0
General Education elective*		3.0
Free elective		4.5
Term Credits		16.5
Term 12		
ECE 493	Senior Design Project III	4.0
Two ECE Electives*		7.0
General Education elective*		3.0
Term Credits		14.0
Total Credit: 192.5		

* See degree requirements (p. 244).

Co-op/Career Opportunities

Top co-op employers for electrical engineering majors include:

- AT&T Mobility
- Central Intelligence Agency
- Comcast Corporation
- EwingCole
- Exelon Corporation (PECO)
- Lockheed Martin
- NAVSEA
- PJM Interconnection LLC
- Schweitzer Engineering Laboratories Inc
- U.S. Federal Aviation Administration
- Singapore as a Apple iPhone App Developer

- Vietnam as a Game Developer for Glass Egg

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) for more detailed information on co-op and post-graduate opportunities.

Drexel University's co-op program has a 80 year history and is one of the oldest and largest co-op programs in the world. Students graduate with 6-18 months of full time employment experience, depending on their choice of a 4-year or 5-year program. The majority of Computer Engineering students in ECE choose the 5-year program and graduate with 18 months of full-time work experience, and often receive a job offer from their third co-op employer or from a connection made from one of their co-op experiences.

Electrical engineers are employed in corporations, government agencies, and other organizations. In their work, these engineers are developers of electrical equipment for digital communications (such as satellite communication, fiber-optic networks, and coding and cryptography), mobile radio, radar and surveillance, process control, robotics, speech processing, aerospace circuitry, power generation and distribution, computer hardware and software, computer networks, sensor technology, counter-crime measures, electronic compatibility, consumer electronics, and related fields.

Graduates are also pursuing advanced studies in electrical and computer engineering, aerospace engineering, and mechanical engineering at such schools as MIT, Stanford, Princeton, Georgia Institute of Technology, University of California at Berkeley, University of Pennsylvania, and University of Maryland.

The Steinbright Career Development Center had a co-op placement rate of approximately 99% for electrical and computer engineering majors.

A degree in electrical engineering can also serve as an excellent foundation to pursue graduate professional careers in medicine, law, business, and government.

Dual/Accelerated Degree

Accelerated Program

The accelerated programs of the College of Engineering provide opportunities for highly talented and strongly motivated students to progress toward their educational goals essentially at their own pace. These options include opportunities for accelerated studies, dual degrees, and combined bachelor's/master's programs.

Primarily through advanced placement, credit by examination, flexibility of scheduling, and independent study, the "fast track" makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum.

Dual Degree Bachelor's Programs

With careful planning, students can complete both an Electrical Engineering degree and a Computer Engineering degree in the time usually required to complete one degree. For detailed information the student should contact the ECE advisor (<http://drexel.edu/ece/academics/undergrad/advising>).

Bachelor's/Master's Dual Degree Program

Exceptional students can also pursue a master of science degree in the same period as the bachelor of science.

For more information on these and other options, visit the Department of Electrical and Computer Engineering BS/MS (<http://drexel.edu/ece/academics/undergrad/bs-ms>) page.

Minor in Electrical Engineering

This minor is designed to provide other engineering majors or students from other disciplines an introduction to the wide-ranging content of the electrical engineering major. The minor consists of a minimum of nine ECE courses resulting in 26.0 credits. There are six required courses and an additional 9 credits of elective courses.

Prerequisites

The minor assumes that students will have a background in mathematics and physics equivalent to that covered in the first two years of the engineering curriculum. In mathematics, this would cover calculus and differential equations. Knowledge of linear algebra is also recommended. Courses taken to meet these requirements will not count toward the minor.

Required Courses

ECE 200	Digital Logic Design	3.0
ECE 201	Foundations of Electric Circuits	3.0
ECEL 301 [WI (p. 242)]	Electrical Engineering Laboratory	2.0
ECEL 302	ECE Laboratory II	2.0
ECES 301	Transform Methods and Filtering	4.0
ECES 303	Transform Methods II	3.0
Electives *		9.0
Total Credits		26.0

* Students should choose 9 credits from the 300- and/or 400-level ECE courses. These courses can come from the Computer (ECEC), Electrophysics (ECEE), Electric Power (ECEP), or Systems (ECES) groups. All prerequisites must be satisfied. Students majoring in Computer Engineering and minoring in Electrical Engineering may **only** choose elective courses from the ECEE, ECEP, and ECES course groups.

Additional information

Additional information about this minor is available on the ECE Department website (<http://www.drexel.edu/ece/academics/undergrad/minors>).

For advising questions, please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu).

To make an appointment, please call 215.895.2241
Drop-in hours: Please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu) for up-to-date drop-in availability.

Facilities

Drexel University and the Electrical and Computer Engineering Department are nationally recognized for a strong history of developing innovative research. Research programs in the ECE Department prepare students for careers in research and development, and aim to endow graduates with the ability to identify, analyze, and address new technical and scientific challenges. The ECE Department is well equipped

with state-of-the-art facilities in each of the following ECE Research laboratories:

Research Laboratories at the ECE Department

Adaptive Signal Processing and Information Theory Research Group

The Adaptive Signal Processing and Information Theory Research Group (<http://www.ece.drexel.edu/walsh/aspitrg/home.html>) conducts research in the area of signal processing and information theory. Our main interests are belief/expectation propagation, turbo decoding and composite adaptive system theory. We are currently doing projects on the following topics:

- i) Delay mitigating codes for network coded systems,
- ii) Distributed estimation in sensor networks via expectation propagation,
- iii) Turbo speaker identification,
- iv) Performance and convergence of expectation propagation,
- v) Investigating bounds for SINR performance of autocorrelation based channel shorteners.

Applied Networking Research Lab

Applied Networking Research Lab (ANRL) projects focus on modeling and simulation as well as experimentation in wired, wireless and sensor networks. ANRL is the home of MuTANT, a Multi-Protocol Label Switched Traffic Engineering and Analysis Testbed composed of 10 high-end Cisco routers and several PC-routers, also used to study other protocols in data networks as well as automated network configuration and management. The lab also houses a sensor network testbed.

Bioimage Laboratory

Uses computer gaming hardware for enhanced and affordable 3-D visualization, along with techniques from information theory and machine learning to combine the exquisite capabilities of the human visual system with computational sensing techniques for analyzing vast quantities of image sequence data.

Data Fusion Laboratory

The Data Fusion Laboratory investigates problems in multisensory detection and estimation, with applications in robotics, digital communications, radar, and target tracking. Among the projects in progress: computationally efficient parallel distributed detection architectures, data fusion for robot navigation, modulation recognition and RF scene analysis in time-varying environments, pattern recognition in biological data sequences and large arrays, and hardware realizations of data fusion architectures for target detection and target tracking.

Drexel Network Modeling Laboratory

The Drexel Network Modeling Laboratory investigates problems in the mathematical modeling of communication networks, with specific focus on wireless ad hoc networks, wireless sensor networks, and supporting guaranteed delivery service models on best effort and multipath routed networks. Typical methodologies employed in our research include mathematical modeling, computer simulation, and performance optimization, often with the end goal of obtaining meaningful insights into network design principles and fundamental performance tradeoffs.

Drexel Power-Aware Computing Laboratory

The Power-Aware Computing Lab (<http://dpac.ece.drexel.edu>) investigates methods to increase energy efficiency across the boundaries of circuits, architecture, and systems. Our recent accomplishments include the Sigil profiling tool, scalable modeling infrastructure for accelerator implementations, microarchitecture-aware VDD gating algorithms, an accelerator architecture for ultrasound imaging, evaluation of hardware reference counting, hardware and operating system support for power-agile computing, and memory systems for accelerator-based architectures.

Drexel University Nuclear Engineering Education Laboratory

The field of nuclear engineering encompasses a wide spectrum of occupations, including nuclear reactor design, medical imaging, homeland security, and oil exploration. The Drexel University Nuclear Engineering Education Laboratory (DUNEEL) provides fundamental hands on understanding for power plant design and radiation detection and analysis. Software based study for power plant design, as well as physical laboratory equipment for radiation detection, strengthen the underlying concepts used in nuclear engineering such that the student will comprehend and appreciate the basic concepts and terminology used in various nuclear engineering professions. Additionally, students use the laboratory to develop methods for delivering remote, live time radiation detection and analysis. The goal of DUNEEL is to prepare students for potential employment in the nuclear engineering arena.

Drexel VLSI Laboratory

The Drexel VLSI Laboratory (http://ece.drexel.edu/faculty/taskin/wiki/visilab/index.php/Main_Page) investigates problems in the design, analysis, optimization and manufacturing of high performance (low power, high throughput) integrated circuits in contemporary CMOS and emerging technologies. Suited with industrial design tools for integrated circuits, simulation tools and measurement beds, the VLSI group is involved with digital and mixed-signal circuit design to verify the functionality of the discovered novel circuit and physical design principles. The Drexel VLSI laboratory develops design methodologies and automation tools in these areas, particularly in novel clocking techniques, featuring resonant clocking, and interconnects, featuring wireless interconnects.

Drexel Wireless Systems Laboratory

The Drexel Wireless Systems Laboratory (DWSL) contains an extensive suite of equipment for constructing, debugging, and testing prototype wireless communications systems. Major equipment within DWSL includes:

- three software defined radio network testbeds (HYDRA, USRP, and WARP) for rapidly prototyping radio, optical and ultrasonic communications systems,
- a TDK RF anechoic chamber and EMSCAN desktop antenna pattern measurement system,
- a materials printer and printed circuit board milling machine for fabricating conformal antennas and
- wireless protocol conformance testing equipment from Aeroflex.

The lab is also equipped with network analyzers, high speed signal generators, oscilloscopes, and spectrum analyzers as well as several Zigbee development platforms for rapidly prototyping sensor networks.

DWSL personnel also collaborate to create wearable, fabric based transceivers through collaboration with the Shima Seiki Haute Laboratory

in the Drexel ExCITE Center. The knitting equipment at Drexel includes sixteen SDS-ONE APEX3 workstations and four state-of-the-art knitting machines. The workstations accurately simulate fabric construction and provide researchers and designers the opportunity to program, create and simulate textile prototypes, import CAD specifications of final products, and produce made-to-measure or mass-produced pieces on Shima Seiki knitting machines. For testing smart textiles for biomedical, DWSL personnel also have collaborators in the Center for Interdisciplinary Clinical Simulation and Practice (CICSP) in the Drexel College of Medicine which provides access to medical mannequin simulators.

Ecological and Evolutionary Signal-processing and Informatics Laboratory

The Ecological and Evolutionary Signal-processing and Informatics Laboratory (EESI) (<http://www.ece.drexel.edu/gailr/EESI>) seeks to solve problems in high-throughput genomics and engineer better solutions for biochemical applications. The lab's primary thrust is to enhance the use of high-throughput DNA sequencing technologies with pattern recognition and signal processing techniques. Applications include assessing the organism content of an environmental sample, recognizing/classifying potential and functional genes, inferring environmental factors and inter-species relationships, and inferring microbial evolutionary relationships from short-read DNA/RNA fragments. The lab also investigates higher-level biological systems such as modeling and controlling chemotaxis, the movement of cells.

Electric Power Engineering Center

This newly established facility makes possible state-of-the-art research in a wide variety of areas, ranging from detailed theoretical model study to experimental investigation in its high voltage laboratories. The mission is to advance and apply scientific and engineering knowledge associated with the generation, transmission, distribution, use, and conservation of electric power. In pursuing these goals, this center works with electric utilities, state and federal agencies, private industries, nonprofit organizations and other universities on a wide spectrum of projects. Research efforts, both theoretical and experimental, focus on the solution of those problems currently faced by the electric power industry. Advanced concepts for electric power generation are also under investigation to ensure that electric power needs will be met at the present and in the future.

Electronic Design Automation Facility

Industrial-grade electronic design automation software suite and integrated design environment for digital, analog and mixed-signal systems development. Field Programmable Gate Array (FPGA) development hardware. Most up-to-date FPGA/embedded system development hardware kits. Printed circuit board production facility. Also see Drexel VLSI Laboratory.

Microwave-Photonics Device Laboratories

The laboratory is equipped with test and measurement equipment for high-speed analog and digital electronics and fiber optic systems. The test equipment includes network analyzers from Agilent (100kHz- 1.3 GHz and 45 MHz-40 GHz), and Anritsu (45 MHz-6 GHz); spectrum analyzers from Tektronix, HP, and Agilent with measurement capability of DC to 40 GHz and up to 90 GHz using external mixers; signal generators and communication channel modulators from HP, Rhode-Schwartz, Systron Donner, and Agilent; microwave power meter and sensor heads, assortment of passive and active microwave components up to 40 GHz ; data pattern generator and BER tester up to 3Gb/s; optical spectrum analyzer from Anritsu and power meters from HP; single and multimode

fiber optic based optical transmitter and receiver boards covering ITU channels at data rates up to 10Gb/s; passive optical components such as isolator, filter, couplers, optical connectors and fusion splicer; LPKF milling machine for fabrication of printed circuit boards; wire-bonding and Cascade probe stations; Intercontinental test fixtures for testing of MMIC circuits and solid-state transistors; state-of-the-art microwave and electromagnetic CAD packages such as Agilent ADS, ANSYS HFSS, and COMSOL multi-physics module.

Music and Entertainment Technology Laboratory

The Music and Entertainment Technology Laboratory (MET-lab) is devoted to research in digital media technologies that will shape the future of entertainment, especially in the areas of sound and music. We employ digital signal processing and machine learning to pursue novel applications in music information retrieval, music production and processing technology, and new music interfaces. The MET-lab is also heavily involved in outreach programs for K-12 students and hosts the Summer Music Technology program, a one-week learning experience for high school students. Lab facilities include a sound isolation booth for audio and music recording, a digital audio workstation running ProTools, two large multi-touch display interfaces of our own design, and a small computing cluster for distributed processing.

NanoPhotonics+ Lab (<http://drexelnanophotonics.com>)

Our research is primarily in the area of nanophotonics with a focus on the nanoscale interaction of light with matter. Interests include: liquid crystal/polymer composites for gratings, lenses and HOEs; liquid crystal interactions with surfaces and in confined nanospaces; alternative energy generation through novel photon interactions; ink-jet printed conducting materials for RF and photonic applications; and the creation and development of smart textiles technologies including soft interconnects, sensors, and wireless implementations.

Opto-Electro-Mechanical Laboratory

This lab concentrates on the system integration on optics, electronics, and mechanical components and systems, for applications in imaging, communication, and biomedical research. Research areas include: Programmable Imaging with Optical Micro-electrical-mechanical systems (MEMS), in which microscopic mirrors are used to image light into a single photodetector; Pre-Cancerous Detection using White Light Spectroscopy, which performs a cellular size analysis of nuclei in tissue; Free-space Optical Communication using Space Time Coding, which consists of diffused light for computer-to-computer communications, and also tiny lasers and detectors for chip-to-chip communication; Magnetic Particle Locomotion, which showed that particles could swim in a uniform field; and Transparent Antennas using Polymer, which enables antennas to be printed through an ink-jet printer.

Plasma and Magnetics Laboratory

Research is focused on applications of electrical and magnetic technologies to biology and medicine. This includes the subjects of non-thermal atmospheric pressure plasma for medicine, magnetic manipulation of particles for drug delivery and bio-separation, development of miniature NMR sensors for cellular imaging and carbon nanotube cellular probes.

Power Electronics Research Laboratory

The Power Electronics Research Laboratory (PERL) is involved in circuit and design simulation, device modeling and simulation, and experimental testing and fabrication of power electronic circuits. The research and

development activities include electrical terminations, power quality, solar photovoltaic systems, GTO modeling, protection and relay coordination, and solid-state circuit breakers. The analysis tools include EMPT, SPICE, and others, which have been modified to incorporate models of such controllable solid-state switches as SCRs, GTOs, and MOSFETs. These programs have a wide variety and range of modeling capabilities used to model electromagnetics and electromechanical transients ranging from microseconds to seconds in duration. The PERL is a fully equipped laboratory with 42 kVA AC and 70 kVA DC power sources and data acquisition systems, which have the ability to display and store data for detailed analysis. Some of the equipment available is a distribution and HV transformer and three phase rectifiers for power sources and digital oscilloscopes for data measuring and experimental analysis. Some of the recent studies performed by the PERL include static VAR compensators, power quality of motor controllers, solid-state circuit breakers, and power device modeling which have been supported by PECO, GE, Gould, and EPRI.

RE Touch Lab

The RE Touch Lab is investigating the perceptual and mechanical basis of active touch perception, or haptics, and the development of new technologies for stimulating the sense of touch, allowing people to touch, feel, and interact with digital content as seamlessly as we do with objects in the real world. We study the scientific foundations of haptic perception and action, and the neuroscientific and biomechanical basis of touch, with a long-term goal of uncovering the fundamental perceptual and mechanical computations that enable haptic interaction. We also create new technologies for rendering artificial touch sensations that simulate those that are experienced when interacting with real objects, inspired by new findings on haptic perception.

Testbed for Power-Performance Management of Enterprise Computing Systems

This computing testbed is used to validate techniques and algorithms aimed at managing the performance and power consumption of enterprise computing systems. The testbed comprises a rack of Dell 2950 and Dell 1950 PowerEdge servers, as well as assorted desktop machines, networked via a gigabit switch. Virtualization of this cluster is enabled by VMWare's ESX Server running the Linux RedHat kernel. It also comprises of a rack of ten Apple Xserve machines networked via a gigabit switch. These servers run the OS X Leopard operating systems and have access to a RAID with TBs of total disk capacity.

Electrical and Computer Engineering Faculty

Fernand Cohen, PhD (*Brown University*). Professor. Surface modeling; tissue characterization and modeling; face modeling; recognition and tracking.

Kapil Dandekar, PhD (*University of Texas-Austin*) *Director of the Drexel Wireless Systems Laboratory (DWSL); Associate Dean of Research, College of Engineering*. Professor. Cellular/mobile communications and wireless LAN; smart antenna/MIMO for wireless communications; applied computational electromagnetics; microwave antenna and receiver development; free space optical communication; ultrasonic communication; sensor networks for homeland security; ultrawideband communication.

Afshin Daryoush, ScD (*Drexel University*). Professor. Digital and microwave photonics; nonlinear microwave circuits; RFIC; medical imaging.

Bruce A. Eisenstein, PhD (*University of Pennsylvania*) *Interim Dean, College of Engineering*. Professor. Pattern recognition; estimation; decision theory.

Adam K. Fontecchio, PhD (*Brown University*) *Electrical and Computer Engineering*. Professor. Electro-optics; remote sensing; active optical elements; liquid crystal devices.

Gary Friedman, PhD (*University of Maryland-College Park*). Professor. Biological and biomedical applications of nanoscale magnetic systems.

Eli Fromm, PhD (*Jefferson Medical College*) *Roy A. Brothers University Professor / Director for Center of Educational Research*. Professor. Engineering education; academic research policy; bioinstrumentation; physiologic systems.

Edwin L. Gerber, PhD (*University of Pennsylvania*) *Assistant Department Head for Evening Programs*. Professor. Computerized instruments and measurements; undergraduate engineering education.

Allon Guez, PhD (*University of Florida*). Professor. Intelligent control systems; robotics, biomedical, automation and manufacturing; business systems engineering.

Mark Hempstead, PhD (*Harvard University*) *Junior Colehower Chair*. Assistant Professor. Computer engineering; power-aware computing; computer architecture; low power VLSI Design; wireless sensor networks.

Peter R. Herczfeld, PhD (*University of Minnesota*) *Lester A. Kraus Professor/Director, Center for Microwave/Lightwave Engineering*. Professor. Lightwave technology; microwaves; millimeter waves; fiberoptic and integrated optic devices.

Leonid Hrebien, PhD (*Drexel University*) *Graduate Advisor and Assistant Department Head for Graduate Affairs*. Professor. Tissue excitability; acceleration effects on physiology; bioinformatics.

Paul R. Kalata, PhD (*Illinois Institute of Technology*). Associate Professor. Stochastic and adaptive control theory; identification and decision theory; Kalman filters.

Moshe Kam, PhD (*Drexel University*) *Robert G. Quinn Professor of Electrical and Computer Engineering and Department Head*. Professor. Decision fusion and sensor fusion; mobile robots (especially robot navigation); pattern recognition (especially in handwriting applications); optimization and control.

Nagarajan Kandasamy, PhD (*University of Michigan*). Associate Professor. Embedded systems, self-managing systems, reliable and fault-tolerant computing, distributed systems, computer architecture, and testing and verification of digital systems.

Bruce Katz, PhD (*University of Illinois*). Adjunct Professor. Speech communication and computer science; artificial intelligence.

Youngmoo Kim, PhD (*MIT*). Associate Professor. Audio and music signal processing, voice analysis and synthesis, music information retrieval, machine learning.

Timothy P. Kurzweg, PhD (*University of Pittsburgh*). Associate Professor. Optical MEM modeling and simulation; system-level simulation; computer architecture.

Karen Miu, PhD (*Cornell University*). Professor. Power systems; distribution networks; distribution automation; optimization; system analysis.

Bahram Nabet, PhD (*University of Washington*) *Associate Dean for Special Projects, College of Engineering; Electrical and Computer Engineering*. Professor. Optoelectronics; fabrication and modeling; fiber optic devices; nanoelectronics; nanowires.

Prawat Nagvajara, Ph.D. (*Boston University*). Associate Professor. System on a chip; embedded systems; power grid computation; testing of computer hardware; fault-tolerant computing; VLSI systems; error control coding.

Dagmar Niebur, Ph.D. (*Swiss Federal Institute of Technology*). Associate Professor. Intelligent systems; dynamical systems; power system monitoring and control.

Chika Nwankpa, PhD (*Illinois Institute of Technology*). Professor. Power system dynamics; power electronic switching systems; optically controlled high power switches.

Karkal S. Prahbu, PhD (*Harvard University*). Auxiliary Professor. Computer and software engineering; advanced microprocessors and distributed operating systems.

Gail L. Rosen, PhD (*Georgia Institute of Technology*). Associate Professor. Signal processing, signal processing for biological analysis and modeling, bio-inspired designs, source localization and tracking.

Kevin J. Scoles, PhD (*Dartmouth College*) *Associate Dean, College of Engineering, Office of Student Services*. Associate Professor. Microelectronics; electric vehicles; solar energy; biomedical electronics.

Harish Sethu, PhD (*Lehigh University*). Associate Professor. Protocols, architectures and algorithms in computer networks; computer security; mobile ad hoc networks; large-scale complex adaptive networks and systems.

P. Mohana Shankar, PhD (*Indian Institute of Technology*) *Allen Rothwarf Professor of Electrical and Computer Engineering*. Professor. Wireless communications; biomedical ultrasonics; fiberoptic bio-sensors.

Baris Taskin, PhD (*University of Pittsburgh*). Associate Professor. Electronic design automation (EDA) of integrated circuits, high-performance VLSI circuits and systems, sequential circuit timing and synchronization, system-on-chip (SOC) design, operational research, VLSI computer-aided design.

Lazar Trachtenberg, DSc (*Israel Institute of Technology*). Professor. Fault tolerance; multi-level logic synthesis; signal processing; suboptimal filtering.

Oleh Tretiak, ScD (*MIT*) *Robert C. Disque Professor of Electrical and Computer Engineering*. Professor. Image processing; tomography; image registration; pattern recognition.

John MacLaren Walsh, PhD (*Cornell University*). Assistant Professor. Performance and convergence of belief/expectation propagation and turbo decoding/equalization/synchronization, permeation models for ion channels, composite adaptive systems theory.

Steven Weber, PhD (*University of Texas-Austin*) *Assistant Department Head for Graduate Affairs, Electrical and Computer Engineering*. Associate Professor. Mathematical modeling of computer and communication networks, specifically streaming multimedia and ad hoc networks.

Jaudelice Cavalcante de Oliveira, PhD (*Georgia Institute of Technology*). Associate Professor. Next generation Internet; quality of service in computer communication networks; wireless networks.

Interdepartmental Faculty

Dov Jaron, PhD (*University of Pennsylvania*) *Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Jeremy R. Johnson, PhD (*Ohio State University*). Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

John Lacontora, PhD (*New Jersey Institute of Technology*). Associate Research Professor. Service engineering; industrial engineering.

Ryszard Lec, PhD (*University of Warsaw Engineering College*). Professor. Biomedical applications of viscoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Spiros Mancoridis, PhD (*University of Toronto*) *Interim Department Head, Computer Science*. Professor. Software engineering; software security; code analysis; evolutionary computation.

Karen Moxon, PhD (*University of Colorado*). Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Paul Y. Oh, PhD (*Columbia University*) *Associate Department Head for External Affairs, Department of Mechanical Engineering and Mechanics*. Professor. Smart sensors servomechanisms; machine vision and embedded microcomputers for robotics and mechatronics.

Banu Onaral, Ph.D. (*University of Pennsylvania*) *H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD (*Rensselaer Polytechnic University*). Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

William C. Regli, PhD (*University of Maryland-College Park*). Professor. Artificial intelligence; computer graphics; engineering design and Internet computing.

Arye Rosen, PhD (*Drexel University*) *Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Jonathan E. Spanier, PhD (*Columbia University*) *Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Aydin Tozeren, PhD (*Columbia University*) *Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and

epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Aspasia Zerva, PhD (*University of Illinois*). Professor. Earthquake engineering; mechanics; seismicity; probabilistic analysis.

Emeritus Faculty

Richard L. Coren, PhD (*Polytechnic Institute of Brooklyn*). Professor Emeritus. Electromagnetic fields, antennas, shielding, RFI, cybernetics of evolving systems.

Robert Fischl, PhD (*University of Michigan*) *John Jarem Professor Emeritus / Director, Center for Electric Power Engineering*. Professor Emeritus. Power: systems, networks, controls, computer-aided design, power systems, solar energy.

Vernon L. Newhouse, PhD (*University of Leeds*) *Disque Professor Emeritus*. Professor Emeritus. Biomedical and electrophysics: ultrasonic flow measurement, imaging and texture analysis in medicine, ultrasonic nondestructive testing and robot sensing, clinical engineering.

Hun H. Sun, PhD (*Cornell University*) *Ernest O. Lange Professor Emeritus*. Professor Emeritus. Systems and signals in biomedical control systems.

Engineering

Major: Engineering

Degree Awarded: Bachelor of Science in Engineering (BSE)

Calendar Type: Quarter

Total Credit Hours: 180.5

Classification of Instructional (CIP) code: 14.0101

Standard Occupational Classification (SOC) code: 17-2199

About the Program

The Bachelor of Science in Engineering major is an interdisciplinary engineering major for students who do not intend to be practicing engineers. Students in the Bachelor of Science in Engineering major combine a rigorous engineering education in the College of Engineering with interdisciplinary studies in fields outside of engineering such as law, medicine, business, entrepreneurship, teaching, international studies, public policy, music, art, environmental studies, and more. The Bachelor of Science in Engineering major provides a strong grounding in the foundations of engineering, in quantitative skills, and in the analytic processes that engineers use in design of practical technology.

Drexel's Bachelor of Science in Engineering major was developed to provide students with educational and professional challenges not available in the traditional engineering curriculum.

Program Objectives

The key objectives of the Bachelor of Science in Engineering program are to provide the student with:

- a strong foundation in science and mathematics
- a foundation of the fundamentals of engineering as a discipline
- a strong grounding in a second cognate area (either technical, pre-professional, cultural, global, or another area worked out between the student and his/her advisor)
- an integrating experience that ties the technical and the cognate areas together. Examples of such experiences may be, but are not

limited to, research projects, capstone designs, a public service assignment, etc.

Additional Information

Additional information about the Bachelor of Science in Engineering program is available on the Bachelor of Science in Engineering website (<http://drexel.edu/engineering/programs/undergrad/Engineering>).

Degree Requirements

General Education/Liberal Studies Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV E101	The Drexel Experience	1.0
General Education Requirements *		24.0
Free Electives		24.0

Math and Science Requirements

BIO 141	Essential Biology	4.5
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0

Core Curriculum Requirements

ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0

Engineering Requirements

As part of the 45.0 credits of Engineering requirements, students must include a capstone experience (Senior design sequence, research project, etc.)

Technical Electives

Students select 18.0 credits of 200-level (or higher) courses in BMES, 18.0 MATH, CHEM, PHYS, BIO or College of Engineering courses. Advisor approval is required for technical electives.

Total Credits **180.5**

* General Education Requirements. (p. 214)

Sample Plan of Study

5 YR UG Co-op Concentration

	Credits
Term 1	
CHEM 101 General Chemistry I	3.5
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100 Beginning Computer Aided Drafting for Design	1.0
ENGR 101 Engineering Design Laboratory I	2.0
ENGR 121 Computation Lab I	2.0
MATH 121 Calculus I	4.0
UNIV E101 The Drexel Experience	1.0
Term Credits	16.5
Term 2	
CIVC 101 Introduction to Civic Engagement	1.0
CHEM 102 General Chemistry II	4.5
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102 Engineering Design Laboratory II	2.0
ENGR 122 Computation Lab II	1.0
MATH 122 Calculus II	4.0
PHYS 101 Fundamentals of Physics I	4.0
Term Credits	19.5
Term 3	
BIO 141 Essential Biology	4.5
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103 Engineering Design Laboratory III	2.0
MATH 200 Multivariate Calculus	4.0
PHYS 102 Fundamentals of Physics II	4.0
Term Credits	17.5
Term 4	
ENGR 201 Evaluation Presentation of Experimental Data I	3.0
ENGR 231 Linear Engineering Systems	3.0
PHYS 201 Fundamentals of Physics III	4.0
Engineering course*	3.0
Term Credits	13.0
Term 5	
ENGR 202 Evaluation Presentation of Experimental Data II	3.0
ENGR 232 Dynamic Engineering Systems	3.0
Engineering course*	3.0
General Education elective*	3.0
Free elective	3.0
Term Credits	15.0
Term 6	
Two Engineering courses*	6.0
General Education elective*	3.0
Free elective	3.0
Term Credits	12.0
Term 7	
Two Engineering courses*	6.0
General Education elective*	3.0

Technical elective	3.0
Free elective	3.0
Term Credits	15.0
Term 8	
Two Engineering courses*	6.0
General Education elective*	3.0
Technical elective	3.0
Free elective	3.0
Term Credits	15.0
Term 9	
Two Engineering courses*	6.0
General Education elective*	3.0
Technical elective	3.0
Free elective	3.0
Term Credits	15.0
Term 10	
Senior Design Project I or Capstone course*	3.0
Engineering course*	3.0
General Education elective*	3.0
Technical elective	3.0
Free elective	3.0
Term Credits	15.0
Term 11	
Senior Design Project II or Capstone course*	3.0
Engineering course*	3.0
General Education elective*	3.0
Technical elective	3.0
Free elective	3.0
Term Credits	15.0
Term 12	
Senior Design Project III or Capstone course*	3.0
General Education elective*	3.0
Technical elective	3.0
Free elective	3.0
Term Credits	12.0
Total Credit: 180.5	

* See degree requirements (p. 251).

Facilities

From the start of their freshman year, students learn to use the equipment they are likely to need in their careers, such as oscilloscopes, signal generators, amplifiers, and power supplies. These skills make students more useful as co-op employees and give them a competitive advantage in their engineering careers.

Computer/Design Center

The Drexel Curriculum boasts two types of lab experience: Instrumentation and Computer Design. Instrumentation Labs introduce Engineering Majors to the sight, sound, and feel of equipment such as digital multimeters, power supplies, oscilloscopes, and waveform

generators. The Computer Labs imbue these pre-engineers with knowledge of software which will be vital in today's work environment.

Engineering Technology

Major: Engineering Technology

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 187.5

Classification of Instructional (CIP) code: 15.0000

Standard Occupational Classification (SOC) code: 17-3029

About the Program

The degree is **Engineering Technology**, the career is **Engineering**.™

Engineering Technology is a branch of engineering that emphasizes practice and the application of theory to solve real-world problems. As a result, although the subject areas of core courses in both engineering technology and traditional engineering are similar, engineering technology courses stress the application of engineering techniques, while traditional engineering courses focus on the development of concepts.

To meet the increasing need for engineering technologists, the BS in Engineering Technology program at Drexel is organized around a practice-based learning approach to knowledge development. There is extensive use of hands-on laboratory exercises in a majority of classes. The Engineering Technology program, due to its application-oriented focus, is ideally suited for students who plan to pursue careers in a variety of design-, production-, and service-related positions and who learn best by seeing concepts put into actual practice. As Engineering Technology students advance, the practice-based approach leads them to become particularly knowledgeable in different practical applications of available technology. *Engineering Technology graduates are focused on using current and emerging technologies and have skills in the practical and immediate use of technology to solve applied engineering problems that industry faces.*

Because the use of state-of-the-art technology is at the heart of the practice-based activities in engineering technology laboratories, Engineering Technology graduates are well versed in the application of modern technology to production-level engineering problems. Through real world industry-sponsored capstone projects, internships with local companies, etc., students in the Engineering Technology program frequently become closely connected to the regional industry and often end up employed with those local industries.

Concentrations are available in biomedical, electrical, mechanical, and industrial engineering technology:

- Biomedical Engineering Technology (p. 255)
- Electrical Engineering Technology (p. 257)
- Industrial Engineering Technology (p. 259)
- Mechanical Engineering Technology (p. 261)

All students enrolled in the program are required to take general education courses, including mathematics, sciences and liberal arts. All concentrations consist of core fundamental courses, technical electives, free electives, and a three-term senior design project, reflecting industrial practices. During their sophomore year, students need to choose one of the four available concentrations.

The program includes full-time and part-time enrollment options. Students pursuing the full-time option can opt for a four-year program with a six-month internship or a five-year program with three six-month co-op cycles.

Engineering technology graduates are uniquely qualified to serve in a variety of functions requiring traditional and nontraditional technological skills. The program also prepares students for graduate study in a variety of fields, including engineering technology, engineering management, business administration, and health-care.

Mission

The mission of the Engineering Technology program is to provide contemporary students with an academic foundation and practical education in engineering technology through an outstanding curriculum and applied research program, and the participation of our students in one of the nation's most successful cooperative educational programs.

Engineering Technology Program Educational Objectives

The Engineering Technology program produces graduates who:

- apply discipline-specific theory, experiments and real world experience to interpret, analyze and solve current and emerging technical problems;
- communicate clearly and persuasively with technical and non-technical people in oral, written and graphical forms;
- function individually and on teams to design quality systems, components or processes in a timely, responsible and creative manner;
- demonstrate behavior consistent with professional ethics and are cognizant of social concerns as they relate to the practice of engineering technology;
- strive for professional growth and engage in lifelong learning.

Engineering Technology Student Outcomes

The program's outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- an ability to conduct standard tests and measurements, to conduct, analyze, and interpret experiments, and to apply experimental results to improve processes;
- an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
- an ability to function effectively as a member or leader on a technical team;
- an ability to identify, analyze, and solve broadly-defined engineering technology problems;
- an ability to apply written, oral, and graphical communication in both technical and non-technical environments, and an ability to identify and use appropriate technical literature;

- an understanding of the need for and an ability to engage in self-directed continuing professional development;
- an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
- a knowledge of the impact of engineering technology solutions in a societal and global context;
- a commitment to quality, timeliness, and continuous improvement.

Additional Information

The Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET. (<http://www.abet.org>)

For additional information, please visit the Engineering Technology (<http://www.drexel.edu/engtech>) web page.

Career Opportunities

The Engineering Technology program is designed to meet employers' growing needs, created by the technology revolution, for college-educated problem-solvers. Career opportunities in engineering technology are virtually limitless with at least 5,500 companies in the region offering more than 150 current job openings for engineering technologists. As a leading urban university in the Greater Philadelphia region, Drexel's location offers access to a vast number of industries including:

- Defense
- Aerospace
- Power generation
- Public utilities
- Shipbuilding
- Railroad
- Manufacturing
- Environmental
- Chemical
- Pharmaceutical
- Medical care

With the skills developed in this program, students will be able to integrate academic theory and professional practice in order to communicate effectively with engineers, scientists, the production workforce, marketing professionals, company management, and ultimately the customer. Students may participate in the design, development, testing, and manufacturing of industrial machinery, electric and electronic equipment, medical devices, consumer products, and other equipment.

Engineering technologists can serve in industry in many capacities; some fields include:

- Automation design and process engineering
- Mechanical/production engineering
- Electrical engineering and electronics
- Field engineering
- Systems engineering and management
- Environmental engineering
- Quality control
- Sales and customer service
- Systems/programming
- Testing engineering

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on post-graduate opportunities.

Dual/Accelerated Degree Transfer Articulation Agreements

The College of Engineering has transfer articulation agreements with Delaware County Community College (<http://www.dccc.edu>) (DCCC) and Burlington County College (<http://www.bcc.edu>) (BCC), leading to concurrent AS and BS degrees in appropriate areas of study.

As an added benefit, students can earn certifications recognized by industry and required by employers for entry into the workforce. Each certificate program, usually completed in six months to one year, provides credits that automatically apply to a student's degrees. For more information contact:

College of Engineering
Gerry Willis, Assistant Director
gtm23@drexel.edu
215-895-6253

Delaware County Community College
Admissions Office
admiss@dccc.edu
610-359-5050

Engineering Technology Faculty

Radian Belu, PhD (*Western Ontario*). Assistant Professor. Renewable energy, including wind and solar energy; power system analysis and control; numerical electromagnetics; lighting electromagnetics; power system protection; instrumentation; and radar and remote sensing in atmospheric research.

Richard Chiou, PhD (*Georgia Institute of Technology*). Associate Professor. Green manufacturing, mechatronics, Internet-based robotics and automation, and remote sensors and monitoring.

Yalcin Ertekin, PhD (*University of Missouri-Rolla*). Associate Clinical Professor. High speed machining with micromachining applications, machining process optimization and condition monitoring using multiple sensors, FEA simulation with 3D solid modeling applications, rapid prototyping and reverse engineering, quality and reliability improvement through statistically designed experiments, neural networks and data mining and Taguchi methods, CNC machine tool calibration characterization of cold fastening, clinching and self-pierced riveting processes, non-invasive surgical tool design, student learning enhancement using online simulation tools.

Vladimir Genis, PhD (*Kiev State University, Ukraine*) Program Director, *Engineering Technology*. Professor. Ultrasound wave propagation and scattering, ultrasound imaging, electronic instrumentation, piezoelectric transducers, and engineering education. Designed and developed diagnostic and therapeutic equipment for medical applications and electronic systems and techniques for defense-related and industrial applications.

Irina Ciobanescu Husanu, PhD (*Drexel University*). Assistant Clinical Professor. Microgravity combustion, thermal-fluid science with applications in micro-combustion, fuel cells and research of alternative and green fuels, energy conversion and renewable energy, industrial experience in aerospace engineering areas (theoretical analysis,

numerical simulations and experimental investigations), design and testing of propulsion systems, mechanical instrumentation, and developing industrial applications of aircraft engines.

Michael Mauk, PhD, PE (*University of Delaware*). Assistant Clinical Professor. Rapid prototyping, microfluidics, alternative energy including solar energy and photovoltaics, semiconductor materials science, nanotechnology.

Warren Rosen, PhD (*Temple University*). Assistant Clinical Professor. Computer networks; optical networks; high-performance switching; lightweight protocols.

Engineering Technology

Biomedical Engineering Technology Concentration

The biomedical engineering technology concentration focuses on the practice of medical equipment operation and support in the clinical environment. This concentration provides students with the knowledge they need to work in the medical field operating complicated diagnostic and patient care equipment.

During the first three years, students of all concentrations in engineering technology take electrical, mechanical, and industrial courses to get a solid, systematic background in different engineering fields. Students are required to complete general and concentration engineering technology courses, technical electives, and free elective courses that permit students great latitude in tailoring the program of study to match their career goals.

Biomedical Engineering Technology Concentration

Degree Requirements

Humanities and Social Sciences Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 111	Principles of Communication	3.0
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0
HIST 285	Technology in Historical Perspective	3.0
PHIL 315	Engineering Ethics	3.0
Liberal Studies electives		9.0

Basic Science Requirements

CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
PHYS 103	General Physics I	4.0
PHYS 104	General Physics II	4.0

Mathematics Requirements

MATH 110	Precalculus	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
STAT 201	Introduction to Business Statistics	4.0

Engineering Technology Core

EET 201	Circuit Analysis I	4.0
EET 202	Circuit Analysis II	4.0
EET 204	Introduction to Nanotechnology	3.0
EET 205	Digital Electronics	4.0
EET 207	Introduction to Laboratory and Process Control	3.0
EET 311	Modeling of Engineering Systems	4.0
EET 319	PLC Fundamentals	4.0
EET 401	Applied Microcontrollers	3.0
EET 333 [WI (p. 255)]	Non-Destructive Evaluation of Materials	4.0
MET 100	Graphical Communication	3.0
MET 101	Manufacturing Materials	4.0
MET 204	Applied Quality Control	3.0
MET 205	Robotics and Mechatronics	3.0
MET 209	Fluid Power	3.0
MET 213	Applied Mechanics	4.0
MHT 205	Thermodynamics I	3.0
MHT 226	Measurement Techniques and Instrumentation	3.0
INDE 240	Technology Economics	3.0
INDE 370	Industrial Project Management	3.0

Biomedical Engineering Technology Concentration

Requirements

BET 301	Healthcare Technology	3.0
BET 302	Biomedical Electronics	4.0
BET 303	Medical Imaging Systems	3.0
BET 305	Clinical Laboratory Equipment	3.0
BIO 107	Cells, Genetics & Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
BMES 302	Laboratory II: Biomeasurements	2.0
BMES 335	Biomedical Informatics I	3.0
BMES 391	Biomedical Instrumentation I	3.0
BMES 488	Medical Device Development	3.0

Technical Electives

Students select 6.0 additional credits from any BET, EET, MET, MHT, or INDE courses not already required. See advisor for specific courses.

Capstone Course Requirements

MET 421 [WI (p. 255)]	Senior Design Project I	3.0
MET 422	Senior Design Project II	3.0
MET 423 [WI (p. 255)]	Senior Design Project III	3.0

Miscellaneous

EET 102	Introduction to Engineering Technology	3.0
UNIV E101	The Drexel Experience	2.0

Free Electives

		12.0
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Total Credits **187.5**

Biomedical Engineering Technology Concentration

Sample Plan of Study

5 YR UG Co-op Concentration

Term	Credits
Term 1	
CHEM 111 General Chemistry I	4.0
CHEM 113 General Chemistry I Laboratory	1.5
EET 102 Introduction to Engineering Technology	3.0
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 110 Precalculus	3.0
PHYS 103 General Physics I	4.0
UNIV E101 The Drexel Experience	1.0
Term Credits	19.5
Term 2	
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 121 Calculus I	4.0
MET 100 Graphical Communication	3.0
PHYS 104 General Physics II	4.0
UNIV E101 The Drexel Experience	0.5
Term Credits	14.5
Term 3	
EET 201 Circuit Analysis I	4.0
EET 207 Introduction to Laboratory and Process Control	3.0
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
MATH 122 Calculus II	4.0
MET 101 Manufacturing Materials	4.0
UNIV E101 The Drexel Experience	0.5
Term Credits	18.5
Term 4	
COM 111 Principles of Communication	3.0
EET 202 Circuit Analysis II	4.0
EET 205 Digital Electronics	4.0
MHT 226 Measurement Techniques and Instrumentation	3.0
STAT 201 Introduction to Business Statistics	4.0
Term Credits	18.0
Term 5	
EET 204 Introduction to Nanotechnology	3.0
EET 333 [WI] Non-Destructive Evaluation of Materials (p. 255)]	4.0
HIST 285 Technology in Historical Perspective	3.0
MET 205 Robotics and Mechatronics	3.0
MHT 205 Thermodynamics I	3.0
Term Credits	16.0
Term 6	
COM 230 Techniques of Speaking	3.0
ECON 201 Principles of Microeconomics	4.0
EET 311 Modeling of Engineering Systems	4.0
EET 319 PLC Fundamentals	4.0

MET 213 Applied Mechanics	4.0
Term Credits	19.0
Term 7	
EET 401 Applied Microcontrollers	3.0
INDE 240 Technology Economics	3.0
MET 204 Applied Quality Control	3.0
MET 209 Fluid Power	3.0
PHIL 315 Engineering Ethics	3.0
Term Credits	15.0
Term 8	
BET 301 Healthcare Technology	3.0
BET 302 Biomedical Electronics	4.0
BIO 107 Cells, Genetics Physiology	3.0
BIO 108 Cells, Genetics and Physiology Laboratory	1.0
BMES 302 Laboratory II: Biomeasurements	2.0
Free Elective	3.0
Term Credits	16.0
Term 9	
BET 303 Medical Imaging Systems	3.0
BET 305 Clinical Laboratory Equipment	3.0
BMES 391 Biomedical Instrumentation I	3.0
BMES 488 Medical Device Development	3.0
INDE 370 Industrial Project Management	3.0
Term Credits	15.0
Term 10	
BMES 335 Biomedical Informatics I	3.0
MET 421 [WI] Senior Design Project I (p. 255)]	3.0
Liberal Studies Elective	3.0
Free Elective	3.0
Term Credits	12.0
Term 11	
MET 422 Senior Design Project II	3.0
Liberal Studies Elective	3.0
Free Elective	3.0
Technical Elective	3.0
Term Credits	12.0
Term 12	
MET 423 [WI] Senior Design Project III (p. 255)]	3.0
Technical elective	3.0
Liberal studies elective	3.0
Free elective	3.0
Term Credits	12.0
Total Credit: 187.5	

Engineering Technology Faculty

Radian Belu, PhD (*Western Ontario*). Assistant Professor. Renewable energy, including wind and solar energy; power system analysis and control; numerical electromagnetics; lighting electromagnetics; power system protection; instrumentation; and radar and remote sensing in atmospheric research.

Richard Chiou, PhD (*Georgia Institute of Technology*). Associate Professor. Green manufacturing, mechatronics, Internet-based robotics and automation, and remote sensors and monitoring.

Yalcin Ertekin, PhD (*University of Missouri-Rolla*). Associate Clinical Professor. High speed machining with micromachining applications, machining process optimization and condition monitoring using multiple sensors, FEA simulation with 3D solid modeling applications, rapid prototyping and reverse engineering, quality and reliability improvement through statistically designed experiments, neural networks and data mining and Taguchi methods, CNC machine tool calibration characterization of cold fastening, clinching and self-pierced riveting processes, non-invasive surgical tool design, student learning enhancement using online simulation tools.

Vladimir Genis, PhD (*Kiev State University, Ukraine*) Program Director, *Engineering Technology*. Professor. Ultrasound wave propagation and scattering, ultrasound imaging, electronic instrumentation, piezoelectric transducers, and engineering education. Designed and developed diagnostic and therapeutic equipment for medical applications and electronic systems and techniques for defense-related and industrial applications.

Irina Ciobanescu Husanu, PhD (*Drexel University*). Assistant Clinical Professor. Microgravity combustion, thermal-fluid science with applications in micro-combustion, fuel cells and research of alternative and green fuels, energy conversion and renewable energy, industrial experience in aerospace engineering areas (theoretical analysis, numerical simulations and experimental investigations), design and testing of propulsion systems, mechanical instrumentation, and developing industrial applications of aircraft engines.

Michael Mauk, PhD, PE (*University of Delaware*). Assistant Clinical Professor. Rapid prototyping, microfluidics, alternative energy including solar energy and photovoltaics, semiconductor materials science, nanotechnology.

Warren Rosen, PhD (*Temple University*). Assistant Clinical Professor. Computer networks; optical networks; high-performance switching; lightweight protocols.

Engineering Technology

Electrical Engineering Technology Concentration

The electrical engineering technology concentration provides an extensive background in electric circuit analysis and electronics. Students are required to study digital and analog electronics, digital computer design, analysis of electric power systems, and renewable energy.

During the first three years, students of all concentrations in engineering technology take electrical, mechanical, and industrial courses to get a solid, systematic background in different engineering fields. Students are required to complete general and concentration engineering technology courses, technical electives, and free elective courses that permit students great latitude in tailoring the program of study to match their career goals.

Electrical Engineering Technology Concentration

Degree Requirements

Humanities and Social Sciences Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 111	Principles of Communication	3.0
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0
HIST 285	Technology in Historical Perspective	3.0
PHIL 315	Engineering Ethics	3.0
Liberal studies electives		9.0

Basic Science Requirements

CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
PHYS 103	General Physics I	4.0
PHYS 104	General Physics II	4.0

Mathematics Requirements

MATH 110	Precalculus	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
STAT 201	Introduction to Business Statistics	4.0

Engineering Technology Core

EET 201	Circuit Analysis I	4.0
EET 202	Circuit Analysis II	4.0
EET 204	Introduction to Nanotechnology	3.0
EET 205	Digital Electronics	4.0
EET 207	Introduction to Laboratory and Process Control	3.0
EET 311	Modeling of Engineering Systems	4.0
EET 319	PLC Fundamentals	4.0
EET 333 [WI (p. 257)]	Non-Destructive Evaluation of Materials	4.0
EET 401	Applied Microcontrollers	3.0
MET 100	Graphical Communication	3.0
MET 101	Manufacturing Materials	4.0
MET 204	Applied Quality Control	3.0
MET 205	Robotics and Mechatronics	3.0
MET 209	Fluid Power	3.0
MET 213	Applied Mechanics	4.0
MHT 205	Thermodynamics I	3.0
MHT 226	Measurement Techniques and Instrumentation	3.0
INDE 240	Technology Economics	3.0
INDE 370	Industrial Project Management	3.0

Electrical Engineering Technology Concentration Requirements

EET 206	Analog Electronics I	4.0
EET 313	Signals and Systems I	4.0
EET 317	Analog Electronics II	4.0
EET 322	Energy Conversion	4.0

EET 323	Electrical Systems Design	3.0
EET 324	Power Electronics	4.0
EET 325	Microprocessors	3.0
Electrical Engineering Technology (EET) Electives		6.0
Select 6.0 additional credits from any BET, EET, MET, MHT or INDE courses not already required. See advisor for specific courses.		
Capstone Course Requirements		
MET 421 [WI (p. 257)]	Senior Design Project I	3.0
MET 422	Senior Design Project II	3.0
MET 423 [WI (p. 257)]	Senior Design Project III	3.0
Miscellaneous		
EET 102	Introduction to Engineering Technology	3.0
UNIV E101	The Drexel Experience	2.0
Free electives		14.0
Total Credits		187.5

Electrical Engineering Technology Concentration

Sample Plan of Study

5 YR UG Co-op

		Credits
Term 1		
CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
EET 102	Introduction to Engineering Technology	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 110	Precalculus	3.0
PHYS 103	General Physics I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		19.5
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 121	Calculus I	4.0
MET 100	Graphical Communication	3.0
PHYS 104	General Physics II	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		14.5
Term 3		
EET 201	Circuit Analysis I	4.0
EET 207	Introduction to Laboratory and Process Control	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 122	Calculus II	4.0
MET 101	Manufacturing Materials	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		18.5
Term 4		
COM 111	Principles of Communication	3.0
EET 202	Circuit Analysis II	4.0
EET 205	Digital Electronics	4.0

MHT 226	Measurement Techniques and Instrumentation	3.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		18.0
Term 5		
EET 204	Introduction to Nanotechnology	3.0
EET 333 [WI (p. 257)]	Non-Destructive Evaluation of Materials	4.0
HIST 285	Technology in Historical Perspective	3.0
MET 205	Robotics and Mechatronics	3.0
MHT 205	Thermodynamics I	3.0
Term Credits		16.0
Term 6		
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0
EET 311	Modeling of Engineering Systems	4.0
EET 319	PLC Fundamentals	4.0
MET 213	Applied Mechanics	4.0
Term Credits		19.0
Term 7		
EET 401	Applied Microcontrollers	3.0
INDE 240	Technology Economics	3.0
MET 204	Applied Quality Control	3.0
MET 209	Fluid Power	3.0
PHIL 315	Engineering Ethics	3.0
Term Credits		15.0
Term 8		
EET 206	Analog Electronics I	4.0
EET 322	Energy Conversion	4.0
EET 325	Microprocessors	3.0
Free elective		3.0
Term Credits		14.0
Term 9		
EET 313	Signals and Systems I	4.0
EET 317	Analog Electronics II	4.0
EET 323	Electrical Systems Design	3.0
INDE 370	Industrial Project Management	3.0
Term Credits		14.0
Term 10		
EET 324	Power Electronics	4.0
MET 421 [WI (p. 257)]	Senior Design Project I	3.0
Liberal studies elective		3.0
Free elective		4.0
Term Credits		14.0
Term 11		
MET 422	Senior Design Project II	3.0
Technical elective		3.0
Liberal studies elective		3.0
Free elective		3.0
Term Credits		12.0
Term 12		

MET 423 [WI Senior Design Project III (p. 257)]	3.0
Technical elective	3.0
Liberal studies elective	3.0
Free elective	4.0
Term Credits	13.0

Total Credit: 187.5

Engineering Technology Faculty

Radian Belu, PhD (*Western Ontario*). Assistant Professor. Renewable energy, including wind and solar energy; power system analysis and control; numerical electromagnetics; lighting electromagnetics; power system protection; instrumentation; and radar and remote sensing in atmospheric research.

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Michael Mauk, PhD, PE (*University of Delaware*). Assistant Clinical Professor. Rapid prototyping, microfluidics, alternative energy including solar energy and photovoltaics, semiconductor materials science, nanotechnology.

Warren Rosen, PhD (*Temple University*). Assistant Clinical Professor. Computer networks; optical networks; high-performance switching; lightweight protocols.

Engineering Technology

Industrial Engineering Technology Concentration

The industrial engineering technology concentration provides students with knowledge and skills in management and relevant engineering technology disciplines for manufacturing, service, and healthcare enterprises, including automation, logistics, scheduling, simulation, maintainability, and advanced manufacturing processes. Students learn how to co-ordinate, integrate, and optimize people, machines, materials, and energy to improve efficiency, sustainability, quality, and environment.

During the first three years, students of all concentrations in engineering technology take electrical, mechanical, and industrial courses to get a solid, systematic background in different engineering fields. Students are required to complete general and concentration engineering technology courses, technical electives, and free elective courses that permit students great latitude in tailoring the program of study to match their career goals.

Industrial Engineering Technology Concentration

Degree Requirements

Humanities and Social Sciences Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 111	Principles of Communication	3.0
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0
HIST 285	Technology in Historical Perspective	3.0
PHIL 315	Engineering Ethics	3.0
Liberal Studies electives		9.0

Basic Science Requirements

CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
PHYS 103	General Physics I	4.0
PHYS 104	General Physics II	4.0

Mathematics Requirements

MATH 110	Precalculus	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
STAT 201	Introduction to Business Statistics	4.0

Engineering Technology Core

EET 201	Circuit Analysis I	4.0
EET 202	Circuit Analysis II	4.0
EET 204	Introduction to Nanotechnology	3.0
EET 205	Digital Electronics	4.0
EET 207	Introduction to Laboratory and Process Control	3.0
EET 311	Modeling of Engineering Systems	4.0
EET 319	PLC Fundamentals	4.0

EET 333 [WI (p. 259)]	Non-Destructive Evaluation of Materials	4.0
EET 401	Applied Microcontrollers	3.0
MET 100	Graphical Communication	3.0
MET 101	Manufacturing Materials	4.0
MET 204	Applied Quality Control	3.0
MET 205	Robotics and Mechatronics	3.0
MET 209	Fluid Power	3.0
MET 213	Applied Mechanics	4.0
MHT 205	Thermodynamics I	3.0
MHT 226	Measurement Techniques and Instrumentation	3.0
INDE 240	Technology Economics	3.0
INDE 370	Industrial Project Management	3.0
Industrial Engineering Technology Concentration Requirements		
ACCT 115	Financial Accounting Foundations	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INDE 300	Quality Management	3.0
INDE 350	Industrial Engineering Simulation	3.0
INDE 363	Operations Research for Engineering II	3.0
INDE 365	Systems Analysis Methods I	3.0
INDE 366	Systems Analysis Methods II	3.0
INDE 375	Quality Improvement by Experimental Design	4.0
IET Technical Electives		
Students select 6.0 additional credits from any BET, EET, MET, MHT, 6.0 INDE, OPM, or MKT courses not already required. See advisor for specific courses.		
Capstone Course Requirements		
MET 421 [WI (p. 259)]	Senior Design Project I	3.0
MET 422	Senior Design Project II	3.0
MET 423 [WI (p. 259)]	Senior Design Project III	3.0
Miscellaneous		
EET 102	Introduction to Engineering Technology	3.0
UNIV E101	The Drexel Experience	2.0
Free Electives		8.0
Total Credits		186.5

Industrial Engineering Technology Concentration

Sample Plan of Study

5 YR UG Co-op Concentration

		Credits
Term 1		
CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
EET 102	Introduction to Engineering Technology	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 110	Precalculus	3.0
PHYS 103	General Physics I	4.0

UNIV E101	The Drexel Experience	1.0
Term Credits		19.5
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 121	Calculus I	4.0
MET 100	Graphical Communication	3.0
PHYS 104	General Physics II	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		14.5
Term 3		
EET 201	Circuit Analysis I	4.0
EET 207	Introduction to Laboratory and Process Control	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 122	Calculus II	4.0
MET 101	Manufacturing Materials	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		18.5
Term 4		
COM 111	Principles of Communication	3.0
EET 202	Circuit Analysis II	4.0
EET 205	Digital Electronics	4.0
MHT 226	Measurement Techniques and Instrumentation	3.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		18.0
Term 5		
EET 204	Introduction to Nanotechnology	3.0
EET 333 [WI (p. 259)]	Non-Destructive Evaluation of Materials	4.0
HIST 285	Technology in Historical Perspective	3.0
MET 205	Robotics and Mechatronics	3.0
MHT 205	Thermodynamics I	3.0
Term Credits		16.0
Term 6		
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0
EET 311	Modeling of Engineering Systems	4.0
EET 319	PLC Fundamentals	4.0
MET 213	Applied Mechanics	4.0
Term Credits		19.0
Term 7		
EET 401	Applied Microcontrollers	3.0
INDE 240	Technology Economics	3.0
MET 204	Applied Quality Control	3.0
MET 209	Fluid Power	3.0
PHIL 315	Engineering Ethics	3.0
Term Credits		15.0
Term 8		
ACCT 115	Financial Accounting Foundations	4.0
ECON 202	Principles of Macroeconomics	4.0
INDE 300	Quality Management	3.0

INDE 350	Industrial Engineering Simulation	3.0
Term Credits		14.0
Term 9		
FIN 301	Introduction to Finance	4.0
INDE 363	Operations Research for Engineering II	3.0
INDE 365	Systems Analysis Methods I	3.0
INDE 370	Industrial Project Management	3.0
Term Credits		13.0
Term 10		
INDE 366	Systems Analysis Methods II	3.0
MET 421 [WI (p. 259)]	Senior Design Project I	3.0
Liberal studies elective		3.0
Free electives		5.0
Term Credits		14.0
Term 11		
INDE 375	Quality Improvement by Experimental Design	4.0
MET 422	Senior Design Project II	3.0
Technical elective (See advisor)		4.0
Liberal studies elective		3.0
Term Credits		14.0
Term 12		
MET 423 [WI (p. 259)]	Senior Design Project III	3.0
Technical elective (See advisor)		3.0
Liberal studies elective		3.0
Free elective		3.0
Term Credits		12.0

Total Credit: 187.5

Engineering Technology Faculty

Radian Belu, PhD (*Western Ontario*). Assistant Professor. Renewable energy, including wind and solar energy; power system analysis and control; numerical electromagnetics; lighting electromagnetics; power system protection; instrumentation; and radar and remote sensing in atmospheric research.

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Michael Mauk, PhD, PE (*University of Delaware*). Assistant Clinical Professor. Rapid prototyping, microfluidics, alternative energy including solar energy and photovoltaics, semiconductor materials science, nanotechnology.

Warren Rosen, PhD (*Temple University*). Assistant Clinical Professor. Computer networks; optical networks; high-performance switching; lightweight protocols.

Engineering Technology

Mechanical Engineering Technology Concentration

The mechanical engineering technology concentration stresses on the design, development, testing, and manufacturing of industrial machinery, consumer and biomedical products, CNC (Computer Numerical Control), prototyping machinery, and similar equipment. The concentration includes study in computer graphics, statics, dynamics, stress analysis, fluid dynamics, and Computer Aided Engineering (CAE) tools, including instrumentation and testing procedures of various industrial systems.

During the first three years, students of all concentrations in engineering technology take electrical, mechanical, and industrial courses to get a solid, systematic background in different engineering fields. Students are required to complete general and concentration engineering technology courses, technical electives, and free elective courses that permit students great latitude in tailoring the program of study to match their career goals.

Mechanical Engineering Technology Concentration

Degree Requirements

Humanities and Social Sciences Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 111	Principles of Communication	3.0
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0
HIST 285	Technology in Historical Perspective	3.0
PHIL 315	Engineering Ethics	3.0
Liberal Studies electives		9.0

Basic Science Requirements

CHEM 111	General Chemistry I	4.0
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CHEM 113	General Chemistry I Laboratory	1.5
PHYS 103	General Physics I	4.0
PHYS 104	General Physics II	4.0

Mathematics Requirements

MATH 110	Precalculus	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
STAT 201	Introduction to Business Statistics	4.0

Engineering Technology Core

EET 201	Circuit Analysis I	4.0
EET 202	Circuit Analysis II	4.0
EET 204	Introduction to Nanotechnology	3.0
EET 205	Digital Electronics	4.0
EET 311	Modeling of Engineering Systems	4.0
EET 207	Introduction to Laboratory and Process Control	3.0
EET 319	PLC Fundamentals	4.0
EET 333 [WI (p. 261)]	Non-Destructive Evaluation of Materials	4.0
EET 401	Applied Microcontrollers	3.0
MET 100	Graphical Communication	3.0
MET 101	Manufacturing Materials	4.0
MET 204	Applied Quality Control	3.0
MET 205	Robotics and Mechatronics	3.0
MET 209	Fluid Power	3.0
MET 213	Applied Mechanics	4.0
MHT 205	Thermodynamics I	3.0
MHT 226	Measurement Techniques and Instrumentation	3.0
INDE 240	Technology Economics	3.0
INDE 370	Industrial Project Management	3.0

Mechanical Engineering Technology Concentration Requirements

MET 316	Computer Numerical Control	3.0
MET 407	Manufacturing Processes	3.0
MET 408	MFG Information Management	3.0
MHT 206	Thermodynamics II	3.0
MHT 222	Applied Dynamics I	3.0
MHT 301	Fluid Mechanics I	3.0
MHT 314	Thermo and Heat Transfer Analysis	3.0
MHT 401	Mechanical Design I	4.0

MHT Technical Electives

Students select 6.0 additional credits from any BET, EET, MET, MHT or INDE courses not already required. See advisor for specific courses.

Capstone Course Requirements

MET 421 [WI (p. 261)]	Senior Design Project I	3.0
MET 422	Senior Design Project II	3.0
MET 423 [WI (p. 261)]	Senior Design Project III	3.0

Miscellaneous

EET 102	Introduction to Engineering Technology	3.0
UNIV E101	The Drexel Experience	2.0

Free Electives	15.0
Total Credits	187.5

Mechanical Engineering Technology Concentration**Sample Plan of Study**

5 YR UG Co-op Concentration

Term 1		Credits
CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
EET 102	Introduction to Engineering Technology	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 110	Precalculus	3.0
PHYS 103	General Physics I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		19.5
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 121	Calculus I	4.0
MET 100	Graphical Communication	3.0
PHYS 104	General Physics II	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		14.5
Term 3		
EET 201	Circuit Analysis I	4.0
EET 207	Introduction to Laboratory and Process Control	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 122	Calculus II	4.0
MET 101	Manufacturing Materials	4.0
UNIV E101	The Drexel Experience	0.5
Term Credits		18.5
Term 4		
COM 111	Principles of Communication	3.0
EET 202	Circuit Analysis II	4.0
EET 205	Digital Electronics	4.0
MHT 226	Measurement Techniques and Instrumentation	3.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		18.0
Term 5		
EET 204	Introduction to Nanotechnology	3.0
EET 333 [WI (p. 261)]	Non-Destructive Evaluation of Materials	4.0
HIST 285	Technology in Historical Perspective	3.0
MET 205	Robotics and Mechatronics	3.0
MHT 205	Thermodynamics I	3.0
Term Credits		16.0
Term 6		
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0

EET 311	Modeling of Engineering Systems	4.0
EET 319	PLC Fundamentals	4.0
MET 213	Applied Mechanics	4.0
Term Credits		19.0
Term 7		
EET 401	Applied Microcontrollers	3.0
INDE 240	Technology Economics	3.0
MET 204	Applied Quality Control	3.0
MET 209	Fluid Power	3.0
PHIL 315	Engineering Ethics	3.0
Term Credits		15.0
Term 8		
MET 316	Computer Numerical Control	3.0
MET 408	MFG Information Management	3.0
MHT 206	Thermodynamics II	3.0
MHT 222	Applied Dynamics I	3.0
MHT 301	Fluid Mechanics I	3.0
Term Credits		15.0
Term 9		
INDE 370	Industrial Project Management	3.0
MET 407	Manufacturing Processes	3.0
MHT 314	Thermo and Heat Transfer Analysis	3.0
MHT 401	Mechanical Design I	4.0
Term Credits		13.0
Term 10		
MET 421 [WI (p. 261)]	Senior Design Project I	3.0
Liberal studies elective		3.0
Free electives		7.0
Term Credits		13.0
Term 11		
MET 422	Senior Design Project II	3.0
Technical elective (See advisor)		3.0
Liberal studies elective		3.0
Free elective		4.0
Term Credits		13.0
Term 12		
MET 423 [WI (p. 261)]	Senior Design Project III	3.0
Technical elective (See advisor)		3.0
Liberal studies Elective		3.0
Free elective		4.0
Term Credits		13.0
Total Credit: 187.5		

Engineering Technology Faculty

Radian Belu, PhD (*Western Ontario*). Assistant Professor. Renewable energy, including wind and solar energy; power system analysis and control; numerical electromagnetics; lighting electromagnetics; power system protection; instrumentation; and radar and remote sensing in atmospheric research.

Richard Chiou, PhD (*Georgia Institute of Technology*). Associate Professor. Green manufacturing, mechatronics, Internet-based robotics and automation, and remote sensors and monitoring.

Yalcin Ertekin, PhD (*University of Missouri-Rolla*). Associate Clinical Professor. High speed machining with micromachining applications, machining process optimization and condition monitoring using multiple sensors, FEA simulation with 3D solid modeling applications, rapid prototyping and reverse engineering, quality and reliability improvement through statistically designed experiments, neural networks and data mining and Taguchi methods, CNC machine tool calibration characterization of cold fastening, clinching and self-pierced riveting processes, non-invasive surgical tool design, student learning enhancement using online simulation tools.

Vladimir Genis, PhD (*Kiev State University, Ukraine*) Program Director, *Engineering Technology*. Professor. Ultrasound wave propagation and scattering, ultrasound imaging, electronic instrumentation, piezoelectric transducers, and engineering education. Designed and developed diagnostic and therapeutic equipment for medical applications and electronic systems and techniques for defense-related and industrial applications.

Irina Ciobanescu Husanu, PhD (*Drexel University*). Assistant Clinical Professor. Microgravity combustion, thermal-fluid science with applications in micro-combustion, fuel cells and research of alternative and green fuels, energy conversion and renewable energy, industrial experience in aerospace engineering areas (theoretical analysis, numerical simulations and experimental investigations), design and testing of propulsion systems, mechanical instrumentation, and developing industrial applications of aircraft engines.

Michael Mauk, PhD, PE (*University of Delaware*). Assistant Clinical Professor. Rapid prototyping, microfluidics, alternative energy including solar energy and photovoltaics, semiconductor materials science, nanotechnology.

Warren Rosen, PhD (*Temple University*). Assistant Clinical Professor. Computer networks; optical networks; high-performance switching; lightweight protocols.

Minor in Engineering Management

This minor focuses on the management of technical organizations. The required courses enhance an engineer's resume to show understanding of management and leadership behaviors, economics, and systems engineering and thinking.

While this minor is primarily designed to provide engineering management knowledge and skills to other engineers, with the equivalent science background students from other majors (biomedical engineering science, for example) can also complete this minor.

Prerequisites

The common engineering core curriculum prerequisites are required of all students in the college of engineering. Students from other colleges will need the appropriate background prerequisite courses.

Required Courses

BLAW 201	Business Law I	4.0
CIVE 240 [WI (p. 263)]	Engineering Economic Analysis	3.0

PROJ 301	Introduction to Project Management	3.0
EGMT 404	Introduction to Engineering Management Communications	3.0
EGMT 462 or MEM 462	Introduction to Engineering Management	3.0
EGMT 465	Introduction to Systems Engineering	3.0
Complete 2 classes from the list below		6.0
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
ENTP 329	Entrepreneurship & New Technologies	
Other courses accepted with Director approval		
Total Credits		25.0

Additional Information

More information is available on the Engineering Management Minor (<http://www.drexel.edu/egmt/programs/minor>) web page.

Engineering Policy Analysis Minor

An increasingly complex, interrelated, and technological society has come to rely on quantitative models of engineering systems to make decisions. While these models are used to make decisions in domains as varied as telecommunications, energy, and environmental quality, a common set of tools for the use of such models in decision making has been developed and forms the basis of an emerging discipline in engineering policy analysis. The practitioners of this discipline need training in mathematical and social science analytic approaches, as well as an understanding of the human factors that inevitably influence real-world policy choices. The minor in engineering policy analysis is designed to introduce students to these topics.

This minor broadens the exposure of engineering students to societal issues and provides an initial introduction to analytic skills which they may use both in engineering practice and as managers (given that many engineers become managers both in the private and public sector). Graduates will have additional training and credentials relevant not only to engineering careers, but also to other fields, including urban planning, management consulting, and public administration.

The program provides a basis for students to evaluate their interest and aptitude for graduate studies in fields such as business administration, public administration, and public policy. For pre-law students, the minor introduces them to analytic methods that inform the establishment and interpretation of laws as a mechanism of public policy implementation.

Students are required to complete a total of 24.0 credits. At least 12.0 of these credits may not be counted as part of their major.

Applied Quantitative Methods (6.0 credits)

Students select one sequence in probability and statistics consisting of one introductory course and one advanced course. Any introductory course may be combined with advanced course provided that the prerequisites of the advanced course are met.

Introductory Course Options

Select one of the following:		3.0-4.0
CHE 335	Statistics and Design of Experiments	
ENGR 361	Statistical Analysis of Engineering Systems	
MATH 311	Probability and Statistics I	
MEM 361	Engineering Reliability	

STAT 205	Statistical Inference I	
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Advanced Course Options

Select one of the following: 3.0-4.0

MATH 312	Probability and Statistics II	
STAT 206	Statistical Inference II	
ENVE 750	Data-based Engineering Modeling	

Additional Quantitative Method Electives

MATH 300	Numerical Analysis I	
MATH 305	Introduction to Optimization Theory	
MATH 318 [WI (p. 264)]	Mathematical Applications of Statistical Software	
STAT 321	Statistical Decision Methods	
OPR 320	Linear Models for Decision Making	
OPR 330	Advanced Decision Making and Simulation	

Policy Analytic Methods (11.0)

Students are required to take at least 11.0 credits, including a course on capital investment decision making and a two-course sequence in economics.

CIVE 240 [WI (p. 264)]	Engineering Economic Analysis	3.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0

Additional Policy Analytic Methods Electives

ECON 250	Game Theory and Applications	
ECON 301	Microeconomics	
ECON 330	Managerial Economics	
ECON 334	Public Finance	
ECON 351	Resource and Environmental Economics	
ENVS 370	Practice of Environmental Economics	
ENVE 727	Risk Assessment	

Human Factors (6.0)

Select two of the following: 6.0

PSCI 110	American Government I	
PSCI 211	American Government II	
PSCI 220	Constitutional Law I	
PSCI 329	Theories of Justice	
PSCI 331	Environmental Politics	
PSCI 372	City in United States Political Development	
SOC 215	Sociology of Work	
SOC 240	Urban Sociology	
SOC 347	Introduction to Environmental Policy Analysis	

Elective

One additional credit of coursework is required for the minor. This credit may be any of the three areas above. It is permissible to count 3.0 of the credits from a 4.0 credit class towards fulfilling one of the other areas, thereby using the 4th credit to meet the elective credit requirement.

Total Credits **24.0**

Environmental Engineering

Major: Environmental Engineering
Degree Awarded: Bachelor of Science (BS)
Calendar Type: Quarter

Total Credit Hours: 193.5

Classification of Instructional Programs (CIP) code: 14.1401

Standard Occupational Classification (SOC) code: 17-2081

About the Program

Environmental engineering is concerned with the design of systems, policies and processes to protect human, animal, and plant populations from the effects of adverse environmental factors, including toxic chemicals and wastes, pathogenic bacteria, and global warming, and to design systems that enable a more sustainable society.

Environmental engineers design systems, processes and policies to minimize the effect of human activities on the physical and living environment so that we can all live more healthy and sustainable lives. Environmental engineers work to meet human needs for resources in ways to minimize impact on the ecosystem and adverse effects on health. This field builds on other branches of engineering, especially civil, chemical, and mechanical engineering. It also builds on information from many of the sciences, such as chemistry, physics, hydrology, geology, atmospheric science, and several specializations of biology (ecology, microbiology, and biochemistry). Students who elect to study environmental engineering will become familiar with many of these areas because maintaining and improving the environment requires that problems be evaluated and solutions found using a multidisciplinary approach.

Mission

The mission of the undergraduate environmental engineering program at Drexel University is to graduate outstanding engineers who can identify, evaluate and solve complex environmental problems, and who desire to continue their education on a lifelong basis.

Program Educational Objectives

Environmental engineering graduates will become professionals who analyze, design, construct, manage or operate facilities or systems to protect or enhance the environment of people and other living things, or advance knowledge of the field.

Student Outcomes

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- an ability to apply knowledge of mathematics, science, and engineering;
- an ability to design and conduct experiments, as well as to analyze and interpret data;
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- an ability to function on multidisciplinary teams;
- an ability to identify, formulate, and solve engineering problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;

h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;

i) a recognition of the need for, and an ability to engage in life-long learning;

j) a knowledge of contemporary issues;

k) an ability to use the techniques, skills, and modern engineering tools necessary for environmental engineering practice.

Additional Information

The Environmental Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

For more information about this major, visit the Civil, Architectural and Environmental Engineering Department (<http://www.cae.drexel.edu>) and the BS in Environmental Engineering (<http://www.drexel.edu/cae/academics/bs-environmental-engineering>) page.

Degree Requirements

General Education/Liberal Studies Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 315	Engineering Ethics	3.0
UNIV E101	The Drexel Experience	1.0
General Education Requirements *		15.0

Engineering Core Courses

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 141	Essential Biology	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
ENGR 361	Statistical Analysis of Engineering Systems	3.0

Environmental Engineering Requirements

CAEE 201	Introduction to Infrastructure Engineering	3.0
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CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0	MATH 121	Calculus I	4.0			
CAEE 211	Measurements in Civil, Architectural and Environmental Engineering II	4.0	UNIV E101	The Drexel Experience	1.0			
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Term Credits					16.5			
Term 2								
CHEM 102	General Chemistry II	4.5	CIVC 101	Introduction to Civic Engagement	1.0			
CHEM 230	Quantitative Analysis	4.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0			
CHEM 231 [WI (p. 264)]	Quantitative Analysis Laboratory	2.0	ENGR 102	Engineering Design Laboratory II	2.0			
CHEM 241	Organic Chemistry I	4.0	ENGR 122	Computation Lab II	1.0			
CHEM 242	Organic Chemistry II	4.0	MATH 122	Calculus II	4.0			
CIVE 240 [WI (p. 264)]	Engineering Economic Analysis	3.0	PHYS 101	Fundamentals of Physics I	4.0			
<hr/>								
Term Credits					19.5			
Term 3								
BIO 141	Essential Biology	4.5	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0			
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	ENGR 103	Engineering Design Laboratory III	2.0			
ENGR 103	Engineering Design Laboratory III	2.0	MATH 200	Multivariate Calculus	4.0			
MATH 200	Multivariate Calculus	4.0	PHYS 102	Fundamentals of Physics II	4.0			
PHYS 102	Fundamentals of Physics II	4.0	<hr/>					
Term Credits					17.5			
Term 4								
CAEE 201	Introduction to Infrastructure Engineering	3.0	ENGR 201	Evaluation Presentation of Experimental Data I	3.0			
ENGR 201	Evaluation Presentation of Experimental Data I	3.0	ENGR 220	Fundamentals of Materials	4.0			
ENGR 220	Fundamentals of Materials	4.0	ENGR 231	Linear Engineering Systems	3.0			
ENGR 231	Linear Engineering Systems	3.0	PHYS 201	Fundamentals of Physics III	4.0			
PHYS 201	Fundamentals of Physics III	4.0	<hr/>					
Term Credits					17.0			
Term 5								
CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0	ENGR 202	Evaluation Presentation of Experimental Data II	3.0			
ENGR 202	Evaluation Presentation of Experimental Data II	3.0	ENGR 210	Introduction to Thermodynamics	3.0			
ENGR 210	Introduction to Thermodynamics	3.0	ENGR 232	Dynamic Engineering Systems	3.0			
ENGR 232	Dynamic Engineering Systems	3.0	ENVS 284 or BIO 221	Physiological and Population Ecology	3.0			
ENVS 284 or BIO 221	Physiological and Population Ecology	3.0	<hr/>					
Term Credits					15.0			
Term 6								
CHE 201	Process Material Balances	3.0	ENGR 361	Statistical Analysis of Engineering Systems	3.0			
CHEM 230	Quantitative Analysis	4.0	ENVE 300	Introduction to Environmental Engineering	3.0			
CHEM 231 [WI (p. 264)]	Quantitative Analysis Laboratory	2.0	<hr/>					
CIVE 320	Introduction to Fluid Flow	3.0	Term Credits					
ENGR 361	Statistical Analysis of Engineering Systems	3.0	18.0					
ENVE 300	Introduction to Environmental Engineering	3.0	Term 7					
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Term Credits					18.0			

* General Education Requirements (p. 214).

Sample Plan of Study

5 YR UG Co-op Concentration

Term 1		Credits
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0

CAEE 211	Measurements in Civil, Architectural and Environmental Engineering II	4.0
CIVE 330	Hydraulics	4.0
ENVE 302	Environmental Transport and Kinetics	3.0
PHIL 315	Engineering Ethics	3.0

General Education elective *		3.0
Term Credits		17.0
Term 8		
CHEM 241 Organic Chemistry I		4.0
CIVE 240 [WI Engineering Economic Analysis (p. 264)]		3.0
CIVE 430 Hydrology		3.0
ENVS 401 Chemistry of the Environment		3.0
General Education elective *		3.0
Term Credits		16.0
Term 9		
CHEM 242 Organic Chemistry II		4.0
Technical elective		3.0
Free elective		3.0
General Education elective *		3.0
Term Credits		13.0
Term 10		
ENVE 485 Professional Environmental Engineering Practice		1.0
ENVE 491 [WI Senior Project Design I (p. 264)]		3.0
ENVE 465 Indoor Air Quality or 460 Fundamentals of Air Pollution Control		3.0
Technical elective		3.0
Technical Elective		3.0
Term Credits		13.0
Term 11		
CIVE 431 Hydrology-Ground Water		3.0
ENVE 410 Solid and Hazardous Waste		3.0
ENVE 421 Water and Waste Treatment II		3.0
ENVE 486 Environmental Engineering Processes Laboratory I		2.0
ENVE 492 [WI Senior Design Project II (p. 264)]		3.0
Technical elective		3.0
Term Credits		17.0
Term 12		
ENVE 422 Water and Waste Treatment Design		3.0
ENVE 435 Groundwater Remediation		3.0
ENVE 487 Environmental Engineering Processes Laboratory II		2.0
ENVE 493 [WI Senior Design Project III (p. 264)]		3.0
General Education elective *		3.0
Term Credits		14.0
Total Credit: 193.5		

* See degree requirements (p. 265).

Co-op/Career Opportunities

Environmental Engineers pursue careers with many different industries, such as chemical, pharmaceutical and manufacturing, in groundwater

and hazardous waste remediation, in water or wastewater treatment, in air pollution abatement and control, and in mining. Some also join environmental consulting firms which serve several engineering areas. In addition, some students go to graduate school. The breadth of an environmental engineering education prepares the student to follow many career paths.

Co-op Experiences

Past co-op employers of Environmental Engineering majors have included:

- Exelon, Philadelphia, PA
- U.S. Environmental Protection Agency, Philadelphia, PA
- Philadelphia Water Department, Philadelphia, PA
- Sun Co., Philadelphia, PA
- Aqua America, Bryn Mawr, PA
- Fairmount Park Commission, Philadelphia, PA
- Weston Solutions, West Chester, PA
- CDM Consultants, Philadelphia PA and other offices

Dual/Accelerated Degree

The Accelerated Program of the College of Engineering provides opportunities for highly talented and strongly motivated students to progress toward their educational goals essentially at their own pace. Through advanced placement, credit by examination, flexibility of scheduling, and independent study, the program makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum.

Bachelor's/Master's Dual Degree Program

Drexel offers a combined BS/MS degree program for our top engineering students who want to obtain both degrees in the same time period as most students obtain a Bachelors degree.

For more information on this program visit the Department's BS/MS Dual Degree Program (<http://www.drexel.edu/cae/academics/bs-environmental-engineering/Accelerated%20and%20Dual%20Degree%20Programs%20CAEE>) page.

Minor in Environmental Engineering

The Environmental Engineering minor focuses on pollution control and is primarily designed to broaden the professional capabilities of engineering students. For example, chemical and mechanical engineers working in process and manufacturing plants will be provided with a better understanding of the natural context of their facilities, better equipped to perform fate and risk analyses, and better able to apply the appropriate technology to control air and water discharges.

While this minor is designed to provide technical knowledge and skills to other engineers, with the appropriate prerequisites students from disciplines other than engineering can also complete this minor.

The minor consists of five required core courses and nine additional credits taken from a list of options.

Prerequisites

The common engineering core curriculum prerequisites are required of all students in the College of Engineering. Students from other colleges

will need the appropriate background in physics, mathematics and thermodynamics.

Required Courses

CAEE 210	Measurements in Civil, Architectural and Environmental Engineering I	3.0
ENVE 300	Introduction to Environmental Engineering	3.0
ENVE 302	Environmental Transport and Kinetics	3.0
CIVE 330	Hydraulics	4.0
ENVS 401	Chemistry of the Environment	3.0
Select three of the following:		8.0
ENVE 410	Solid and Hazardous Waste	
ENVE 460	Fundamentals of Air Pollution Control	
ENVE 486	Environmental Engineering Processes Laboratory I	
ENVE 487	Environmental Engineering Processes Laboratory II	
CIVE 430	Hydrology	
Total Credits		24.0

Facilities

The Department is well equipped with state-of-the-art facilities:

- The department computer labs are in operation: a computer-assisted design (CAD) and computerized instructional lab; and a graduate-level lab (advanced undergraduates can become involved in graduate-level work)
- External labs are used for surveying, building diagnostics, and surface and ground-water measurements
- Molecular microbiology laboratory to conduct PCR and qPCR analyses, as well as classical measurements
- Analytical equipment for chemical contaminants
- Instrumentation for characterization of indoor and outdoor atmospheric aerosols

Minor in Entertainment Engineering

Digital technologies have revolutionized the world of entertainment and created a new field combining the foundations of electrical engineering with entertainment media. This minor is designed for students with the technical literacy to effectively use, as well as develop, new tools for digital content creation and manipulation for entertainment applications.

The entertainment engineering minor consists of a minimum of six (6) required courses and an additional two (2) elective courses.

Entertainment Engineering Option for Non-Engineering Majors

The minor assumes students have a background in mathematics (equivalent to Calculus II). Courses taken to meet these pre-requisite requirements will not count toward the minor.

Required Courses

DIGM 105	Overview of Digital Media	3.0
ECE 101	Electrical and Computer Engineering in the Real World	1.0

ECE 121	Introduction to Entertainment Engineering	3.0
ECES 201	Introduction to Audio-Visual Signals	4.0
ECES 352	Introduction to Digital Signal Process	4.0
PSY 101	General Psychology I	3.0

Electives

Select one of the following:		3.0
PSY 213	Sensation and Perception	
CS 337	The Psychology of Human-Computer Interaction	
INFO 310	Human-Computer Interaction II	
Select one of the following:		3.0
FMVD 110	Basic Shooting and Lighting	
FMVD 115	Basic Editing	
FMVD 120	Basic Sound	
MIP 133	Digital Audio Workstations I	

Total Credits **24.0**

Additional Information

Additional information about this minor is available on the ECE Department (<http://www.ece.drexel.edu>) website.

For advising questions, please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu).

To make an appointment, please call 215.895.2837.

Drop-in hours: Please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu) for up-to-date drop-in availability.

Advising

Jeffrey Birou

Associate Director of Undergraduate Advising

Bossone Research Center, Room 313

E-mail: jbirou@coe.drexel.edu (%20jbirou@coe.drexel.edu)

Dr. Jaudelice de Oliveira

Associate Department Head for Undergraduate Affairs

Bossone Research Center, Room 313

E-mail: jau@coe.drexel.edu (%20jau@coe.drexel.edu)

Minor in Global Engineering

The Minor in Global Engineering is designed to train engineering students to become global citizens, skilled in meeting the challenges of a global work environment. Coursework in this minor aims at developing students' international historical, political, and cultural awareness as well as their knowledge of international business in order to succeed in the global economy. In addition to the required coursework, students must successfully complete an experience abroad prior to graduation. Experiences other than approved Study Abroad (<http://www.drexel.edu/studyabroad>) or Co-Op Abroad programs must receive prior approval from the College of Engineering Associate Dean for Undergraduate Affairs.

Foreign language

Foreign language is not required for the Minor in Global Engineering, but it may be required as a prerequisite to a student's experience abroad. In addition, a student can choose to apply as many as eight (8) credits of 200-level or higher foreign language toward the credit requirements for the minor.

Restrictions

Currently, only students enrolled in either the the College of Engineering or the School of Biomedical Engineering, Science and Health Systems can enroll in this minor.

Required Courses

ENGR 280	Introduction to Global Engineering	2.0
Select seven of the following (a minimum of one course from each of the three categories):		22.0

International Business

INTB 200	International Business (Recommended)
BLAW 340	International Business Law
ECON 342	Economic Development *
INTB 332	Multinational Corporations *
INTB 334	International Trade *
INTB 336	International Money and Finance *

Political Science/History

PSCI 140	Introduction to Comparative Political Analysis
PSCI 150	International Politics
PSCI 351	International Organizations: The United Nations
PSCI 352	Ethics and International Relations
PSCI 353	International Human Rights
PSCI 354	United States & the Third World
PSCI 357	The European Union in World Politics
HIST 220	History of American Business
HIST 259	History of Europe in the 20th Century

Culture and Communications

COM 360	International Communication
PHIL 335	Global Ethical Issues **
SOC 330	Development and Underdevelopment in the Global South
WGST 240	Women and Society in a Global Context

* Require ECON 201 and ECON 202 as pre-requisites.

** Requires PHIL 105 as a prerequisite.

Note: Students may petition the College of Engineering's Associate Dean for Undergraduate Affairs for permission to apply other courses they believe relevant to the Minor in Global Engineering toward their credit requirements. Such requests will be handled on a case-by-case basis.

Materials Science and Engineering

Major: Materials Science and Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 192.0

Classification of Instructional Programs (CIP) code: 14.1801

Standard Occupational Classification (SOC) code: 17-2131

About the Program

Materials science and engineering (MSE) is concerned with the production, structure, characterization, properties and utilization of metals, ceramics, polymers, composites, electronic, optical, nano- and bio-compatible materials. Materials scientists and engineers play a key role in our increasingly complex technological society by extending the limited supply of materials, improving existing materials, and developing and designing new and superior materials and processes with an awareness of their cost, reliability, safety, and societal/environmental implications.

Students majoring in materials science and engineering (MSE) receive a thorough grounding in the basic sciences and engineering of all materials. All students are required to take course sequences that include materials processing, thermodynamics and kinetics of materials, and their physical and mechanical behavior, plus laboratories designed to familiarize them with the instruments and advanced techniques used to characterize materials and evaluate their structure, properties and performance. A number of custom tracks allow upper level students to focus their technical electives in areas of specialization, including nanoscale materials and nanotechnology, biomaterials, electronic and photonic materials, soft materials and polymers, advanced materials design and processing, or in a custom track. In addition, several required senior level courses emphasize the role of materials selection and specification in design.

Throughout the senior year, students majoring in materials science and engineering work on a capstone senior design project over the course of three terms, with guidance from a faculty advisor and graduate student mentor. Students, working individually or in small groups, synthesize information from their courses to arrive at solutions to real-world engineering problems.

Some recent senior design projects include:

- Analyzing Nonskid Material for Naval Applications
- Core-Cladding Electrospun Nanofibers for Controlled Release Applications
- Adsorption of Antibiotics onto Nanodiamond Platforms
- Effect of Nickel Distribution on Hardenability
- Synthesis and Characterization of Mo₂GaC, Mo₂GaN and Mo₂AlC MAX Phases
- Design and Synthesis of ITO-Free Flexible Organic Solar Cells.

Mission Statement

The Department of Materials Science and Engineering (<http://www.materials.drexel.edu>) will provide our BS, MS and PhD graduates with the technical and theoretical knowledge, design capabilities, professionalism, and communications skills necessary for them to excel in leadership positions in academia, industry, and government at the national and international levels.

Vision

Materials science and engineering is a multi-disciplinary field that is at the forefront of all emerging technologies. Advances in the understanding of the process-structure-property-performance relationships of materials will be critical for future developments in energy storage and power generation, biomaterials and nanomaterials. The Department of Materials

Science and Engineering at Drexel University is recognized as a leader in these areas through its teaching and scholarly research.

Program Educational Objectives

The educational objectives of the Materials Science and Engineering BS degree program are:

- Materials Science and Engineering program graduates possess the core technical competencies in their field necessary to successfully interface with other engineering disciplines in the workplace.
- At least 30% of Materials Science and Engineering program graduates have progressed towards graduate education.
- Materials Science and Engineering program graduates are leaders in their chosen fields.
- Materials Science and Engineering program graduates are engaged in lifelong learning.
- Materials Science and Engineering program graduates possess written and verbal communication skills appropriate for professional materials engineers and/or scientists.

Student Outcomes

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- a. an ability to apply knowledge of mathematics, science and engineering.
- b. an ability to design and conduct experiments, as well as to analyze and interpret data.
- c. an ability to design a material, system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
- d. an ability to function on multidisciplinary teams.
- e. an ability to identify, formulate and solve *materials* engineering problems.
- f. an understanding of professional and ethical responsibility.
- g. an ability to communicate effectively.
- h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.
- i. a recognition of the need for, and an ability to engage in, life-long learning.
- j. a knowledge of contemporary issues.
- k. an ability to use the techniques, skills and modern engineering tools necessary for materials science and engineering practice.

Additional Information

The Materials Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

For additional information about this major, contact:

Sarit Kunz

Academic Program Coordinator
215.895.2328
skunz@coe.drexel.edu

Degree Requirements

General Education/Liberal Studies Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 315	Engineering Ethics	3.0
UNIV E101	The Drexel Experience	1.0
Technical Electives/Track Courses *		12.0
Non-designated General Education Requirements **		9.0
Free Electives		6.0

Foundation Requirements

CHE 335	Statistics and Design of Experiments	3.0
CHEC 353	Physical Chemistry and Applications III	4.0
CHEM 241	Organic Chemistry I	4.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 141	Essential Biology	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0

Professional Requirements

MATE 214	Introduction to Polymers	4.0
MATE 221	Introduction to Mechanical Behavior of Materials	3.0
MATE 240	Thermodynamics of Materials	4.0
MATE 245	Kinetics of Materials	4.0
MATE 280	Advanced Materials Laboratory	4.0
MATE 315	Processing Polymers	4.5

MATE 341	Defects in Solids	3.0
MATE 345	Processing of Ceramics	4.5
MATE 351	Electronic and Photonic Properties of Materials	4.0
MATE 355	Structure and Characterization of Crystalline Materials	3.0
MATE 366 [WI (p. 269)]	Processing of Metallic Materials	4.5
MATE 370	Mechanical Behavior of Solids	3.0
MATE 410	Case Studies in Materials	3.0
MATE 455	Biomedical Materials	3.0
MATE 460	Engineering Computational Laboratory	4.0
MATE 491 [WI (p. 269)]	Senior Project Design I	2.0
MATE 492	Senior Project Design II	2.0
MATE 493 [WI (p. 269)]	Senior Project Design III	4.0
Total Credits		192.0

* A "Track" is a sequence of 4-5 technical electives (12-18 credits) with an underlying connection to a specific area of materials science and engineering. With the rapid expansion of the technical and scientific knowledge in the field of materials science and engineering, organizing technical electives into thematic tracks benefits students. Combined with relevant co-op experiences and senior design, the tracks can provide strong evidence of specialization, which will benefit students in future job searches.

Technical electives can be taken during the junior and (mostly during) the senior year. For planning reasons, better coordination with senior design, and to accommodate students with an out-of-cycle schedule (e.g., transfer students), tracks need to be declared by the beginning of the pre-junior year. Students may change their track selection after consulting with their MSE department advisor.

** Non-designated General Education Requirements (p. 214).

Sample Plan of Study

5 YR UG Co-op Concentration

Term 1		Credits
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
CIVC 101	Introduction to Civic Engagement	1.0
ENGR 102	Engineering Design Laboratory II	2.0
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 122	Computation Lab II	1.0

MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
Term Credits		19.5

Term 3

BIO 141	Essential Biology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0

Term Credits 17.5

Term 4

CHEM 241	Organic Chemistry I	4.0
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0

Term Credits 18.0

Term 5

ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MATE 221	Introduction to Mechanical Behavior of Materials	3.0
Free elective		3.0

Term Credits 15.0

Term 6

ECON 201	Principles of Microeconomics	4.0
MATE 214	Introduction to Polymers	4.0
MATE 240	Thermodynamics of Materials	4.0
MATE 355	Structure and Characterization of Crystalline Materials	3.0

Term Credits 15.0

Term 7

ECON 202	Principles of Macroeconomics	4.0
MATE 245	Kinetics of Materials	4.0
MATE 315	Processing Polymers	4.5
MATE 341	Defects in Solids	3.0

Term Credits 15.5

Term 8

HIST 285	Technology in Historical Perspective	3.0
MATE 280	Advanced Materials Laboratory	4.0
MATE 366 [WI (p. 269)]	Processing of Metallic Materials	4.5
MATE 370	Mechanical Behavior of Solids	3.0
Technical elective/Track course		3.0

Term Credits 17.5

Term 9

CHEC 353	Physical Chemistry and Applications III	4.0
MATE 345	Processing of Ceramics	4.5
MATE 351	Electronic and Photonic Properties of Materials	4.0
PHIL 315	Engineering Ethics	3.0

Term Credits 15.5

Term 10			BIO 141	Essential Biology	4.5
MATE 455	Biomedical Materials	3.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATE 460	Engineering Computational Laboratory	4.0	ENGR 103	Engineering Design Laboratory III	2.0
MATE 491 [WI (p. 269)]	Senior Project Design I	2.0	Term Credits		17.5
General education elective*		3.0	Term 4		
Technical elective/Track course		3.0	PHYS 201	Fundamentals of Physics III	4.0
Term Credits		15.0	CHEM 241	Organic Chemistry I	4.0
Term 11			ENGR 201	Evaluation Presentation of Experimental Data I	3.0
CHE 335	Statistics and Design of Experiments	3.0	ENGR 220	Fundamentals of Materials	4.0
MATE 492	Senior Project Design II	2.0	ENGR 231	Linear Engineering Systems	3.0
Free elective		3.0	Term Credits		18.0
Technical elective/Track course		3.0	Term 5		
General education elective*		3.0	ENGR 202	Evaluation Presentation of Experimental Data II	3.0
Term Credits		14.0	ENGR 210	Introduction to Thermodynamics	3.0
Term 12			ENGR 232	Dynamic Engineering Systems	3.0
MATE 410	Case Studies in Materials	3.0	MATE 221	Introduction to Mechanical Behavior of Materials	3.0
MATE 493 [WI (p. 269)]	Senior Project Design III	4.0	Free Elective		3.0
Technical elective/Track course		3.0	Term Credits		15.0
General education elective*		3.0	Term 6		
Term Credits		13.0	ECON 201	Principles of Microeconomics	4.0
Total Credit: 192.0			HIST 285	Technology in Historical Perspective	3.0
			Technical Elective/Track Course		3.0
			Technical Elective/Track Course		3.0
			General Education Elective		3.0
			Term Credits		16.0
			Term 7		
			ECON 202	Principles of Macroeconomics	4.0
			PHIL 315	Engineering Ethics	3.0
			Free Elective		3.0
			General Education Elective		3.0
			Technical Elective/Track Course		3.0
			Term Credits		16.0
			Term 8		
			MATE 214	Introduction to Polymers	4.0
			MATE 240	Thermodynamics of Materials	4.0
			MATE 355	Structure and Characterization of Crystalline Materials	3.0
			MATE 280	Advanced Materials Laboratory	4.0
			MATE 370	Mechanical Behavior of Solids	3.0
			Term Credits		18.0
			Term 9		
			MATE 245	Kinetics of Materials	4.0
			MATE 341	Defects in Solids	3.0
			MATE 315	Processing Polymers	4.5
			MATE 351	Electronic and Photonic Properties of Materials	4.0
			Term Credits		15.5
			Term 10		
			MATE 366 [WI (p. 269)]	Processing of Metallic Materials	4.5
			MATE 455	Biomedical Materials	3.0
			MATE 460	Engineering Computational Laboratory	4.0

* See degree requirements (p. 270).

4 YR UG Co-op Concentration

		Credits
Term 1		
MATH 121	Calculus I	4.0
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 121	Computation Lab I	2.0
UNIV 101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Term Credits		19.5
Term 3		
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0

MATE 491 [WI (p. 269)]	Senior Project Design I	2.0
Term Credits		13.5
Term 11		
MATE 345	Processing of Ceramics	4.5
MATE 492	Senior Project Design II	2.0
CHE 335	Statistics and Design of Experiments	3.0
CHEC 353	Physical Chemistry and Applications III	4.0
Term Credits		13.5
Term 12		
MATE 410	Case Studies in Materials	3.0
MATE 493 [WI (p. 269)]	Senior Project Design III	4.0
Technical Elective/Track Course		3.0
General Education Elective		3.0
Term Credits		13.0
Total Credit: 192.0		

Co-op/Career Opportunities

Examples of industries in which materials science and engineering graduates play major roles include: base metals industries; specialist alloys; advanced ceramics; petrochemical; biomaterials and implants; pharmaceuticals; consumer products; electronics and photonics; nanotechnology; power generation; energy conversion, storage and conservation (fuel cells, advanced batteries, supercapacitors and solar cells); environmental protection and remediation; information and telecommunications; and transportation (aerospace, automotive, bicycles, railways).

Typical job functions include design and development of new materials, materials selection for specific applications, manufacturing, performance and failure analysis, quality control and testing, research and development, technical management, sales and marketing, teaching, technical services, and technical writing.

Please visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) for more detailed information on co-op and post-graduate opportunities.

Dual/Accelerated Degree Accelerated Program

The Accelerated Program of the College of Engineering provides opportunities for highly talented and motivated students to progress toward their educational goals essentially at their own pace. These options include opportunities for accelerated studies, dual degrees, as well as a combined bachelor's/master's (BS/MS) program. Primarily through advanced placement, credit by examination, flexibility of scheduling, and independent study, this "fast-track" makes it possible to complete the undergraduate curriculum and initiate graduate studies in less than the five years required by the standard curriculum.

Dual Degree Bachelor's Programs

With careful planning, students can complete two full degrees in the time usually required to complete one. For detailed information, students should contact their advisors.

Bachelor's/Master's Dual Degree Program

Exceptional students can also pursue a master of science (MS) degree in the same period as the bachelor of science (BS). The combined BS/MS degree in Materials Science and Engineering differs from the standard BS degree in that there are two Co-op periods instead of three and in the last two years, specific graduate courses are taken.

For more information about this program, please visit the Department's BS/MS Dual Degree Program (<http://www.mse.drexel.edu/academics/undergrad/bs-ms>) page.

Minor in Materials Science and Engineering

In addition to the core engineering curriculum and the courses required for majors in chemical, civil, electrical, or mechanical engineering, engineering students from other majors can obtain a minor in materials engineering by taking 24.0 credits from the courses listed below.

Required Courses

MATE 221	Introduction to Mechanical Behavior of Materials	3.0
Select six (at least 21.0 credits) of the following:		21.0
MATE 214	Introduction to Polymers *	
MATE 240	Thermodynamics of Materials	
MATE 245	Kinetics of Materials	
MATE 280	Advanced Materials Laboratory	
MATE 341	Defects in Solids	
MATE 351	Electronic and Photonic Properties of Materials	
MATE 355	Structure and Characterization of Crystalline Materials	
MATE 370	Mechanical Behavior of Solids **	
MATE 455	Biomedical Materials	
Total Credits		24.0

* MATE 214 requires CHEM 241 as a pre-requisite. If MATE 214 is elected, the credits for CHEM 241 can count toward the 21 credits.

** MATE 370 requires MATH 201 as a pre-requisite. If MATE 370 is elected, the credits for MATH 201 can count toward the 21 credits.

Note: Only one of the prerequisites (either or MATH 201) can count toward the required 24.0 credits. In other words, both MATE 214 and MATE 370 can be used to fulfill the requirements for the minor, but only the pre-requisite for one of those courses will be calculated into the 24.0 credits. Similarly, MATH 201 or CHEM 241 cannot be counted alone as fulfilling the requirements for this minor. The credits for MATH 201 or CHEM 241 will only count toward the minor when the course(s) is/are taken as a prerequisite for MATE 214 or MATE 370. Substitution for these courses of equivalent courses offered by other departments and/or institutions may be made with the approval of the Department of Materials Science and Engineering on a case-by-case basis.

At least two-thirds of the content of a substitute course must be the same as that of the course in the list above. It is imperative that students check each course carefully with respect to prerequisites since some may be

included in the list above and some may be from other departments. Courses taken outside the department as prerequisites do not count towards the 24.0 credits required for the minor. They may, however, be used as technical or free electives in students' home department. Students pursuing the minor in Materials Science and Engineering are also encouraged to select a senior design topic that relates to the field of materials.

Facilities

Biomaterials and Biosurfaces Laboratory

This laboratory contains 10 kN biaxial and 5 kN uniaxial servo-hydraulic mechanical testing machines, a Fluoroscan X-ray system, a microscopic imaging system, a spectra fluorometer, a table autoclave, centrifuge, vacuum oven, CO₂ incubators, biological safety cabinet, thermostatic water baths, precision balance and ultrasonic sterilizer.

Nanobiomaterials and Cell Engineering Laboratory

This laboratory contains fume hood with vacuum/gas dual manifold, vacuum pump and rotary evaporator for general organic/polymer synthesis; gel electrophoresis and electroblotting for protein characterization; bath sonicator, glass homogenizer and mini-extruder for nanoparticle preparation; centrifuge; ultrapure water conditioning system; precision balance; pH meter and shaker.

Ceramics Processing Laboratory

This laboratory contains a photo-resist spinner, impedance analyzer, Zeta potential meter, spectrofluorometer, piezoelectric d33 meter, wire-bonder, and laser displacement meter.

Dynamic Characterization Laboratory

This laboratory contains metallographic sample preparation (sectioning, mounting and polishing) facilities; inverted metallograph; microhardness tester; automated electropolishing for bulk and TEM sample preparation; SEM tensile stage for EBSD; magneto-optical Kerr effect (MOKE) magnetometer.

MAX Phase Ceramics Processing Laboratory

This laboratory contains a vacuum hot-press; cold isostatic press (CIP) and hot isostatic press (HIP) for materials consolidation and synthesis; precision dilatometer; laser scattering particle size analyzer; impedance analyzer, creep testers, and assorted high temperature furnaces.

Mechanical Testing Laboratory

This laboratory contains mechanical and closed-loop servo-hydraulic testing machines, hardness testers, impact testers, equipment for fatigue testing, metallographic preparation facilities and a rolling mill with twin 6" diameter rolls.

Mesoscale Materials Laboratory

This laboratory contains instrumentation for growth, characterization, device fabrication, and design and simulation of electronic, dielectric, ferroelectric and photonic materials. Resources include physical and chemical vapor deposition and thermal and plasma processing of thin films, including oxides and metals, and semiconductor nanowire growth. Facilities include pulsed laser deposition, atomic layer deposition, chemical vapor deposition, sublimation growth, and resistive thermal evaporation. Variable-temperature high-vacuum probe station and optical cryostats including high magnetic field, fixed and tunable-wavelength laser sources, several monochromators for luminescence and Raman scattering spectroscopies, scanning electron microscopy with electron beam lithography, and a scanning probe microscope.

Nanomaterials Laboratory

This laboratory contains instrumentation for testing and manipulation of materials under microscope, high-temperature autoclaves, Sievert's apparatus; glove-box; high-temperature vacuum and other furnaces for the synthesis of nano-carbon coatings and nanotubes; electro-spinning system for producing nano-fibers.

Oxide Films and Interfaces Laboratory

This laboratory contains an oxide molecular beam epitaxy (MBE) thin film deposition system; physical properties measurement system for electronic transport and magnetometry measurements from 2 – 400K, up to 9 T fields; 2 tube furnaces.

Powder Processing Laboratory

This laboratory contains vee blenders, ball-mills, sieve shaker + sieves for powder classification, several furnaces (including one with controlled atmosphere capability); and a 60-ton Baldwin press for powder compaction.

Soft Matter Research and Polymer Processing Laboratories

These laboratories contain computerized thermal analysis facilities including differential scanning calorimeters (DSC), dynamic mechanical analyzer (DMA) and thermo-gravimetric analyzer (TGA); single-fiber tensile tester; strip biaxial tensile tester; vacuum evaporator; spincoater; centrifuge; optical microscope with hot stage; liquid crystal tester; microbalance; ultrasonic cleaner; laser holographic fabrication system; polymer injection molder and single screw extruder.

Natural Polymers and Photonics Laboratory

This laboratory contains a spectroscopic ellipsometer for film characterization; high purity liquid chromatography (HPLC) system; lyophilizer; centrifuge; refractometer; electro-spinning system for producing nano-fibers.

X-ray Tomography Laboratory

This laboratory contains a high resolution X-ray tomography instrument and a cluster of computers for 3D microstructure reconstruction; mechanical stage, a positioning stage and a cryostage for in-situ testing. For more information on departmental facilities, please visit the Department's Facilities page at <http://www.materials.drexel.edu/research/facilities/>

Centralized Research Facilities

The Department of Materials Science & Engineering relies on Core Facilities within the University for materials characterization and micro- and nano-fabrication. These facilities contain state-of-the-art materials characterization instruments, including environmental and variable pressure field-emission scanning electron microscopes with Energy Dispersive Spectroscopy (EDS) for elemental analysis, and Orientation Image Microscopy (OIM) for texture analysis; a Transmission Electron Microscope (TEM) with STEM capability and TEM sample preparation equipment; a dual beam focused ion beam (FIB) system for nano-characterization and nano fabrication; a femtosecond/ terahertz laser Raman spectrometer; visible and ultraviolet Raman micro spectrometers with a total of 7 excitation wavelengths for non-destructive chemical and structural analysis and Surface Enhanced Raman (SERS); a Fourier Transform Infrared (FTIR) spectrometer with a microscope and full array of accessories; a Nanoindenter; an X-ray Photoelectron Spectrometer (XPS)/Electron Spectroscopy for Chemical Analysis (ESCA) system; and X-Ray Diffractometers (XRD), including small angle/wide angle X-Ray scattering (SAX/WAX).

More details of these instruments, information how to access them and instrument usage rates can be found at <http://crf.coe.drexel.edu/>

Materials Science and Engineering Faculty

Michel Barsoum, PhD (*Massachusetts Institute of Technology*) *A. W. Grosvenor Professor*. Professor. Processing and characterization of novel ceramics and ternary compounds, especially the MAX and 2-D MXene phases.

Hao Cheng, PhD (*Northwestern University*). Assistant Professor. Drug delivery, molecular self-assembly, cell-nanomaterial interactions, regenerative medicine and cell membrane engineering.

Yury Gogotsi, PhD (*Kiev Polytechnic Institute*) *Director, A. J. Drexel Nanotechnology Institute*. Distinguished University & Trustee Chair Professor. Nanomaterials; carbon nanotubes; nanodiamond; graphene; MXene; materials for energy storage, supercapacitors, and batteries.

Richard Knight, PhD (*Loughborough University*) *Associate Department Head and Undergraduate Advisor*. Teaching Professor. Thermal plasma technology; thermal spray coatings and education; plasma chemistry and synthesis.

Christopher Y. Li, PhD (*University of Akron*). Professor. Soft and hybrid materials for optical, energy, and bio applications; polymeric materials, nanocomposites, structure and properties.

Michele Marcolongo, PhD, PE (*University of Pennsylvania*) *Senior Associate Vice Provost for Translational Research*. Professor. Orthopedic biomaterials; acellular regenerative medicine, biomimetic proteoglycans; hydrogels.

Steven May, PhD (*Northwestern University*). Assistant Professor. Synthesis of complex oxide films, superlattices, and devices; materials for energy conversion and storage; magnetic and electronic materials; x-ray and neutron scattering.

Ekaterina Pomerantseva, PhD (*Moscow State University, Russia*). Assistant Professor. Solid state chemistry; electrochemical characterization, lithium-ion batteries, energy generation and storage; development and characterization of novel nanostructured materials, systems and architectures for batteries, supercapacitors and fuel cells.

James Rondinelli, PhD (*University of California, Santa Barbara*). Assistant Professor. Electronic structure theory of inorganic materials; atomic structure driven view of functional properties; density functional theory-based materials design; inorganic carbides, oxides and fluorides for electronic, magnetic, optical and electrochemical applications.

Caroline L. Schauer, PhD (*SUNY Stony Brook*) *Graduate Advisor*. Associate Professor. Polysaccharide thin films and nanofibers.

Wei-Heng Shih, PhD (*Ohio State University*). Professor. Colloidal ceramics and sol-gel processing; piezoelectric biosensors, optoelectronics, and energy harvesting devices; nanocrystalline quantum dots for bioimaging, lighting, and solar cells.

Jonathan E. Spanier, PhD (*Columbia University*) *Associate Dean, Strategic Planning, College of Engineering*. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Mitra Taheri, PhD (*Carnegie Mellon University*) *Hoeganeas Assistant Professor of Metallurgy*. Assistant Professor. Development of the ultrafast Dynamic Transmission Electron Microscope (DTEM) for the study

of laser-induced microstructural evolution/phase transformations in nanostructured materials; use of various *in-situ* Transmission Electron Microscopy techniques.

Garritt Tucker, PhD (*Georgial Institute of Technology*). Assistant Professor. Computational materials science and engineering; microstructural evolution and material behavior in extreme environments; interfacial-driven processes for improving material functionality; multi-scale physics modeling.

Christopher Weyant, PhD (*Northwestern University*). Associate Teaching Professor.

Antonios Zavaliangos, PhD (*Massachusetts Institute of Technology*). Department Head and Professor. Constitutive modeling; powder compaction and sintering; pharmaceutical tableting, X-ray tomography.

Interdepartmental Faculty

Jason Baxter, PhD (*University of California, Santa Barbara*). Associate Professor. Solar cells, semiconductor nanomaterials, ultrafast spectroscopy.

Yossef A. Elabd, PhD (*Johns Hopkins University*). Professor. Fuel cells; polymer membranes; diffusion in polymers.

Adam K. Fontecchio, PhD (*Brown University*) *Electrical and Computer Engineering*. Professor. Electro-optics; remote sensing; active optical elements; liquid crystal devices.

Alexander Fridman, DSc, PhD (*Moscow Institute of Physics and Technology*) *Mechanical Engineering and Mechanics, John A. Nyheim Endowed University Chair Professor, Director of the Drexel Plasma Institute*. Professor. Plasma science and technology; pollutant mitigation; super-adiabatic combustion; nanotechnology and manufacturing.

Haviva M. Goldman, PhD (*City University of New York*) *Neurobiology and Anatomy*. Associate Professor. Understanding how the size and shape of whole bones, as well as the distribution quantity and quality of the mineralized tissue that forms the bone, reflect both evolutionary constraints of skeletal growth and development, and responsiveness to mechanical loading during life.

Lin Han, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Emin Caglan Kumbur, PhD (*Pennsylvania State University*). Assistant Professor. Next generation energy technologies; fuel cell design and development.

Kenneth K.S. Lau, PhD (*Massachusetts Institute of Technology*). Associate Professor. Surface science; nanotechnology; polymer thin films and coatings; chemical vapor deposition.

Bahram Nabet, PhD (*University of Washington*) *Associate Dean for Special Projects, College of Engineering; Electrical and Computer Engineering*. Professor. Optoelectronics; fabrication and modeling; fiber optic devices; nanoelectronics; nanowires.

Giuseppe R. Palmese, PhD (*University of Delaware*) *Department Head, Chemical and Biological Engineering*. Professor. Reacting polymer

systems; nanostructured polymers; radiation processing of materials; composites and interfaces.

Wan Young Shih, PhD (*Ohio State University*) *School of Biomedical Engineering, Science and Health Systems*. Associate Professor.

Piezoelectric microcantilever biosensors development, piezoelectric finger development, quantum dots development, tissue elasticity imaging, piezoelectric microcantilever force probes.

Karl Sohlberg, PhD (*University of Delaware*). Associate Professor. Computational and theoretical materials-related chemistry: (1) complex catalytic materials; (2) mechanical and electrical molecular devices.

Margaret Wheatley, PhD (*University of Toronto*) *School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor*. Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

Emeritus Faculty

Roger D. Corneliussen, PhD (*University of Chicago*). Professor Emeritus. Fracture, blends and alloys, as well as compounding.

Roger D. Doherty, PhD (*Oxford University*). Professor Emeritus. Metallurgical processing; thermo-mechanical treatment.

Ihab L. Kamel, PhD (*University of Maryland*). Professor Emeritus. Nanotechnology, polymers, composites, biomedical applications, and materials-induced changes through plasma and high energy radiation.

Jack Keverian, PhD (*Massachusetts Institute of Technology*). Professor Emeritus. Rapid parts manufacturing, computer integrated manufacturing systems, strip production systems, technical and/or economic modeling, melting and casting systems, recycling systems.

Alan Lawley, PhD (*University of Birmingham, England*). Professor Emeritus. Mechanical and physical metallurgy, powder metallurgy, materials engineering design, engineering education.

Mechanical Engineering

Major: Mechanical Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 192.5

Classification of Instructional Programs (CIP) code: 14.1901

Standard Occupational Classification (SOC) code: 17-2141

About the Program

The role of the mechanical engineer in today's society is rapidly changing. Advances in manufacturing, transportation, infrastructure systems, materials, communications, and high-performance computing have introduced new demands, opportunities, and challenges for mechanical engineers. What was once an individual endeavor has now become a team activity. Today's industries require that mechanical engineers possess diverse interdisciplinary skills, a global viewpoint, entrepreneurial and managerial abilities, and an understanding of the forces governing the marketplace.

Traditionally, mechanical engineers have been associated with industries like automotive, transportation, and power generation, and with activities involving the design, analysis, and manufacturing of products useful to society. While today such activities are still dominated by mechanical

engineers, the spectrum of opportunities for these professionals has expanded tremendously. For example, mechanical engineers are involved in the design and analysis of biomedical instrumentation, electronic components, smart structures, and advanced materials; they are involved in sophisticated studies of human motion, control of satellites, and the development of more efficient energy-transfer techniques.

Drexel's Department of Mechanical Engineering and Mechanics (http://www.drexel.edu/coe/departments/mech_eng) prides itself on providing its students with a comprehensive program of courses, laboratories, design projects, and co-op experiences. The MEM curriculum is designed to balance technical breadth (provided by a set of fundamental required core courses) with technical depth (provided by optional concentrations that emphasize particular fields within the profession). Thus, the MEM program not only prepares its graduates to become successful mechanical engineers needed in industry and government, but also provides an excellent springboard to pursue graduate studies in medical sciences, law, business, information technology, and any other disciplines where technological and analytical skills play an important role.

Mission Statement

The mission of the Department of Mechanical Engineering and Mechanics of Drexel University is to transfer and acquire knowledge through: (a) the education of engineers for leadership in industry, business, academia, and government; and (b) the establishment of internationally recognized research programs. This mission is accomplished by the delivery of an outstanding curriculum, by the participation of our students in one of the nation's most prestigious co-operative educational programs, and by the scholarly activities of the faculty.

Program Educational Objectives

- Graduates will be successful in careers that deal with the design, simulation and analysis of engineering systems, experimentation and testing, manufacturing, technical services, and research.
- Graduates will enter and complete academic and professional programs in engineering, business, management, law and medicine.
- Graduates will communicate effectively with peers and be successful working with and leading multi-disciplinary and multi-cultural teams.
- Graduates will recognize the global, legal, societal, and ethical contexts of their work.
- Graduates will advance in their careers; for example, assuming increasing levels of responsibility and acquiring professional licensure.

Student Outcomes

The department's student outcomes reflect the skills and abilities that the curriculum is designed to provide to students by the time they graduate. These are:

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;
- e) an ability to identify, formulate, and solve engineering problems;

- f) an understanding of professional and ethical responsibility;
- g) an ability to communicate effectively;
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) a recognition of the need for, and an ability to engage in life-long learning;
- j) a knowledge of contemporary issues;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for mechanical engineering and mechanics practice.

Additional Information

The Mechanical Engineering and Mechanics program is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

For additional information about this major, contact:

Dane Zdunowski
dzdunowski@coe.drexel.edu
215.895.2336
Randell 115

Sheena Butler
sbutler@coe.drexel.edu
215.895.1474
Randell 115

Degree Requirements

The mechanical engineering and mechanics curriculum is designed to balance technical breadth (provided by a set of fundamental required core courses) with technical depth (provided by optional concentrations that emphasize particular fields within the profession).

General Education/Liberal Studies Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HIST 285	Technology in Historical Perspective	3.0
PHIL 315	Engineering Ethics	3.0
UNIV E101	The Drexel Experience	1.0
General Education Requirements *		12.0

Mathematics Requirements

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0

Physics Requirements

PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0

Chemistry/Biology Requirements

CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5

BIO 141	Essential Biology	4.5
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Design/Laboratory Requirements

ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0

Engineering Requirements

ENGR 201	Evaluation & Presentation of Experimental Data I	3.0
ENGR 202	Evaluation & Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0

Engineering Economics Requirements

CIVE 240 [WI (p. 276)]	Engineering Economic Analysis	3.0
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Materials Requirements

ENGR 220	Fundamentals of Materials	4.0
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Mechanical Requirements

MEM 201	Foundations of Computer Aided Design	3.0
MEM 202	Statics	3.0
MEM 220	Basic Fluid Mechanics	4.0
MEM 230	Mechanics of Materials I	4.0
MEM 238	Dynamics	4.0
MEM 255	Introduction to Controls	4.0
MEM 310	Thermodynamic Analysis I	4.0
MEM 311	Thermal Fluid Science Laboratory	2.0
MEM 331	Experimental Mechanics I	2.0
MEM 351	Dynamic Systems Laboratory I	2.0
MEM 333	Mechanical Behavior of Materials	3.0
MEM 345	Heat Transfer	4.0
MEM 355	Performance Enhancement of Dynamic Systems	4.0
MEM 361	Engineering Reliability	3.0
MEM 435	Introduction to Computer-Aided Design and Manufacturing	4.0
MEM 491 [WI (p. 276)]	Senior Design Project I	3.0
MEM 492 [WI (p. 276)]	Senior Design Project II	3.0
MEM 493 [WI (p. 276)]	Senior Design Project III	3.0

Elective Courses

MEM Fundamental Courses **	12.0
MEM Open Electives (Any two MEM courses 300 level or higher.)	6.0-8.0
COE Electives (Any 2 College of Engineering courses, including MEM 6.0-8.0 courses, 300 level or higher.)	
Math/Science Electives (300+ level MATH, PHYS, BIO, CHEM, CHEC, and ENVS.)	6.0-8.0
Free Electives	6.0-8.0

Total Credits 192.5

* General Education Requirements (p. 214).
 ** All MEM students must complete a minimum of four of the MEM Fundamentals courses. (See List Below)

MEM Fundamental Courses

Select four of the following:

MEM 320	Fluid Dynamics I
MEM 330	Mechanics of Materials II
MEM 410	Thermodynamic Analysis II
MEM 417	Introduction to Microfabrication
MEM 423	Mechanics of Vibration
MEM 431	Machine Design I
MEM 437	Manufacturing Process I
MEM 440	Thermal Systems Design
MEM 458	Micro-Based Control Systems I
MEM 459	Control Applications of DSP Microprocessors

Sample Plan of Study

5 YR UG Co-op Concentration

Term		Credits
Term 1		
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
UNIV E101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
CHEM 102	General Chemistry II	4.5
CIVC 101	Introduction to Civic Engagement	1.0
COOP 001	Co-op Essentials	0.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
Term Credits		19.5
Term 3		
BIO 141	Essential Biology	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
Term Credits		17.5
Term 4		
ENGR 201	Evaluation Presentation of Experimental Data I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
MEM 202	Statics	3.0

PHYS 201	Fundamentals of Physics III	4.0
Term Credits		17.0
Term 5		
ENGR 202	Evaluation Presentation of Experimental Data II	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 201	Foundations of Computer Aided Design	3.0
MEM 238	Dynamics	4.0
Term Credits		16.0
Term 6		
CIVE 240 [WI (p. 276)]	Engineering Economic Analysis	3.0
HIST 285	Technology in Historical Perspective	3.0
MEM 230	Mechanics of Materials I	4.0
MEM 310	Thermodynamic Analysis I	4.0
Free Elective		3.0
Term Credits		17.0
Term 7		
MEM 220	Basic Fluid Mechanics	4.0
MEM 255	Introduction to Controls	4.0
MEM 331	Experimental Mechanics I	2.0
MEM 333	Mechanical Behavior of Materials	3.0
PHIL 315	Engineering Ethics	3.0
Term Credits		16.0
Term 8		
MEM 311	Thermal Fluid Science Laboratory	2.0
MEM 355	Performance Enhancement of Dynamic Systems	4.0
MEM 435	Introduction to Computer-Aided Design and Manufacturing	4.0
MEM 345	Heat Transfer	4.0
MEM Fundamentals Course*		3.0
Term Credits		17.0
Term 9		
MEM 351	Dynamic Systems Laboratory I	2.0
MEM 361	Engineering Reliability	3.0
Two MEM Fundamentals Courses*		6.0
General Education Elective*		3.0
Term Credits		14.0
Term 10		
MEM 491 [WI (p. 276)]	Senior Design Project I	3.0
General Education Elective*		3.0
A MEM or College of Engineering Elective (300+)		3.0
MEM Fundamentals Course*		3.0
Math/Science Course*		3.0
Term Credits		15.0
Term 11		
MEM 492 [WI (p. 276)]	Senior Design Project II	3.0
General Education Elective*		3.0
Any 300-level or Higher MEM Elective		3.0

A MEM or College of Engineering Elective (300+)	3.0
Math/Science Course*	3.0
Term Credits	15.0
Term 12	
MEM 493 [WI Senior Design Project III (p. 276)]	3.0
Free Electives	3.0
Any 300-level or Higher MEM Elective	3.0
General Education Elective*	3.0
Term Credits	12.0
Total Credit: 192.5	

* See degree requirements (p. 277).

Co-op/Career Opportunities

Mechanical engineers are employed in a growing number of areas, including aerospace, automotive, biomechanics, computer systems, electronic entertainment, energy, environmental, health care, manufacturing, nuclear technology, and utilities. Most mechanical engineering graduates begin full-time employment immediately upon graduation. However, there are a number of graduates who go on to pursue master's and/or doctoral degrees in mechanical engineering. The graduate schools that Drexel's mechanical engineers have attended include Harvard, UC Berkeley, and the University of Pennsylvania.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) for more detailed information on co-op and post-graduate opportunities.

Dual/Accelerated Degree

Accelerated Program

The Accelerated Program of the College of Engineering provides opportunities for highly talented and strongly motivated students to progress toward their educational goals essentially at their own pace. These options include opportunities for accelerated studies, dual degrees, a combined bachelor's/master's program as well as participation in the University Honors Program (<http://www.drexel.edu/honors>).

Primarily through advanced placement, credit by examination, flexibility of scheduling, and independent study, the "fast track" makes it possible to complete the undergraduate curriculum and initiate graduate study in less than the five years required by the standard curriculum.

Dual Degree Bachelor's Programs

With careful planning, you can complete two full degrees in the time usually required to complete one. The double major option works best in closely related areas. For detailed information please contact your advisor.

Bachelor's/Master's (BS/MS) Dual Degree Program

Exceptional students can also pursue a master of science degree in the same period as the bachelor of science. For MEM undergraduate students, the following are the possible graduate programs for the Master's degree in the BS/MS dual degree program:

- Electrical Engineering
- Computer Engineering
- Material Science Engineering
- Mechanical Engineering and Mechanics
- Biomedical Engineering
- Chemical Engineering

BS/MS students must be in the 5-year co-op option, must have a 3.2 GPA to gain admission, and must maintain a 3.0 GPA while in the program. For more information about this program, visit the College of Engineering BS/MS Dual Degree Program page.

Minor in Mechanical Engineering and Mechanics

Any undergraduate student in good standing who has completed more than 30.0 credits at Drexel may apply for the minor in mechanical engineering.

The minor must contain a minimum of 24.0 MEM credits according to the following distribution: (a) 16.0 credits from any four of the 4-credit required course options; (b) at least eight credits from additional required courses or from the laboratory components and recommended electives.

Required Course Options

Select four of the following:	16.0
MEM 220	Basic Fluid Mechanics
MEM 230	Mechanics of Materials I
MEM 238	Dynamics
MEM 255	Introduction to Controls
MEM 310	Thermodynamic Analysis I
MEM 345	Heat Transfer
MEM 355	Performance Enhancement of Dynamic Systems
MEM 361	Engineering Reliability
MEM 435	Introduction to Computer-Aided Design and Manufacturing

Select three of the following: 8.0

Laboratories

MEM 311	Thermal Fluid Science Laboratory
MEM 331	Experimental Mechanics I
MEM 351	Dynamic Systems Laboratory I

Recommended Electives

MEM 320	Fluid Dynamics I
MEM 330	Mechanics of Materials II
MEM 361	Engineering Reliability
MEM 410	Thermodynamic Analysis II
MEM 420	Aerodynamics
MEM 423	Mechanics of Vibration
MEM 425	Aircraft Design & Performance
MEM 430	Advanced Stress Analysis
MEM 437	Manufacturing Process I
MEM 438	Manufacturing Process II
MEM 440	Thermal Systems Design
MEM 453	Aircraft Flight Dynamics & Control I
MEM 455	Introduction to Robotics
MEM 458	Micro-Based Control Systems I

MEM 459	Control Applications of DSP Microprocessors
MEM 462 [WI (p. 276)]	Introduction to Engineering Management

Total Credits**24.0**

Facilities

Advanced Design and Manufacturing Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=6) This laboratory provides research opportunities in design methodology, computer-aided design, analysis and manufacturing, and materials processing and manufacturing. Facilities include various computers and software, I-DEAS, Pro/E, ANSYS, MasterCAM, Mechanical DeskTop, SurfCAM, Euclid, Strim, ABQUS, and more. The machines include two Sanders Model Maker rapid prototyping machines, a BridgePort CNC Machining Center, a BOY 220 injection molding machine, an Electra high-temperature furnace for metal sintering, infiltration, and other heat treatment.

Biofluid Mechanics Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=5)

The biofluid mechanics laboratory conducts computational and experimental research on the dynamics of flow in the cardiovascular and respiratory system, and the effects of flow on biological processes, particularly hemostasis and thrombosis. Lab resources include high-performance engineering workstations, commercial computational fluid dynamics (CFD) software, and basic experimental facilities including Laser Doppler Velocimetry (LDV), pressure and flow transducers, pumps, and microscopes.

Biomechanics Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=2)

Emphasis in this laboratory is placed on understanding the mechanical properties of human joints, characterization of the mechanical properties of biological materials, studies of human movements, and design and development of artificial limbs. Facilities include a 3-D kinematic measuring system, Instron testing machine, and microcomputers for data acquisition and processing. Additional biomechanical laboratory facilities are available at Moss Rehab.

Combustion and Fuels Chemistry Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=1)

Emphasis in this laboratory is placed on developing an understanding of both the chemical and physical factors that control and, hence, can be used to tailor combustion processes for engineering applications. Facilities include continuous spectroscopic reaction monitoring systems, static reactors, combustion bombs, flat flame burner systems, flow reactors, and complete analytical and monitoring instrumentation.

Combustion and Thermal-Science Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=9)

Research is conducted in the areas of (1) low temperature hydrocarbon oxidation, (2) cool flames, (3) auto-ignition, (4) flame instabilities, (5) flame structure, (6) flame ignition, and (7) flame extinction (quenching). New ways to improve fuel efficiency in practical combustors and recover waste energy in the transportation sector are also being explored.

Combustion Emissions/Engine Laboratory

In this laboratory the effects of engine operating variables, fuel type, ambient conditions, and control devices on engine performance and emissions are studied. The laboratory contains both diesel and spark ignition engines, as well as extensive engine and emissions monitoring instrumentation, including dynamometers and continuous gaseous

emission analyzers. The laboratory has a high-pressure flow reactor for detailed kinetic studies of hydrocarbon oxidation processes in engines.

Composite Mechanics Laboratory

Emphasis in this laboratory is placed on the characterization of performance of composite materials. Current interest includes damage mechanisms, failure processes, and time-dependent behavior in resin-, metal-, and ceramic-matrix composites. Major equipment includes servo-hydraulic and electromechanical Instron testing machines, strain/displacement monitoring systems, environmental chambers, microcomputers for data acquisition and processing, composites fabrication facility, interferometric displacement gauge, X-radiography, and acoustic emission systems.

Drexel Plasma Institute (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=11)

The Drexel Plasma Institute (DPI) was formed in 2002 to stimulate and coordinate research projects related to plasma and other modern high energy engineering techniques. Today the DPI is an active multidisciplinary organization involving 23 faculty members from 6 engineering departments working in close collaboration with School of Biomedical Engineering, College of Arts and Sciences and College of Nursing and Health Professions.

Heat Transfer Laboratory

The heat transfer laboratory is outfitted with an array of instrumentation and equipment for conducting single- and multiphase heat transfer experiments in controlled environments. Facilities include computer-controlled data acquisition (LabVIEW and MacAdios) systems, a Newport holographic interferometric system with associated lasers and optics, image enlargers, power amplifiers, precision voltmeters, slip-ring assemblies, and an IBM RISC/6000 workstation for large-scale computing and simulation. A draft-free room is available with independent temperature control for carrying out natural convection experiments. An experimental test-rig is available for studying heat transfer from rotating surfaces. A bubble column has been recently built to study multiphase flow and heat transfer problems. Facilities are also available for measuring thermal conductivities of thin films using a thermal comparator.

Industrial Robot Performance Laboratory

Emphasis in this laboratory is placed on determining the relationship between robot design parameters and performance criteria.

Microcomputer Controls Laboratory

This laboratory provides an environment conducive to appreciating aspects of systems and control through hands-on experiments. They range from data acquisition and processing to modeling of dynamical systems and implementing a variety of controllers to control systems, such as DC motors and the inverted pendulum. Active research is being conducted on control reconfiguration in the event of actuator failures in aircrafts.

Non-Newtonian Fluid and Heat Transfer Laboratory

Emphasis in this laboratory is placed on the study of hydrodynamic and thermal performance of various non-Newtonian viscoelastic fluids in complex flow geometries. Facilities and equipment include a 20-foot-long recirculating flow loop with a 500-gallon reservoir tank and a thermal conductivity measurement cell. A complete data acquisition system provides fully automated experimental operation and data reduction. State-of-the-art finite element codes provide three-dimensional flow and heat transfer simulations of flows in complex geometrics, with a complete post-processing graphic capability backed by template.

Polymer Processing Laboratory

This laboratory is devoted to understanding the basic controlling parameters in polymer processing and the procedures for communicating between the automated processing machine and the rest of the manufacturing facilities, such as the material handling system and the intelligent monitoring system. Facilities include a BOY 55-ton injection molding machine with necessary equipment for processing fiber-reinforced polymers, an IBM microcomputer for data acquisition and control, a Macintosh II microcomputer with software for mold design and process simulation, a Brookfield digital viscometer, and a Tinius Olsen tensile strength tester for material property evaluation.

Precision Instrumentation and Metrology Laboratory (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=7) This laboratory is focused on activities related to precision measurement, computer-aided inspection, and precision instrument design. Facilities include 3D Coordinate Measuring Machine (Brown & Sharpe) with Micro Measurement and Reverse engineering software, Surface Profilometer, and Laser Displacement Measuring System.

Program for Robotics, Intelligent Sensing, and Mechatronics (PRISM) Laboratory

The PRISM Laboratory is a state-of-the-art laboratory for pursuing research in the areas of medical robotics, haptic (sense of touch) and vision feedback through a user interface for augmenting a surgeon's capability in performing surgery, and visual servoing. The laboratory is equipped with a robotic arm, haptic interface devices, head-mounted display for immersion in the surgical environment, and dedicated hardware and software for the above research areas.

Rheology Laboratory

Emphasis in this laboratory is placed on developing tools for rheological property measurement of various non-Newtonian fluids, including friction-reducing viscoelastic fluids, molten polymers, coal-water slurries, ceramic slurries, and bonding cements for biomedical applications. A capillary tube viscometer, falling ball and needle viscometers, and Brookfield rotating viscometer are available. In particular, the capillary tube viscometer is designed to allow fully automated operation, thus avoiding time-consuming data collection procedures. A high-temperature and high-pressure capillary tube viscometer is under development, so that viscosities of advanced polymer materials can be measured at relatively high temperatures and shear rates.

Stress Wave and Ballistics Laboratory

Emphasis in this laboratory is placed on studying the effects of stress waves in structures. Equipment and facilities include a pendulum impact system, small air gun, high-air-pressure mass accelerator, drop impact system, exploding wire, explosion chamber, and instrumented Charpy impact system.

Rapid Product Development Center (http://www.mem.drexel.edu/current/labs/?m=research&a=lab_desc&labID=4)

This center provides fundamental research, educational instruction, and engineering services in product design and manufacturing, solid freeform fabrication, and computer-aided tissue engineering. The center is equipped with state-of-the-art CAD/CAE/CAM, medical imaging processing, and 3D reconstruction software, and a rapid prototyping system.

Mechanical Engineering and Mechanics Faculty

Jonathan Awerbuch, DSc (*Technion, Israel Institute of Technology*). Professor. Mechanics of composites; fracture and fatigue; impact and wave propagation; structural dynamics.

Philipp Boettcher, PhD (*California Institute of Technology*). Assistant Teaching Professor. Thermal and hot surface ignition of hydrocarbons; high speed flow diagnostics; absorption and emission spectroscopy.

Nicholas P. Cernansky, PhD (*University of California-Berkeley*) *Hess Chair Professor of Combustion*. Professor. Combustion chemistry and kinetics; combustion generated pollution; utilization of alternative and synthetic fuels.

Bor-Chin Chang, PhD (*Rice University*). Professor. Computer-aided design of multivariable control systems; robust and optimal control systems.

Young I. Cho, PhD (*University of Illinois-Chicago*). Professor. Heat transfer; fluid mechanics; non-Newtonian flows; biofluid mechanics; rheology.

Alisa Clyne, PhD (*Harvard-Massachusetts Institute of Technology*). Associate Professor. Cardiovascular biomechanics.

Bakhtier Farouk, PhD (*University of Delaware*) *Billings Professor of Mechanical Engineering*. Professor. Heat transfer; combustion; numerical methods; turbulence modeling; materials processing.

Alexander Fridman, DSc, PhD (*Moscow Institute of Physics and Technology*) *Mechanical Engineering and Mechanics, John A. Nyheim Endowed University Chair Professor, Director of the Drexel Plasma Institute*. Professor. Plasma science and technology; pollutant mitigation; super-adiabatic combustion; nanotechnology and manufacturing.

Ani Hsieh, PhD (*University of Pennsylvania*). Assistant Professor. Multi-robot systems, decentralized and distributed control, bio-inspired control, swarm robotics.

Andrei Jablokow, PhD (*University of Wisconsin; Madison*). Associate Teaching Professor. Computational kinematics; geometric modeling.

Suhada Jayasuriya, PhD (*Wayne State University*) *Department Head, Mechanical Engineering and Mechanics*. Distinguished Professor. Multi-agent systems; machine diagnostics in turbomachinery; human-machine interaction; structural health monitoring; alternative energy systems; gait studies in biomechanics.

Antonios Kontsos, PhD (*Rice University*). Assistant Professor. Applied mechanics; probabilistic engineering mechanics; modeling of smart multifunctional materials.

Emin Caglan Kumbur, PhD (*Pennsylvania State University*). Assistant Professor. Next generation energy technologies; fuel cell design and development.

Harry G. Kwatny, PhD (*University of Pennsylvania*) *S. Herbert Raynes Professor of Mechanical Engineering*. Professor. Dynamic systems analysis; stochastic optimal control; control of electric power plants and systems.

John Lacontora, PhD (*New Jersey Institute of Technology*). Associate Research Professor. Service engineering; industrial engineering.

Leslie Lamberson, PhD (*California Institute of Technology*). Assistant Professor. Dynamic behavior of materials, dynamic fracture, damage micromechanics, active materials.

Alan Lau, PhD (*Massachusetts Institute of Technology*) Associate Department Head for Graduate Affairs, Department of Mechanical Engineering and Mechanics. Professor. Deformation and fracture of nano-devices and macroscopic structures; damage-tolerant structures and microstructures.

Matthew McCarthy, PhD (*Columbia University*). Assistant Professor. Micro- and nanoscale thermofluidic systems, bio-inspired cooling, smart materials and structures for self-regulated two-phase cooling, novel architectures for integrated energy conversion and storage.

David L. Miller, PhD (*Louisiana State University*). Professor. Gas-phase reaction kinetics; thermodynamics; biofuels.

Alexander Moseson, PhD (*Drexel University*). Assistant Teaching Professor. Sustainability; engineering design; humanitarian (appropriate) technology; international development; service learning

Hongseok Noh, PhD (*Georgia Institute of Technology*). Associate Professor. MEMS; BioMEMS; lab-on-a-chip; microfabrication; microfluidics.

Paul Y. Oh, PhD (*Columbia University*) Associate Department Head for External Affairs, Department of Mechanical Engineering and Mechanics. Professor. Smart sensors servomechanisms; machine vision and embedded microcomputers for robotics and mechatronics.

Sorin Siegler, PhD (*Drexel University*). Professor. Orthopedic biomechanics; robotics; dynamics and control of human motion; applied mechanics.

Wei Sun, PhD (*Drexel University*) Albert Soffa Chair Professor of Mechanical Engineering. Professor. Computer-aided tissue engineering; solid freeform fabrication; CAD/CAM; design and modeling of nanodevices.

Ying Sun, PhD (*University of Iowa*). Associate Professor. Transport processes in multi-component systems with fluid flow; heat and mass transfer; phase change; pattern formation.

Tein-Min Tan, PhD (*Purdue University*) Associate Department Head for Undergraduate Affairs, Department of Mechanical Engineering and Mechanics. Associate Professor. Mechanics of composites; computational mechanics and finite-elements methods; structural dynamics.

James Tangorra, PhD (*Massachusetts Institute of Technology*) Associate Department Head for Finance and Administration, Department of Mechanical Engineering and Mechanics. Associate Professor. Analysis of human and (other) animal physiological systems; head-neck dynamics and control; balance, vision, and the vestibular system; animal swimming and flight; robotics; system identification; bio-inspired design.

Christopher Weinberger, PhD (*Stanford University*). Assistant Professor. Multiscale materials modeling of mechanical properties including DFT, atomistics, mesoscale and microscale FEM modeling.

Ajmal Yousuff, PhD (*Purdue University*). Associate Professor. Optimal control; flexible structures; model and control simplifications.

Jack G. Zhou, PhD (*New Jersey Institute of Technology*). Professor. CAD/CAM; computer integrated manufacturing systems; rapid prototyping; system dynamics and automatic control.

Interdepartmental Faculty

Richard Chiou, PhD (*Georgia Institute of Technology*). Associate Professor. Green manufacturing, mechatronics, Internet-based robotics and automation, and remote sensors and monitoring.

Michael Glaser, MFA (*Ohio State University*) Program Director for Product Design. Assistant Professor. Quantifying the designer's intuition; the interplay between digital and physical forms; human desire to shape our surroundings.

Yury Gogotsi, PhD (*Kiev Polytechnic Institute*) Director, A. J. Drexel Nanotechnology Institute. Distinguished University & Trustee Chair Professor. Nanomaterials; carbon nanotubes; nanodiamond; graphene; MXene; materials for energy storage, supercapacitors, and batteries.

Y. Grace Hsuan, PhD (*Imperial College*). Professor. Polymeric and cementitious materials; geosynthetic reliability and durability.

Michele Marcolongo, PhD, PE (*University of Pennsylvania*) Senior Associate Vice Provost for Translational Research. Professor. Orthopedic biomaterials; acellular regenerative medicine, biomimetic proteoglycans; hydrogels.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Mira S. Olson, PhD (*University of Virginia*). Associate Professor. Groundwater; environmental fluid mechanics; hydrology.

William C. Regli, PhD (*University of Maryland-College Park*). Professor. Artificial intelligence; computer graphics; engineering design and Internet computing.

Jonathan E. Spanier, PhD (*Columbia University*) Associate Dean, Strategic Planning, College of Engineering. Professor. Electronic, ferroic and plasmonic nanostructures and thin-film materials and interfaces; scanning probe microscopy; laser spectroscopy, including Raman scattering.

Emeritus Faculty

Leon Y. Bahar, PhD (*Lehigh University*). Professor Emeritus. Analytical methods in engineering, coupled thermoelasticity, interaction between analytical dynamics and control systems.

Pei C. Chou, ScD (*Aeronautical Engineering from New York University*) Billings Professor Emeritus of Mechanical Engineering. Professor Emeritus. Material response due to impulsive loading, wave propagation in isotropic and composite materials, manufacturing technology.

Gordon D. Moskowitz, PhD (*Princeton University*). Professor Emeritus. Biomechanics, dynamics, design, applied mathematics.

Donald H. Thomas, PhD (*Case Institute of Technology*). Professor Emeritus. Biocontrol theory, biomechanics, fluidics and fluid control, vehicle dynamics, engineering design.

Albert S. Wang, PhD (*University of Delaware*) Albert and Harriet Soffa Professor. Professor Emeritus. Treatment of damage evolution processes

in multi-phased high-temperature materials, including ceramics and ceramic-matrix composites.

Minor in Nuclear Engineering

The minor assumes that students will have a background in mathematics and physics equivalent to that covered in the first two years of the engineering curriculum. Specifically, students are required to complete the following pre-requisites: PHYS 101 Fundamentals of Physics I ; PHYS 102 Fundamentals of Physics II; PHYS 201 Fundamentals of Physics III; ENGR 210 Introduction to Thermodynamics and ENGR 220 Fundamentals of Materials. Courses taken to meet these prerequisite requirements will not count toward the minor.

Required Courses

ECEP 402	Theory of Nuclear Reactors	4.0
ECEP 372	Radiation Detection and Measurement	3.0
ECEP 404/MEM 371	Introduction to Nuclear Engineering	2.0
ECEP 406	Introduction to Radiation Health Principles	3.0
MATE 450	The Nuclear Fuel Cycle & Materials	3.0
PHYS 330	Introduction to Nuclear Physics	2.0
Select 9.0 credits from at least two of the following principal areas		9.0

Industrial Applications Electives

ECEP 403	Nuclear Power Plant Design & Operation	
MEM 402	Power Plant Design	
MEM 448	Applications of Thermal Plasmas	
MEM 449	Applications of Non-Thermal Plasmas	

Power Engineering Electives

ECEP 352	Electric Motor Control Principles	
ECEP 354	Energy Management Principles	
ECEP 411	Power Systems I	
ECEP 412	Power Systems II	

Nuclear & Thermal Engineering & Science Electives

MEM 446	Fundamentals of Plasmas I	
MEM 447	Fundamentals of Plasmas II	

Materials Electives

MATE 221	Introduction to Mechanical Behavior of Materials	
MATE 341	Defects in Solids	
MATE 355	Structure and Characterization of Crystalline Materials	
MATE 370	Mechanical Behavior of Solids	

Transport Phenomena Electives

CHE 302	Process Fluid Mechanics	
CHE 303	Process Heat Transfer	
CHE 310	Transport Phenomena	
CHE 311	Fluid Flow and Transport	
CIVE 320	Introduction to Fluid Flow	
MEM 220	Basic Fluid Mechanics	
MEM 345	Heat Transfer	

Simulation Electives

PHYS 105	Computational Physics I	
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PHYS 305	Computational Physics II	
PHYS 405	Advanced Computational Physics	
Total Credits		26.0

The Nuclear Engineering minor is open to all engineering majors. The minor consists of a minimum of six required courses for 17.0 credits and an additional 9.0 credits of elective courses.

Additional Information

Additional information about the minor is available on the ECE Department website (http://www.ece.drexel.edu/Undergraduate_Programs2.html).

For advising questions, please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu).

To make an appointment, please call 215.895.2241
Drop-in hours: Please e-mail advising@ece.drexel.edu (%20advising@ece.drexel.edu) for up-to-date drop-in availability.

Minor in Project Management

Project management focuses on the management of teams of people and other resources in the planning, design, execution, and implementation of various aspects of projects in practically every industry. The minor in Project Management provides students with the skills necessary to perform successfully as members of project management teams.

The minor in Project Management will provide a foundation for graduate education in project management and prepare interested students to pursue the Certified Associate in Project Management (CAPM)[®] or Project Management Professional (PMP)[®] credentials from the Project Management Institute (PMI)[®].

Requirements

- Open to Drexel undergraduate students in any discipline.
- Must have sophomore, pre-junior, junior, or senior standing.
- Must have a cumulative GPA of at least 3.0.
- A minimum grade of "C" (2.0) must be earned in each course in this minor for the course to be counted.

Required Courses

PROJ 401	Introduction to Project Management	3.0
PROJ 402	Essentials of Project Planning & Scheduling	3.0
PROJ 403	Essentials of Project Leadership and Teamwork	3.0
PROJ 415	Essentials of Project Estimation & Cost Management	3.0
PROJ 430	Essentials of Managing Multiple Projects	3.0

Select 3 additional courses: 9.0

PROJ 410	Essentials of Project Quality Management	
PROJ 420	Essentials of Project Risk Assessment & Management	
PROJ 435	Essentials of International Project Management	
Project Management Elective (4XX or higher)		

Other courses, with prior written approval of student's Academic Advisor and the Project Management program (must be 4XX or higher and be relevant to Project Management)

Total Credits **24.0**

Property Management

Major: Property Management

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.1501

Standard Occupational Classification (SOC) code: 11-9141

About the Program

Drexel's Bachelor of Science in Property Management provides an interdisciplinary education necessary for success in the ever-expanding and complex field of real estate management. This **full-time, face-to-face** bachelor's degree program incorporates Philadelphia's amazing real estate market as its outdoor classroom. The curriculum consists of courses that will equip students with a foundation in real estate operations and management, along with specialized courses in asset management, sustainability, urban economics, business law, accounting, finance, and construction management. In addition, students complete courses that will lead to a minor in Business Administration. The curriculum also includes a six-month co-op experience that partners classroom knowledge with experiential learning to further develop the requisite skills students need to succeed as professionals.

For additional information, visit the Property Management site.

Degree Requirements

General Education Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 111	Principles of Communication	3.0
COM 230	Techniques of Speaking	3.0
COM 280	Public Relations Principles and Theory	3.0
or COM 345	Intercultural Communication	
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Select one of the following sequences:		8.0-9.0
MATH 101 & MATH 102	Introduction to Analysis I and Introduction to Analysis II	
MATH 181 & MATH 182 & MATH 183	Mathematical Analysis I and Mathematical Analysis II and Mathematical Analysis III	
PHYS 182	Applied Physics I	3.0
Natural Science Electives *		6.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
UNIV G101	The Drexel Experience	2.0
Humanities and Social Science Electives **		9.0

Minor in Business Administration ***

ACCT 115	Financial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 284)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0

Property Management Core

CAT 302	Customer Service Theory and Practice	3.0
CMGT 262	Building Codes	3.0
CRTV 301	Foundations in Creativity	3.0
REAL 310	Introduction to Real Estate	3.0
PROJ 301	Introduction to Project Management	3.0
PRST 211	Computer Applications for Professionals	3.0
PRMT 110	Introduction to Property Management	3.0
PRMT 210	Rental Property & Fair Housing Law	3.0
PRMT 215	Building Systems for PRMT I	3.0
PRMT 216	Building Systems for PRMT II	3.0
PRMT 225	Technical Drawings for Property Managers	3.0
PRMT 310	Property Financing & Valuation	3.0
PRMT 315	Property Risk Management	3.0
PRMT 320	Sustainable Property Management	3.0
PRMT 325	Human Resource Strategies - Property Management	3.0
PRMT 330	Property Management Technology	3.0
PRMT 333	Social Responsibility and Ethics in Real Estate Management	3.0
PRMT 491	Senior Project in Property Management	3.0

Free Electives 32.0

Suggested Electives

BACS 200	Foundation of Behavioral Health Care
CAT 201 [WI (p. 284)]	Interpersonal Communication
CAT 360	Applied Organizational Research
CMGT 263	Understanding Construction Drawings
CRTV 302	Tools and Techniques in Creativity
CRTV 303	Creativity in the Workplace
DSMR 231	Retail Principles
HSAD 316	Health Care across Cultures
HSAD 323	Health Services and the Elderly
PHIL 323	Organizational Ethics
PRMT 340	Managing and Marketing for Retail Properties
PRMT 345	Managing & Marketing Housing for an Aging Population
PRMT 350	Affordable Housing Management
PRMT 356	Military Housing Management
PRMT 360	Marketing and Operations: Commercial Properties
PRMT 365	Commercial Property Appraisal
PRST 450	Creative Leadership for Professionals
SOC 120	Sociology of the Family
SOC 210	Race, Ethnicity and Social Inequality
SOC 240	Urban Sociology

Concentration Requirement

15.0-16.0 interdisciplinary curriculum will be able to approach management of the built environment with a holistic view of the multifaceted real estate industry.

Total Credits

180.0-182.0

* Students select 6.0 credits from the following: ANAT, BIO, CHEM, ENVR, FDSC, NFS, PHEV, PHYS. Courses from other departments may be considered with advisor approval.

** Anthropology, African-American studies, fine arts (history of architecture, art, film, music, theatre) foreign language, history, linguistics, literature, philosophy, political science, psychology, sociology, women's studies, writing, etc.

*** No more than 2 transferred courses may be used to complete the Minor in Business. A grade of C (2.0) or better must be earned in each course in the Minor in Business.

Concentrations**Residential Property Management Concentration**

PRMT 335	Marketing and Operations: Multifamily Properties	3.0
Select four of the following:		12.0
PRMT 340	Managing and Marketing for Retail Properties	
PRMT 345	Managing & Marketing Housing for an Aging Population	
PRMT 350	Affordable Housing Management	
PRMT 355	Student Housing Management	
PRMT 356	Military Housing Management	
Total Credits		15.0

Housing for an Aging Population Concentration

HSAD 323	Health Services and the Elderly	3.0
NURS 370	Issues in Aging and Longevity	4.0
PRMT 335	Marketing and Operations: Multifamily Properties	3.0
PRMT 345	Managing & Marketing Housing for an Aging Population	3.0
SOC 125	Sociology of Aging	3.0
Total Credits		16.0

Affordable Housing Administration Concentration

HSAD 323	Health Services and the Elderly	3.0
PRMT 335	Marketing and Operations: Multifamily Properties	3.0
PRMT 350	Affordable Housing Management	3.0
SOC 210	Race, Ethnicity and Social Inequality	3.0
SOC 240	Urban Sociology	3.0
Total Credits		15.0

Commercial Property Management Concentration

PRMT 340	Managing and Marketing for Retail Properties	3.0
PRMT 341	Managing and Marketing Office Buildings	3.0
PRMT 342	Managing and Marketing Industrial Properties	3.0
PRMT 363	Commercial Property Financial Reports	3.0
PRMT 365	Commercial Property Appraisal	3.0
Total Credits		15.0

Minor in Property Management

A minor in property management is designed to prepare students to engage, analyze, and synthesize investment real estate portfolios from a comprehensive operational perspective. Students completing the

The property management minor is open to all undergraduate students across the University.

Program Requirements

- Completion of a minimum of 24 credits.
- A grade of "C" (2.0) or better must be earned for every courses in the curriculum or the minor will not be conferred.
- Students should verify prerequisites when selecting courses. It is the student's responsibility to ensure all course prerequisites are completely timely and satisfactorily.
- An academic major and minor within the same curriculum cannot be completed.

Required Courses

PRMT 110	Introduction to Property Management	3.0
PRMT 320	Sustainable Property Management	3.0
PRMT 330	Property Management Technology	3.0
PRMT 333	Social Responsibility and Ethics in Real Estate Management	3.0
ARCH 432	The Development Process	3.0
REAL 320	Real Estate Law - Principle & Practice	3.0
REAL 474	Real Estate Economics in Urban Markets	3.0
Select one of the following:		3.0
PRMT 335	Marketing and Operations: Multifamily Properties	
PRMT 360	Marketing and Operations: Commercial Properties	

Total Credits 24.0

Politics Faculty

Phillip Ayoub, PhD (*Cornell University*). Assistant Professor. International relations, comparative politics, transnational social movements, marginalized groups

Scott Barclay, PhD (*Northwestern University*) *Department Head, Politics*. Professor. Judicial systems, civil rights, public policy and administration.

Zoltan Buzas, PhD (*Ohio State University*). Post-Doctoral Fellow. International relations theory, international security, race and politics, diplomatic history.

George Ciccariello-Maher, PhD (*University of California, Berkeley*). Assistant Professor. Colonialism, social movements, political theory.

Audrey Comstock, PhD (expected 2015) (*Cornell University*). Post-Doctoral Fellow. International law, international LGBT politics, foreign aid, African politics

Rose Corrigan, PhD (*Rutgers University*). Associate Professor. Women, public law, American politics and policy.

Richardson Dilworth, PhD (*Johns Hopkins University*) *Director, Center for Public Policy*. Associate Professor. American political development, urban politics, public policy.

Erin R. Graham, PhD (*Ohio State University*). Assistant Professor. International institutions, international relations theory, global environmental politics.

Amelia Hoover Green, PhD (*Yale University*). Assistant Professor. Dynamics of conflict-related violence; intra-armed group politics and socialization; statistics in human rights.

Christian Hunold, PhD (*University of Pittsburgh*). Associate Professor. Environmental policy; comparative politics; political theory.

Alison Kenner, PhD (*Rensselaer Polytechnic Institute*). Assistant Professor. Science, technology, and health; environmental health problems; cities and place; feminist theory; medical anthropology; digital humanities

Julie Mostov, PhD (*New York University*) *Vice Provost for Global Initiatives*. Professor. Modern political thought, democratic theory, nationalism, gender studies, South Eastern Europe and the Balkans.

Elva Orozco-Mendoza, PhD (*University of Massachusetts*). Assistant Teaching Professor. Political freedom and action in the thought of Hanna Arendt; Feminist theory and feminist methodology; Protest politics; Theories of Violence; Identity politics, race, and gender in Latin American politics

Gwen Ottinger, PhD (*University of California, Berkeley*). Assistant Professor. Social studies of science and technology, environmental justice, science and engineering ethics, environmental ethics.

William L. Rosenberg, PhD (*Temple University*). Professor. Behavioral politics, public opinion, and political communication.

Chloe Silverman, PhD (*University of Pennsylvania*). Associate Professor. Parent advocacy for autism and pollinator health research.

Jose Tapia, PhD (*New School for Social Research*). Associate Professor. The crises and fluctuations of the economy and the relation between these fluctuations and health conditions; quantitative aspects of social science.

Interdepartmental Faculty

Joel E. Oestreich, PhD (*Brown University*) *Director of International Area Studies*. Associate Professor. International organizations, international finance, development, and human rights.

Emeritus Faculty

Richard L. Rosen, PhD (*Case Western Reserve University*). Associate Professor Emeritus. History of science, appropriate technology, and world history.

Michael J. Sullivan, PhD (*University of Virginia*). Professor Emeritus. Comparative politics and developing nations.

Minor in Real Estate

Designed for students in various disciplines (such as architecture, business, civil engineering, architectural engineering, fashion merchandising and interior design) the minor in real estate provides the necessary knowledge, skills, and perspective to be successful in the real estate development process. Students will explore the knowledge and skill sets required to create and maintain built environments for living, working and entertainment purposes.

Required Courses

ARCH 432	The Development Process	3.0
CMGT 468	Real Estate	3.0

REAL 310	Introduction to Real Estate	3.0
REAL 320	Real Estate Law - Principle & Practice	3.0
REAL 330	Facilities & Property Management	3.0
REAL 470	Real Estate Investments - Market & Feasibility Analysis	3.0
Select two of the following:		6.0
REAL 471	Advanced Real Estate in Investment & Analysis	
REAL 472	Advanced Market Research & Analysis	
REAL 473	Sales & Marketing of Real Estate	
REAL 474	Real Estate Economics in Urban Markets	
REAL 475	Real Estate Finance	
REAL 476	Real Estate Valuation & Analysis	

Total Credits **24.0**

Minor in Systems Engineering

About the Program

Systems engineering is a set of processes and tools used to guide the engineering of large scale systems. Unlike traditional engineering which may focus on very specific technical components, systems engineers focus on the entirety of a system to ensure it is run efficiently and effectively. The Minor will prepare undergraduate students for the current demands of industry and provide them with the opportunity to achieve a formal education in systems engineering.

The Minor in Systems Engineering is designed for students in the College of Engineering and School of Biomedical Engineering who are interested in the management of large, complex systems. It leads to careers in a wide range of industries, such as aerospace, communications, healthcare, manufacturing, and transportation.

The opportunity to pursue a minor in systems engineering will be offered to students who meet the following conditions:

- Minimum 3.0 Cumulative GPA
- Upper Class students (sophomores, juniors, pre-juniors and seniors)
- Student in the College of Engineering or the School of Biomedical Engineering

Core Requirements

CIVE 240 [WI (p. 286)]	Engineering Economic Analysis	3.0
PROJ 301	Introduction to Project Management	3.0
EGMT 462 or MEM 462	Introduction to Engineering Management	3.0
EGMT 465	Introduction to Systems Engineering	3.0
SYSE 488	Systems Engineering Analysis	3.0

Complete 3 courses in one track **9.0**

Systems Analysis and Modeling Track

INDE 350	Industrial Engineering Simulation	
INDE 365	Systems Analysis Methods I	
INDE 366	Systems Analysis Methods II	

Decision Analysis Track

INDE 362	Operations Research for Engineering I	
INDE 363	Operations Research for Engineering II	
INDE 467	Decision Processes	

Industrial Engineering Track

INDE 400	Designs of Program Evaluation Systems
INDE 462	Industrial Plant Design
INDE 364	Special Topics in Industrial Engineering

Logistics Systems Engineering Track

MEM 361	Engineering Reliability
OPM 341	Supply Chain Management
SYSE 520	Sustainment and Integrated Logistics

Total Credits **24.0**

Certificate in Construction Management

Certificate Level: Undergraduate

Admission Requirements: High school diploma or GED

Certificate Type: Certificate

Number of Credits to Completion: 18.0 - 19.0

Instructional Delivery: Campus, Online

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 52.2001

Standard Occupational Classification (SOC) Code: 11-9021

Construction Management I - Fundamentals

18.0 quarter credits

The Construction Management I - Fundamentals Certificate introduces students to the basic concepts of the construction industry.

Students interested in continuing their education after certification are able to apply their coursework and credits directly to the Bachelor of Science in Construction Management (<http://www.drexel.edu/catalog/ug/goodwin/cmgt->).

Requirements

CMGT 101	Introduction to Construction Management	3.0
CMGT 161	Building Materials and Construction Methods I	3.0
CMGT 162	Building Materials and Construction Methods II	3.0
CMGT 163	Building Materials and Construction Methods III	3.0
CMGT 261	Construction Safety	3.0
CMGT 263	Understanding Construction Drawings	3.0

Total Credits **18.0**

Construction Management II - Construction Science

18.0 quarter credits

The Construction Management II - Construction Science Certificate focuses on introducing students to design concepts relating to heating, ventilation, and air conditioning systems and the integration of these systems into the construction process. In addition, the certificate also covers the process of estimating as well as building codes involved in construction projects.

Students interested in continuing their education after certification are able to apply their coursework and credits directly to the Bachelor of Science

in Construction Management (<http://www.drexel.edu/catalog/ug/goodwin/cmgt->).

Requirements

CMGT 266	Building Systems I	3.0
CMGT 267	Building Systems II	3.0
CMGT 363	Estimating I	3.0
CMGT 364	Estimating II	3.0
Select two of the following:		6.0
CMGT 262	Building Codes	
CMGT 264	Construction Management of Field Operations	
CMGT 265	Information Technologies in Construction	

Total Credits **18.0**

Construction Management III - Management Concepts

19.0 quarter credits

The Construction Management III - Management Concepts Certificate focuses on construction contracts, specifications, and practices with regard to business law and liability. The certificate also covers value engineering and construction planning, scheduling, network systems, as well as the communications required for project control and claims prevention.

Students interested in continuing their education after certification are able to apply their coursework and credits directly to the Bachelor of Science in Construction Management (<http://www.drexel.edu/catalog/ug/goodwin/cmgt->).

Requirements

CMGT 361	Contracts And Specifications I	3.0
CMGT 362	Contracts and Specifications II	3.0
CMGT 461	Construction Project & Company Management	3.0
CMGT 463	Value Engineering	3.0
CMGT 465	Marketing Construction Services	3.0
CMGT 467	Techniques of Project Control	4.0

Total Credits **19.0**

Construction Management IV - Customized Independent

18.0 quarter credits

The Construction Management IV - Customized Independent Certificate is designed to allow students to choose the higher-level courses that best suit their special needs and interests. Students must select all six of their courses at the start of the Certificate program.

Students interested in continuing their education after certification are able to apply their coursework and credits directly to the Bachelor of Science in Construction Management (<http://www.drexel.edu/catalog/ug/goodwin/cmgt->).

Requirements

A minimum of six (6) 300-level or higher approved CMGT courses * 18.0

* CIVE and CAEE majors may not include CMGT 371 or CMGT 372.

Construction Management Faculty

Charles Cook, PhD (*New York University*). Assistant Clinical Professor. Construction management; project management; leadership and teambuilding; oral and written communication.

Robert Muir Jr., PhD (*Drexel University*). Assistant Clinical Professor. Construction management; value engineering; management of field operations; planning and scheduling; project management; heavy and industrial construction.

Richard Sievert, PhD (*Northwestern University*). Associate Clinical Professor. Project management and construction management; value engineering; cost reduction and waste minimization; facilities planning and management; marketing and selling professional services; quality management, engineering and construction business administration.

Certificate in the Fundamentals of Property Management

Certificate Level: Undergraduate

Admission Requirements: One year of college and two years of work experience

Certificate Type: Certificate

Number of Credits to Completion: 18.0

Instructional Delivery: Online

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Aid eligible

Classification of Instructional Program (CIP) Code: 52.1501

Standard Occupational Classification (SOC) Code: 11-9141

Note: Effective Fall 2014, students are no longer being accepted into this certificate program.

The fundamentals of property management certificate is designed to provide students with the basic competencies required for the management of residential and commercial real estate. This certificate presents a comprehensive overview of the multidisciplinary responsibilities of the professional property manager, from leasing a rental unit to maintaining the physical plant.

Requirements

PRMT 110	Introduction to Property Management	3.0
PRMT 210	Rental Property & Fair Housing Law	3.0
PRMT 215	Building Systems for PRMT I	3.0
PRMT 225	Technical Drawings for Property Managers	3.0
PRMT 330	Property Management Technology	3.0
Select one of the following:		3.0
PRMT 216	Building Systems for PRMT II	
PRMT 335	Marketing and Operations: Multifamily Properties	

Total Credits **18.0**

Certificate in Residential Property Management

Certificate Level: Undergraduate

Admission Requirements: One year of college and two years of work experience

Certificate Type: Certificate

Number of Credits to Completion: 18.0

Instructional Delivery: Online

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 52.1501

Standard Occupational Classification (SOC) Code: 11-9141

Note: Effective Fall 2014, students are no longer being accepted into this certificate program.

Drexel University offers several different certificate programs in property management. These certificates are designed to provide a professional background in a specified area of property management, and to assist in career goals or prompt additional study in the field.

Requirements

PRMT 110	Introduction to Property Management	3.0
PRMT 335	Marketing and Operations: Multifamily Properties	3.0
Select four of the following:		12.0
PRMT 340	Managing and Marketing for Retail Properties	
PRMT 345	Managing & Marketing Housing for an Aging Population	
PRMT 350	Affordable Housing Management	
PRMT 355	Student Housing Management	
PRMT 356	Military Housing Management	

Total Credits **18.0**

College of Nursing and Health Professions

By anticipating and meeting the challenges presented by the nation's health care system, Drexel's College of Nursing and Health Professions is doing its part to guarantee a lasting legacy for current and future health professionals.

The College of Nursing and Health Professions offers a wide range of undergraduate programs. Many offer flexible scheduling, making it possible for students to continue their education through part-time, online, night, or weekend study.

Majors

- Behavioral Health Counseling (p. 290)
- Health Sciences (p. 294)
 - Accelerated 3+3 BS/DPT (p. 297)
 - Accelerated 4+1 BS/MHS (p. 298)
- Health Services Administration (p. 299)
- Invasive Cardiovascular Technology (p. 304)
- Nursing (BSN) (p. 306)
 - Accelerated Career Entry (ACE) (p. 309)
 - RN/BSN Completion Program (p. 310)
 - Dual/Accelerated Degree (p. 311)
- Nutrition and Foods (p. 315)
- Radiologic Technology (AS) (p. 319)

Minors

- Addictions Counseling (p. 322)
- Health Services Administration (p. 303)
- Nutrition and Foods (p. 318)
- Psychiatric Rehabilitation (p. 322)

Certificates

- Medical Billing and Coding (p. 322)

About the College

As the practice of medicine has become more complex with the advent of technology and new drug therapies, so has the provision of health services. An increasingly diverse, aging US population experiencing higher rates of chronic illness is demanding more service and culturally competent care. While technology improvements help provide the means to deliver safer, high-quality care, our society is facing shortages in health professionals such as nurses, mental health workers, nurse anesthetists, physician assistants, and rehabilitation science professionals. The demand for these and other skilled professionals continues to increase and is expected to remain steady well into the 21st century. There is no more vibrant a place to prepare for these kinds of meaningful, rewarding careers than at Drexel University's College of Nursing and Health Professions (<http://www.drexel.edu/cnhp>). The College offers associate's, bachelor's, master's, and doctoral degrees in more than a dozen health care fields.

Just as the health profession disciplines have come of age, so has the College of Nursing and Health Professions. Founded in 1969 as the

College of Allied Health Professions with just three degree programs and a faculty of five, the college has undergone a remarkable evolution. Today it serves over 3,000 students, with a broad array of contemporary program offerings. Along the way, it has earned widespread recognition and accreditation for the education of health professionals.

Mission and Approach

The College believes that the health care needs of today and tomorrow can best be met by professionals who have expertise in their own fields and a concurrent understanding of other health disciplines. In addition to providing a broad-based education that balances academic learning with clinical training, the University promotes collaboration among students in our College of Nursing and Health Professions, our School of Public Health, and the College of Medicine, which draws from the rich traditions of predecessors Hahnemann University and the Medical College of Pennsylvania.

Teamwork is as important in academics as it is in health care. The College of Nursing and Health Professions' dedicated and knowledgeable faculty members work closely with students, providing a supportive and creative learning environment. Graduates from the College possess a wide range of experiences and the knowledge, compassion, and lifelong learning skills needed to become accomplished health care professionals.

The student body, which is diverse in age and culture, reflects Drexel University's commitment to provide qualified students with an opportunity for advanced education. Drexel welcomes nontraditional applicants and especially encourages applications from underrepresented minorities and those interested in practicing in underserved areas.

Many of Drexel's College of Nursing and Health Professions programs offer flexible scheduling, making it possible for students to continue their education through part-time, online, night, or weekend study.

Accreditation

Nursing programs are accredited by the CCNE (Commission on Collegiate Nursing Education), and the PA State Board of Nursing.

The Couple and Family Therapy MFT degree and Post-Master's Certificates are accredited by COAMFTE (Commission on Accreditation of Marriage and Family Therapy Education).

The Creative Arts in Therapy MA degrees in Dance/Movement Therapy, Music Therapy, and Art Therapy are approved by the ADTA (American Dance Therapy Association), the AMTA (American Music Therapy Association), and the AATA (American Art Therapy Association), respectively.

The Didactic Program in Nutrition is accredited by ACEND (Accreditation Council for Education in Nutrition and Dietetics).

The Health Services Administration program is certified by AUPHA (Association of University Programs in Health Administration).

The Nurse Anesthesia program is accredited by the Council on Accreditation of Nurse Anesthesia Educational Programs.

The Professional Physical Therapy (DPT) program is accredited by CAPTE (Commission on Accreditation in Physical Therapy Education).

The Physician Assistant program is accredited by ARC-PA (Accreditation Review Commission on Education for the Physician Assistant).

Behavioral Health Counseling

Major: Behavioral Health Counseling

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 51.1501; 51.1508

Standard Occupational Classification (SOC) code: 21-1011

About the Program

The Behavioral Health Counseling program focuses on developing clinical competencies needed to counsel and support people experiencing mental illnesses and substance use disorders. Our students go on to graduate school or directly to work in areas such as psychiatric rehabilitation, prevention and treatment of substance use disorders, child and adolescent services, and forensic behavioral health. Students create a plan of study and select courses based on their career interests.

During the freshman and sophomore years, students develop a foundation for clinical practice by studying humanities, social sciences, writing, biological sciences, math, and research methods. Behavioral Health Counseling (BHC) courses build on this foundation by demonstrating that biological, psychological, and social perspectives are needed to deliver today's evidence-based practices and develop tomorrow's innovative interventions. BHC courses offer a comprehensive selection of topics that focus on aspects of therapeutic rapport building, assessment, planning, and intervening with people from diverse backgrounds and needs.

The major also offers a co-op experience in a clinical setting that greatly enhances the student's preparation for employment after graduation and for graduate study in professional counseling, social work, or psychology. For students interested in certification as addictions counselors, all program courses are accredited by the Pennsylvania Certification Board. Students may also pursue certification in psychiatric rehabilitation.

For additional information about this major, visit the Behavioral Health Counseling (<https://www.drexel.edu/cnhp/academics/departments/Behavioral-Health>) Department on the College of Nursing and Health Profession's site.

Degree Requirements

General Education Requirements

UNIV NH101	The Drexel Experience	2.0
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Computing Requirement

CS 161	Introduction to Computing	3.0
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English Sequence

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
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ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
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ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
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Life Science

BIO 100 or BIO 107	Applied Cells, Genetics & Physiology Cells, Genetics & Physiology	3.0
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Mathematics Sequence

MATH 107	Probability and Statistics for Liberal Arts	3.0
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Humanities and Social Sciences Electives *		39.0
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Free Electives		51.0
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Required Behavioral Health Counseling Courses

BACS 100	Life Span Human Development	3.0
BACS 200	Foundation of Behavioral Health Care	3.0
BACS 220	Counseling Theory and Practice	3.0
BACS 230	Genetics and Mental Health	3.0
BACS 232	Ethics and Professional Responsibility	3.0
BACS 234	Introduction to Addictive Disorders	3.0
BACS 236	Psychiatric Rehabilitation Principles and Practices	3.0
BACS 255	Multicultural Counseling	3.0
BACS 301	Group Counseling I	3.0
BACS 304	Cognitive and Behavioral Counseling I	3.0
BACS 310	Recovery and Relapse Prevention	3.0
BACS 312	Case Management Methods	3.0
BACS 320	Crisis and Brief Intervention	3.0
BACS 325	Psychopharmacology for Counselors	3.0
BACS 401	Assessment and Treatment Planning	3.0
BACS 405	Family-Focused Interventions	3.0
BACS 490	Senior Research Project	3.0
BACS 499	Readings in Behavioral Health	1.0

Advanced Program Electives

Select from the following: **		18.0
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BACS 250	Behavioral Health Informatics	
BACS 350	Child Psychopathology	
BACS 360	Preventing Substance Abuse	
BACS 367	Advanced Counseling Intervention	
BACS 368	Addictions Counseling with Special Populations	
BACS 370	Problem Gambling Interventions	
BACS 404	Cognitive and Behavioral Counseling II	
BACS 410	Child and Adolescent Support	
BACS 411	Forensic Behavior Health Service	
BACS 412	Group Counseling II	
BACS 414	Co-Occurring Disorders	
BACS 420	Psychiatric Rehabilitation Competencies	

Total Credits		180.0
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* Students enrolled in the Saturday Scholars program have slightly different general elective requirements. Saturday Scholar students must have 33.0 credits of Social Science and Humanities electives (11-13 courses) and 39.0 credits of free electives (12-18 courses). Often these courses are transfer credits. Saturday Scholars do not take UNIV 101. The Saturday Scholars curriculum still requires 180.0 credits to graduate. See the plan of study for more details.

** Students select a minimum of 18.0 credits, and up to 33.0 credits of advanced program electives (as needed).

Sample Plans of Study

BS Behavioral Health Counseling: 4-Year Co-op Option

(View below for a sample plan for the 4-Year Non-Co-op Option, and for sample plans for both the Saturday Scholars - Fall and Winter Cohort Options.)

Term 1		Credits	Free elective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0		
MATH 107	Probability and Statistics for Liberal Arts	3.0		
UNIV NH101	The Drexel Experience	1.0		
	Three (3) Humanities/Social Science electives	9.0		
	Term Credits	16.0	Term Credits	15.0
Term 2			Term 9	
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	BACS 310	Recovery and Relapse Prevention 3.0
UNIV NH101	The Drexel Experience	1.0	BACS Advanced Program elective	3.0
	Two (2) Humanities/Social Science electives	6.0	Humanities/Social Science elective	3.0
	Free electives	6.0	Free electives	6.0
	Term Credits	16.0	Term Credits	15.0
Term 3			Term 10	
BACS 200	Foundation of Behavioral Health Care	3.0	BACS 320	Crisis and Brief Intervention 3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	BACS Advanced Program elective	3.0
	Two (2) Humanities/Social Science electives	6.0	Free electives	9.0
	Free elective	3.0	Term Credits	15.0
	Term Credits	15.0	Term 11	
Term 4			BACS 405	Family-Focused Interventions 3.0
BACS 100	Life Span Human Development	3.0	BACS 490	Senior Research Project 3.0
BACS 220	Counseling Theory and Practice	3.0	BACS Advanced Program elective	3.0
BACS 236	Psychiatric Rehabilitation Principles and Practices	3.0	Free electives	6.0
BIO 100 or 107	Applied Cells, Genetics Physiology or Cells, Genetics Physiology	3.0	Term Credits	15.0
	Humanities/Social Science elective	3.0	Term 12	
	Term Credits	15.0	BACS 312	Case Management Methods 3.0
Term 5			BACS 401	Assessment and Treatment Planning 3.0
BACS 230	Genetics and Mental Health	3.0	BACS 499	Readings in Behavioral Health 1.0
BACS 232	Ethics and Professional Responsibility	3.0	BACS Advanced Program electives	6.0
CS 161	Introduction to Computing	3.0	Term Credits	13.0
	Humanities/Social Science elective	3.0	Total Credit: 180.0	
	Free elective	3.0	BS Behavioral Health Counseling: 4-Year Non-Co-op Option	
	Term Credits	15.0	Term 1	Credits
Term 6			ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research 3.0
BACS 234	Introduction to Addictive Disorders	3.0	UNIV NH101	The Drexel Experience 1.0
BACS 255	Multicultural Counseling	3.0	MATH 107	Probability and Statistics for Liberal Arts 3.0
BACS 325	Psychopharmacology for Counselors	3.0		Three (3) Humanities/Social Science electives 9.0
	Humanities/Social Science elective	3.0	Term Credits	16.0
	Free elective	3.0	Term 2	
	Term Credits	15.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0
Term 7			UNIV NH101	The Drexel Experience 1.0
	Humanities/Social Science elective	3.0		Two (2) Humanities/Social Science electives 6.0
	Free electives	12.0		Free electives 6.0
	Term Credits	15.0	Term Credits	16.0
Term 8			Term 3	
BACS 301	Group Counseling I	3.0	BACS 200	Foundation of Behavioral Health Care 3.0
BACS 304	Cognitive and Behavioral Counseling I	3.0	ENGL 103	Composition and Rhetoric III: Themes and Genres 3.0
BACS Advanced Program elective		3.0		Two (2) Humanities/Social Science electives 6.0
	Humanities/Social Science elective	3.0		Free elective 3.0
	Term Credits	15.0	Term Credits	15.0
Term 9			Term 4	
BACS 310	Recovery and Relapse Prevention	3.0	BACS 100	Life Span Human Development 3.0
BACS Advanced Program elective		3.0	BACS 220	Counseling Theory and Practice 3.0
Humanities/Social Science elective		3.0		
Free electives		6.0		
Term Credits	15.0			

BACS 236	Psychiatric Rehabilitation Principles and Practices	3.0
BIO 101 or 107	Applied Biological Diversity, Ecology Evolution Cells, Genetics Physiology	3.0
Humanities/Social Science elective		3.0
Term Credits		15.0
Term 5		
BACS 230	Genetics and Mental Health	3.0
BACS 232	Ethics and Professional Responsibility	3.0
CS 161	Introduction to Computing	3.0
Humanities/Social Science elective		3.0
Free elective		3.0
Term Credits		15.0
Term 6		
BACS 234	Introduction to Addictive Disorders	3.0
BACS 255	Multicultural Counseling	3.0
BACS 325	Psychopharmacology for Counselors	3.0
Humanities/Social Science elective		3.0
Free elective		3.0
Term Credits		15.0
Term 7		
BACS 301	Group Counseling I	3.0
BACS 304	Cognitive and Behavioral Counseling I	3.0
Humanities/Social Science elective		3.0
BACS Advanced Program elective		3.0
Free elective		3.0
Term Credits		15.0
Term 8		
BACS 310	Recovery and Relapse Prevention	3.0
BACS Advanced Program elective		3.0
Humanities/Social Science elective		3.0
Free electives		6.0
Term Credits		15.0
Term 9		
Humanities/Social Science elective		3.0
Free electives		12.0
Term Credits		15.0
Term 10		
BACS 320	Crisis and Brief Intervention	3.0
BACS Advanced Program elective		3.0
Free electives		9.0
Term Credits		15.0
Term 11		
BACS 405	Family-Focused Interventions	3.0
BACS 490	Senior Research Project	3.0
BACS Advanced Program elective		3.0
Free electives		6.0
Term Credits		15.0
Term 12		
BACS 312	Case Management Methods	3.0
BACS 401	Assessment and Treatment Planning	3.0
BACS 499	Readings in Behavioral Health	1.0

BACS Advanced Program electives	6.0
Term Credits	13.0

Total Credit: 180.0

BS Behavioral Health Counseling: Saturday Scholars - Fall Cohort Option

First Year

Term 1		Credits
Fall		
Term A		
BACS 100	Life Span Human Development	3.0
BACS 200	Foundation of Behavioral Health Care	3.0
Term B		
BACS 210	Behavioral Disorders	3.0
BACS 220	Counseling Theory and Practice	3.0
Term Credits		12.0

Term 2

Winter		
Term A		
BACS 234	Introduction to Addictive Disorders	3.0
BACS 255	Multicultural Counseling	3.0
Term B		
BACS 232	Ethics and Professional Responsibility	3.0
BACS 325	Psychopharmacology for Counselors	3.0
Term Credits		12.0

Term 3

Spring		
Term A		
BACS 236	Psychiatric Rehabilitation Principles and Practices	3.0
BACS 350	Child Psychopathology	3.0
Term B		
BACS 405	Family-Focused Interventions	3.0
BACS 420	Psychiatric Rehabilitation Competencies	3.0
Term Credits		12.0

Term 4

Summer		
Term A		
BACS 301	Group Counseling I	3.0
BACS 410	Child and Adolescent Support	3.0
Term B		
BACS 401	Assessment and Treatment Planning	3.0
BACS 412	Group Counseling II	3.0
Term Credits		12.0

Second Year

Term 5

Fall		
Term A		
BACS 304	Cognitive and Behavioral Counseling I	3.0
BACS 312	Case Management Methods	3.0

Term B		
BACS 320	Crisis and Brief Intervention	3.0
BACS 404	Cognitive and Behavioral Counseling II	3.0
Term Credits		12.0

Term 6		
Winter		
Term A		
BACS 411	Forensic Behavior Health Service	3.0
BACS 310	Recovery and Relapse Prevention	3.0
Term B		
BACS 230	Genetics and Mental Health	3.0
BACS 368	Addictions Counseling with Special Populations	3.0
Term Credits		12.0

Term 7		
Spring		
Term A		
BACS 360	Preventing Substance Abuse	3.0
BACS 367	Advanced Counseling Intervention	3.0
Term B		
BACS 490	Senior Research Project	3.0
BACS 414	Co-Occurring Disorders	3.0
Term Credits		12.0

Term 8		
Summer		
Term A		
BACS 370	Problem Gambling Interventions	3.0
BACS 499	Readings in Behavioral Health	3.0
Note*		
Term Credits		6.0

Total Credit: 90.0

* Students either transfer or take at Drexel an additional 90.0 quarter credits of General Education courses for 180.0 quarter credits total to complete the degree requirements.

BS Behavioral Health Counseling: Saturday Scholars - Winter Cohort Option

First Year		
Term 1		
Winter		
Term A		
BACS 100	Life Span Human Development	3.0
BACS 200	Foundation of Behavioral Health Care	3.0
Term B		
BACS 210	Behavioral Disorders	3.0
BACS 220	Counseling Theory and Practice	3.0
Term Credits		12.0
Term 2		
Spring		
Term A		
BACS 234	Introduction to Addictive Disorders	3.0
BACS 255	Multicultural Counseling	3.0

Term B		
BACS 325	Psychopharmacology for Counselors	3.0
BACS 232	Ethics and Professional Responsibility	3.0
Term Credits		12.0

Term 3		
Summer		
Term A		
BACS 301	Group Counseling I	3.0
BACS 410	Child and Adolescent Support	3.0
Term B		
BACS 401	Assessment and Treatment Planning	3.0
BACS 412	Group Counseling II	3.0
Term Credits		12.0

Term 4		
Fall		
Term A		
BACS 304	Cognitive and Behavioral Counseling I	3.0
BACS 312	Case Management Methods	3.0
Term B		
BACS 320	Crisis and Brief Intervention	3.0
BACS 404	Cognitive and Behavioral Counseling II	3.0
Term Credits		12.0

Second Year

Term 5		
Winter		
Term A		
BACS 310	Recovery and Relapse Prevention	3.0
BACS 411	Forensic Behavior Health Service	3.0
Term B		
BACS 230	Genetics and Mental Health	3.0
BACS 368	Addictions Counseling with Special Populations	3.0
Term Credits		12.0

Term 6		
Spring		
Term A		
BACS 236	Psychiatric Rehabilitation Principles and Practices	3.0
BACS 350	Child Psychopathology	3.0
Term B		
BACS 405	Family-Focused Interventions	3.0
BACS 420	Psychiatric Rehabilitation Competencies	3.0
Term Credits		12.0

Term 7		
Summer		
Term A		
BACS 360	Preventing Substance Abuse	3.0
BACS 367	Advanced Counseling Intervention	3.0
Term B		
BACS 490	Senior Research Project	3.0

BACS 414	Co-Occurring Disorders	3.0
Term Credits		12.0
Term 8		
Fall		
Term A		
BACS 370	Problem Gambling Interventions	3.0
BACS 499	Readings in Behavioral Health	3.0
Note*		
Term Credits		6.0
Total Credit: 90.0		

* Students either transfer or take at Drexel an additional 90.0 quarter credits of General Education courses for 180.0 quarter credits total to complete the degree requirements.

Co-op/Career Opportunities

Drexel University has long been known for its cooperative education program, through which students mix periods of full-time, career-related employment with their studies. The Behavioral Health Counseling curriculum includes one co-op option that exposes students to the varied work environments of behavioral health professionals. Co-op provides students with an opportunity to assess their personal strengths and interests for a career in behavioral health by observing successful mental health and addictions professionals in action. Co-op students work for six months in paid or unpaid positions consistent with their interests, abilities, and aptitudes.

After Graduation

Graduates of the Behavioral Health Counseling program are widely acknowledged by regional employers as being among their best prepared new employees. This reputation helps graduates easily find preferred employment in a variety of behavioral health care settings. Many graduates elect to continue their education in graduate and doctoral programs at Drexel or leading universities across the nation. Within Drexel, students may select excellent graduate programs preparing them for licensure as behavioral health clinicians and/or administrative, research, and behavioral health policy-making positions.

Career Opportunities

Behavioral health counseling professionals are employed in a wide range of venues. Counselors are needed in social service agencies, schools, health care facilities, and inpatient and residential treatment settings. Counselors work with children, adolescents, adults, and elderly individuals who experience disability due to mental illnesses or substance use disorders. Graduates who choose to enter the behavioral health workforce find immediate employment in areas such as psychiatric rehabilitation; family and child support services; addictions counseling; case management and services coordination; forensic mental health services; individual and group counseling; and crisis intervention. The behavioral health care field is tremendously diverse and encompasses far more career opportunities than are listed here. There are career choices to be made at all levels of service — from direct care to administration and policy making. In this regard, students will find tremendous benefit both in the listings and outreach offered by Drexel's Steinbright Career Development Center and in the diverse professional career experience our faculty bring to our students.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) web page for more detailed information on post-graduate opportunities.

Facilities

The College of Nursing and Health Professions is located at Drexel University's Health Sciences Campus located in Center City. A Clinical Learning Resource Center (<http://www.drexel.edu/cnhp/about/CELR/Services>) offers a simulation lab where students practice skills needed in their chosen behavioral health professions careers. Sessions are video captured to allow students the opportunity to observe and critique their performance.

Behavioral Health Counseling Faculty

Veronica Carey, PhD (*Capella University*) Associate Director of the *Saturday Scholars Program*. Assistant Clinical Professor. Evidence-based best practices in recovery-oriented services, treatment planning, behavioral health care system practices, program planning, and implementation of psychiatric rehabilitation services.

Robert J. Chapman, MS Ed, PhD (*Syracuse University*) Associate Director of the *Behavioral Health Counseling Program*. Clinical Associate Professor. Motivational interviewing; brief alcohol screening and intervention for college students; harm reduction; innovative ways to motivate student change.

Ronald C. Comer, DSW (*University of Pennsylvania, School of Social Work*) Chair, *Behavioral Health Counseling Program*. Clinical Associate Professor. Pre-professional and professional workforce development, and behavioral health care policy -- particularly at the service delivery level.

Lisa T. Schmidt, PhD (*University of Medicine and Dentistry of New Jersey*). Associate Clinical Professor. The identification of best practices in psychiatric rehabilitation, illness management and recovery, and psycho-education.

Health Sciences

Major: Health Sciences

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 181.0

Classification of Instructional Programs (CIP) code: 51.1199

Standard Occupational Classification (SOC) code: 11-9111

About the Program

The Bachelor's degree program in Health Sciences at Drexel University exposes students to a wide variety of careers in health care and related professions. Our emphasis on interdisciplinary study, coupled with expert faculty, gives students the opportunity to explore different facets of health-related professions before matriculating to specialized graduate programs or entering the workplace. Whether you are on the fast track to a career in health professions or still finding your path, our Health Sciences Program offers a multitude of options for completing your degree.

What you will learn

The Health Sciences Program offers a rigorous four-year curriculum for students interested in pursuing careers in health-related professions. Courses in health and clinical sciences, research methods, statistics, and healthcare ethics are combined with a core curriculum of mathematics,

humanities, and social sciences to provide a fully integrated and comprehensive curriculum.

Career Opportunities

Health care professions are one of the fastest growing job sectors in the United States. There is tremendous demand for trained health care providers at all levels. In the Health Sciences Program, our multidisciplinary approach, flexible curriculum, and co-op experience provide students with a highly competitive edge in the market place and in the pursuit of graduate program admission. Some of the fields Health Sciences graduates can expect to pursue post-graduation include:

- Rehabilitation Professions
 - Physical therapy
 - Occupational therapy
 - Speech and language pathology
 - Cardiac rehabilitation
- Physician Assistant Studies
- Medicine and Dentistry
- Optometry
- Audiology
- Clinical Research
- Public Health and Health Advocacy
- Nursing
- Exercise Physiology
- Nutrition Sciences
- Bioethics
- Health Psychology

Co-op Experience

Drexel University has long been known for its cooperative education programs. As part of the Health Sciences curriculum, students incorporate a six-month co-op experience into their plan of study. This allows students to learn from healthcare leaders at renowned facilities nationwide. By building career-related employment into undergraduate study, students gain work experience, network with healthcare professionals, and hone their clinical and research skills. Some local co-op employers of Health Sciences students include Children's Hospital of Philadelphia, Magee Rehabilitation Hospital, Bryn Mawr Rehabilitation Hospital, Hahnemann University Hospital, Good Shepherd Penn Partners, NovaCare, and many other health care facilities in the region.

Accelerated Options

The Health Sciences program offers accelerated academic tracks for high achieving students to pursue degrees in the Physician Assistant Studies program and the Doctor of Physical Therapy program within the College of Nursing and Health Professions. Graduates of the Health Sciences program may also continue their education in the biomedical graduate programs of the Drexel University College of Medicine (such as the MS in Clinical Research Organization and Management and the MS in Pathologist's Assistant programs).

For more information, visit the Health Sciences Program (<http://www.drexel.edu/cnhp/academics/departments/Health-Sciences>) page at the College of Nursing and Health Professions web site.

Degree Requirements

General Requirements

UNIV NH101	The Drexel Experience	2.0
CIVC 101	Introduction to Civic Engagement	1.0

English Sequence

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Biology Sequence

BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
BIO 226	Microbiology for Health Professionals	5.0

Chemistry Sequence

CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0

Mathematics Sequence

MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0

Computer Science Course

CS 161	Introduction to Computing	3.0
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Other Humanities and Social Sciences Courses

COM 310 [WI (p. 294)]	Technical Communication	3.0
COM 320 [WI (p. 294)]	Science Writing	3.0
ECON 240	Economics of Health Care Systems	4.0
HSAD 210	Health-Care Ethics I	3.0
HSAD 309	Advanced Health-Care Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 120	Developmental Psychology	3.0
PSY 240 [WI (p. 294)]	Abnormal Psychology	3.0
SOC 101	Introduction to Sociology	3.0
SOC 120	Sociology of the Family	3.0
SOC 125	Sociology of Aging	3.0
Three Humanities and Social Sciences electives		9.0

Pathway to Health Professions Courses

Anatomy & Physiology Courses

ANAT 101	Anatomy & Physiology I	5.0
ANAT 102	Anatomy & Physiology II	5.0
ANAT 103	Anatomy & Physiology III	5.0

Clinical Research Courses

HSCI 310	Introduction to Clinical Research	4.0
HSCI 313	Clinical Trials Protocols	4.0

Other Health Sciences Courses

HSCI 201	Health Assessment through the Lifespan	4.0
HSCI 301	Pharmacology I	3.0
HSCI 302	Pharmacology II	3.0

HSCI 337	Genetics and Health	3.0
STS 345	Statistics for the Health Sciences	4.0
STS 350	Advanced Statistics for Clinical Science	4.0
Health Sciences electives *		25.0
Free Electives		15.0
Total Credits		181.5

* Health Sciences electives include ANAT 420 Advanced Anatomy I; ANAT 421 Advanced Anatomy II; HSCI 430 Developmental Anatomy (WI); PHGY 325 Physiology; PHGY 382 Pathophysiology (WI); HSCI 325 Exercise Physiology; HSCI 326 Applied Anatomy & Kinesiology; and ANAT 202 Sectional Anatomy and NEUR 410 Neuroscience. Certain Health Services Administration (HSAD) courses may also be taken as Health Sciences electives; see your advisor for more information.

Optional Concentration in Exercise Science

The concentration in Exercise Science helps prepare students for graduate studies in Exercise Physiology. In addition, the concentration provides foundational knowledge and skills for a variety of fitness certifications from the American College of Sports Medicine, National Strength and Conditioning Association, and others. These certifications are often required of graduates interested in seeking employment in the fitness industry.

Students wishing to complete the concentration in Exercise Science must complete the courses listed below as 17 of their elective credits.

Required courses:

HSCI 325	Exercise Physiology	4.0
HSCI 326	Applied Anatomy and Kinesiology	4.0

Complete 9 credits from the following list:

HSCI 415	Musculoskeletal Pathophysiology	
HSCI 480	Special Topics in Health Sciences	
HSCI 490	Senior Research Project	
NFS 100	Nutrition, Foods, and Health	
NFS 101	Introduction to Nutrition & Food	
NFS 325	Nutrition & Exercise Physiology	

Sample Plan of Study

For accelerated sample plans, students should visit the Health Sciences Professions Program page.

Term		Credits	
Term 1	BIO 122	Cells and Genetics	4.5
	CHEM 101	General Chemistry I	3.5
	CS 161	Introduction to Computing	3.0
	ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
	CIVC 101	Introduction to Civic Engagement	1.0
	Term Credits		15.0
Term 2	BIO 124	Evolution Organismal Diversity	4.5
	CHEM 102	General Chemistry II	4.5
	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
	Term Credits		12.0

MATH 101	Introduction to Analysis I	4.0
UNIV NH101	The Drexel Experience	2.0
Term Credits		18.0

Term 3		
BIO 126	Physiology and Ecology	4.5
CHEM 103	General Chemistry III	5.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 102	Introduction to Analysis II	4.0
Term Credits		16.5

Term 4		
ANAT 101	Anatomy Physiology I	5.0
BIO 226	Microbiology for Health Professionals	5.0
COM 310 [WI (p. 294)]	Technical Communication	3.0
STS 345	Statistics for the Health Sciences	4.0
Term Credits		17.0

Term 5		
ANAT 102	Anatomy Physiology II	5.0
STS 350	Advanced Statistics for Clinical Science	4.0
PSY 101	General Psychology I	3.0
HSCI 310	Introduction to Clinical Research	4.0
Term Credits		16.0

Term 6		
ANAT 103	Anatomy Physiology III	5.0
COM 320 [WI (p. 294)]	Science Writing	3.0
COOP 101	Career Management and Professional Development	0.0
HSAD 210	Health-Care Ethics I	3.0
Free elective		3.0
Term Credits		14.0

Term 7		
HSAD 309	Advanced Health-Care Ethics	3.0
PSY 120	Developmental Psychology	3.0
SOC 101	Introduction to Sociology	3.0
Free elective		3.0
Term Credits		12.0

Term 8		
HSCI 301	Pharmacology I	3.0
HSCI 313	Clinical Trials Protocols	4.0
HSCI 337	Genetics and Health	3.0
Health Sciences elective *		3.0
Term Credits		13.0

Term 9		
SOC 120	Sociology of the Family	3.0
HSCI 201	Health Assessment through the Lifespan	4.0
HSCI 302	Pharmacology II	3.0
Free elective		3.0
Health Sciences elective *		3.0
Term Credits		16.0

Term 10		
ECON 240	Economics of Health Care Systems	4.0

Free elective	3.0
Health Sciences electives *	8.0
Term Credits	15.0
Term 11	
SOC 125 Sociology of Aging	3.0
Free elective *	3.0
Health Sciences elective *	3.0
Humanities/Social Science electives	6.0
Term Credits	15.0
Term 12	
PSY 240 [WI] Abnormal Psychology (p. 294)]	3.0
Health Sciences electives *	8.0
Humanities/Social Science elective	3.0
Term Credits	14.0
Total Credit: 181.5	

* See degree requirements (p. 295).

Accelerated 3+3 BS/DPT: Physical Therapy Option

About the Accelerated 3+3 BS/DPT Option

Drexel's undergraduate Health Sciences Program and graduate Physical Therapy (PT) Program have partnered to offer an Accelerated dual-degree BS/DPT option available to high-achieving students enrolled in the Health Sciences Program. The *Accelerated 3+3 BS/DPT Option* is an accelerated academic track that enables students to complete their Bachelor of Sciences and Doctor of Physical Therapy degrees in 5.5 years as opposed to the traditional 6.5 years. Students pursue a BS degree in Health Sciences during their first three years of study, and a DPT degree during their final 2.5 years of study. The bachelor's degree in Health Sciences is awarded following completion of year four (first year of graduate study), and the doctoral degree is awarded following completion of the Physical Therapy program.

For additional information visit the Accelerated BS/DPT Option (<http://www.drexel.edu/cnhp/academics/departments/Health-Sciences>) on Health Sciences page.

General Requirements

UNIV NH101	The Drexel Experience	2.0
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English Sequence

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Biology Sequence

BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
BIO 226	Microbiology for Health Professionals	5.0

Chemistry Sequence

CHEM 101	General Chemistry I	3.5
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CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0

Mathematics Sequence

MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0

Physics for Life Sciences

PHYS 152	Introductory Physics I	4.0
PHYS 153	Introductory Physics II	4.0

Computer Science Course

CS 161	Introduction to Computing	3.0
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Other Humanities and Social Sciences Courses

COM 310 [WI (p. 294)]	Technical Communication	3.0
COM 320 [WI (p. 294)]	Science Writing	3.0
HSAD 210	Health-Care Ethics I	3.0
HSAD 309	Advanced Health-Care Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 120	Developmental Psychology	3.0
SOC 101	Introduction to Sociology	3.0
SOC 120	Sociology of the Family	3.0

Free Electives

		4.5
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Pathway to Health Professions Courses

Anatomy & Physiology Courses

ANAT 101	Anatomy & Physiology I	5.0
ANAT 102	Anatomy & Physiology II	5.0
ANAT 103	Anatomy & Physiology III	5.0

Clinical Research Courses

HSCI 310	Introduction to Clinical Research	3.0
HSCI 313	Clinical Trials Protocols	4.0
HSCI 315	Current Issues in Clinical Research	3.0

Other Health Sciences Courses

HSCI 201	Health Assessment through the Lifespan	4.0
HSCI 301	Pharmacology I	3.0
HSCI 302	Pharmacology II	3.0
HSCI 337	Genetics and Health	3.0
HSCI 204	Clinical Health Informatics	3.0
STS 345	Statistics for the Health Sciences	4.0
STS 350	Advanced Statistics for Clinical Science	4.0

Two Health Sciences electives *		7.0
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1st Year DPT Courses

NEUR 507	Neuroscience I	3.0
PTRS 530	Kinesiology I	4.0
PTRS 531	Kinesiology II	3.0
PTRS 532	Human Gross Anatomy I	4.0
PTRS 533	Human Gross Anatomy II	3.5
PTRS 534	Physical Therapy Exam & Intervention I	3.0
PTRS 537	Clinical Correlations I	3.0
PTRS 539	Topics in Pathophysiology I	3.5
PTRS 540	Topics in Pathophysiology II	2.0
PTRS 620	Orthopedic Physical Therapy: Upper Extremity	4.0
PTRS 623	Physical Agents	4.0

PTRS 656	Motor Control and Rehabilitation	2.0
Total Credits		185.0

* Health Science electives include: Advanced Anatomy I & II; Developmental Anatomy (WI); Physiology; Pathophysiology (WI); Exercise Physiology; Applied Anatomy & Kinesiology; and Sectional Anatomy or NEUR 410 Neurosciences. Certain Health Services Administration courses may also be taken as Health Science electives.

Accelerated 4+1 BS/MHS: Physician Assistant Option

About the Accelerated 4+1 BS/MHS Option

Drexel's undergraduate Health Sciences Program and graduate Physician Assistant (PA) Program have partnered to offer an accelerated dual-degree BS/MHS option available to high achieving students enrolled in the Health Sciences Program. The *Accelerated 4+1 BS/MHS PA Option* is an accelerated academic track that enables students to complete their bachelor's and master's degrees in Health Sciences, including sitting for the Physician Assistant National Certifying Exam (PANCE), in 5.25 years as opposed to the traditional 6.25 years. Students pursue a Bachelor of Science degree in Health Sciences during their first three years of study, and a Master of Health Science degree during the final 2.25 years of study. The bachelor's degree in Health Sciences is awarded following completion of year four (first year of graduate study), and the master's degree is awarded following completion of the Physician Assistant Program.

For additional information visit the Accelerated 4+1 BS/MHS Option (<http://www.drexel.edu/cnhp/academics/departments/Health-Sciences>) on Health Sciences page.

Degree Requirements

General Requirements		
UNIV NH101	The Drexel Experience	2.0
English Sequence		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Biology Sequence		
BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
BIO 226	Microbiology for Health Professionals	5.0
Chemistry Sequence		
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
Mathematics Sequence		
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
Computing Course		
CS 161	Introduction to Computing	3.0
Humanities and Social Science Courses		

COM 310 [WI (p. 294)]	Technical Communication	3.0
COM 320 [WI (p. 294)]	Science Writing	3.0
HSAD 125	Medical Terminology	3.0
HSAD 210	Health-Care Ethics I	3.0
HSAD 309	Advanced Health-Care Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 120	Developmental Psychology	3.0
PSY 240 [WI (p. 294)]	Abnormal Psychology	3.0
SOC 101	Introduction to Sociology	3.0
SOC 120	Sociology of the Family	3.0

Pathway to Health Professions Courses

Anatomy & Physiology Courses		
ANAT 101	Anatomy & Physiology I	5.0
ANAT 102	Anatomy & Physiology II	5.0
ANAT 103	Anatomy & Physiology III	5.0
Clinical Research Courses		
HSCI 310	Introduction to Clinical Research	4.0
HSCI 313	Clinical Trials Protocols	4.0
HSCI 315	Current Issues in Clinical Research	3.0
Other Health Sciences Courses		
HSCI 201	Health Assessment through the Lifespan	4.0
HSCI 301	Pharmacology I	3.0
HSCI 302	Pharmacology II	3.0
HSCI 337	Genetics and Health	3.0
HSCI 204	Clinical Health Informatics	3.0
STS 345	Statistics for the Health Sciences	4.0
STS 350	Advanced Statistics for Clinical Science	4.0
Three Health Sciences electives *		11.0

1st Year PA Courses

PA 540	Clinical Anatomy	5.0
PA 542	Patient Communication	2.0
PA 543	Ethical Issues in Physician Assistant Practice	2.0
PA 544	Clinical Assessment	5.0
PA 547	Evidence Based Medicine for Physician Assistants	3.0
PA 548	Principles of Medical Science I	2.0
PA 549	Principles of Medical Science II	2.0
PA 551	Pharmacology and Therapeutics I	3.0
PA 552	Pharmacology and Therapeutics II	2.0
PA 554	Biopsychosocial Issues in Patient Care	5.0
PA 556	Clinical Medicine I	5.0
PA 557	Clinical Medicine II	5.0

Total Credits **185.5**

* Health Science electives include: Advanced Anatomy I & II; Developmental Anatomy (WI); Physiology; Pathophysiology (WI); Exercise Physiology; Applied Anatomy & Kinesiology; and Sectional Anatomy or NEUR 410 (<https://nextcatalog.drexel.edu/undergraduate/collegeofnursingandhealthprofessions/healthsciences>) Neurosciences. Certain Health Services Administration courses may also be taken as Health Science electives.

Facilities

The College of Nursing and Health Professions is located on Drexel University's Center City Campus, adjacent to Hahnemann University Hospital. The proximity of this major medical center provides a rich environment for students to study and experience the health sciences. Students have access to the *Center for Interdisciplinary Clinical Simulation and Practice (CICSP)* which utilizes patient actors and automated simulation manikins to mimic real-life human physiology. The CICSP provides undergraduate Health Sciences students the opportunity to learn assessment and communication skills in a controlled setting. The College of Nursing and Health Professions also maintains the *Stephen and Sandra Sheller 11th Street Family Health Services of Drexel University*, a comprehensive, community-based health center, where students have unique opportunities to observe and participate in health care delivery.

Health Sciences Faculty

William D'Andrea, MS, RPh, CCP (*MCP Hahnemann*). Associate Teaching Professor. Pharmacology, anatomy & physiology, advanced pharmacology.

Mary Elizabeth Flynn, PhD (*Temple University*). Assistant Professor. Anatomy and physiology, developmental biology, genetics

Alan James Haroian, PhD (*St. Louis University*). Associate Professor. Examination of the normal afferent and efferent connections of the mouse cerebella nuclei.

Michael Craig Kennedy, PhD (*University of Rochester*) *Chair, Department of Health Sciences*. Professor. Physiology, pathophysiology, neuroanatomy, autonomic nervous system, and the auditory system.

Michael L. Kirifides, PhD (*Hahnemann University*). Assistant Professor. Intracellular electrophysiology, ratiometric calcium imaging, fluorescence microscopy and flow cytometry.

Margery A. Lockard, PhD (*Hahnemann University*). Clinical Professor. Orthopedic/musculoskeletal physical therapy; management of patients using prosthetic and orthotic devices; and anatomy and physiology.

Robert J. Mele, DPM (*Pennsylvania College of Podiatric Medicine*). Assistant Teaching Professor. Physiology, pathophysiology.

Janell L. Mensinger, PhD (*City University of New York*). Assistant Teaching Professor. Behavioral health promotion strategies, treating obesity, clinical research methods, statistics.

Robert Peter Meyer, PhD (*Temple University*). Associate Professor. Quantitative microscopy studies.

Krista L. Rompolski, PhD (*University of Pittsburgh*). Assistant Teaching Professor. Interventions to prevent and treat diabetes mellitus, obesity, cardiovascular disease, and complications during pregnancy.

Stephanie Ross, MH, HT, CNC (*University of Calgary*). Assistant Clinical Professor. Botanical medicine; women's natural health and complementary and integrative therapies.

Joseph A. Rubertone, MPT, PhD (*West Virginia University*). Associate Clinical Professor. Connectivity of vestibular nuclear complex, brain tumor imaging, and clinical studies pertaining to the effectiveness of stroke rehabilitation.

Sinclair A. Smith, MS, ScD (*Boston University*). Associate Professor. The use of magnetic resonance spectroscopy and near infrared spectroscopy to non-invasively study neuromuscular metabolism in humans.

Masaru Teramoto, PhD (*University of Nevada, Las Vegas*). Assistant Teaching Professor. Physical activity epidemiology and statistical analysis for human behavior.

Vincent J. Zarro, MD, PhD (*Hahnemann Medical College*). Clinical Assistant Professor. Community and preventative medicine.

Health Services Administration

Major: Health Services Administration

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 51.0701

Standard Occupational Classification (SOC) code: 11-9111

About the Program

The Health Services Administration program provides students with a foundation in general management and economic principles related to health care, as well as an understanding of the administrative structure, operations, and policies of the health care industry.

Additional options are available for students wishing to complete an accelerated BS degree immediately prior to pursuing graduate study.

The Health Services Administration (HSA) curriculum is a four-year full-time course of study consisting of 180.0 quarter credits and including one cooperative (co-op) experience comprised of two consecutive quarter terms during the first half or the second half of the junior year. (Non-co-op full-time and part-time options are also available. Transfer students are eligible for the full-time curriculum with or without co-op depending on the number of approved transfer credits.) The curriculum is designed to give students a foundation in general management and economic principles and policies related to health care, as well as to expose students to the quantitative and qualitative aspects of the health care industry by means of courses in health care related to policy, law, economics, management, marketing, and health information systems. At the same time, the curriculum provides interdisciplinary courses dealing with religious, ethical, psychosocial, political, legal, literary, and historical perspectives regarding health care practices and populations in need of health care. Courses in disability and aging expand students' understanding of the role of society and health care in the lives of individuals not always well understood. In addition, the curriculum can prepare students wishing to pursue graduate studies in health services administration, business administration, public health, law, and health communication.

The program also provides a concentration and a minor in HSA and an online certificate in Medical Billing and Coding (p. 322) for Drexel University bachelor's degree-seeking students.

Courses are available online (<http://www.drexel.com/online-degrees/healthcare-degrees/bs-hsa>). A maximum of 90.0 semester credits can be transferred.

Additional Information

The contact for this program is:

Susan Feinstein, BS
Administrative Coordinator, Health Services Administration

1601 Cherry Street, 7th floor, Room 773
Philadelphia PA, 19102
267-359-5543
slf52@drexel.edu

For more information, visit the Health Services Administration (<https://www.drexel.edu/cnhp/academics/undergraduate/BS-MPH-Dual-Degree-Program>) page on the College's website.

Degree Requirements

English Sequence

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Natural Sciences

8.0-10.0
Students may select from Biology (BIO), Chemistry (CHEM) or Anatomy (ANAT) courses. However, any course selected must include a laboratory component. Additional natural science subject options may be considered with the approval of the student's advisor.

Mathematics

MATH 101 or MATH 181	Introduction to Analysis I Mathematical Analysis I	3.0-4.0
MATH 102 or MATH 182	Introduction to Analysis II Mathematical Analysis II	3.0-4.0

Computing Course

CS 161	Introduction to Computing	3.0
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Drexel Experience

UNIV NH101	The Drexel Experience	1.0
UNIV 380	Special Topics-University Wide	1.0

Health Services Administration Core Requirements

HSAD 210	Health-Care Ethics I	3.0
HSAD 310	Introduction to Health-Systems Administration	3.0
HSAD 321	Health-Care Human Resources	3.0
HSAD 322	Health-Care Law	3.0
HSAD 330	Financial Management in Health Care	3.0
HSAD 331 [WI (p. 299)]	Non-profits and Health Care	3.0
HSAD 332 [WI (p. 299)]	Health-Care Marketing	3.0
HSAD 334	Management of Health Services	3.0
HSAD 335 [WI (p. 299)]	Health-Care Policy	3.0
HSAD 340	Leadership in Health Services Administration	3.0
HSAD 345	Ethics in Health Care Management	3.0
9 Health Services Administration (HSAD) electives *		27.0

Business Courses

ACCT 115	Financial Accounting Foundations	4.0
ECON 240	Economics of Health Care Systems	4.0
ORGB 300 [WI (p. 299)]	Organizational Behavior	4.0
STAT 201 or STS 345	Introduction to Business Statistics Statistics for the Health Sciences	4.0

Humanities and Social Sciences

PSCI 110	American Government I	4.0
SOC 101	Introduction to Sociology	3.0
Humanities and Social Sciences electives **		29.0
Free Electives		40.0

Total Credits **180.0-184.0**

* HSAD 316 Health Care across Cultures, HSAD 325 Issues in Health Care System, and HSAD 320 Managed Health Care are recommended electives.

** SOC 235 is a recommended elective.

Sample Plan of Study

Four Year Year Co-op and Spring/Summer Cycle

Term 1		Credits
CS 161	Introduction to Computing	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
SOC 101	Introduction to Sociology	3.0
UNIV NH101	The Drexel Experience	1.0
Natural Science course with laboratory *		4.0-5.0

Term Credits **14.0-15.0**

Term 2

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
HSAD 310	Introduction to Health-Systems Administration	3.0
MATH 101 or 181	Introduction to Analysis I Mathematical Analysis I	3.0-4.0
Natural Science courses with laboratory *		4.0-5.0

Term Credits **13.0-15.0**

Term 3

ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HSAD 334	Management of Health Services	3.0
MATH 102 or 182	Introduction to Analysis II Mathematical Analysis II	3.0-4.0
UNIV 380	Special Topics-University Wide	1.0

Term Credits **14.0-15.0**

Term 4

ECON 240	Economics of Health Care Systems	4.0
PSCI 110	American Government I	4.0
STAT 201	Introduction to Business Statistics	4.0
Two Humanities/Social Science electives		6.0

Term Credits **18.0**

Term 5

SOC 215	Sociology of Work	3.0
Health Services Administration (HSAD) elective		6.0
Two Humanities/Social Science electives		6.0
Free elective		3.0

Term Credits **18.0**

Term 6

HSAD 210	Health-Care Ethics I	3.0
HSAD 330	Financial Management in Health Care	3.0
	Humanities/Social Science elective	3.0
	Free electives	5.0

Term Credits **14.0**

Term 7

HSAD 321	Health-Care Human Resources	3.0
HSAD 322	Health-Care Law	3.0
	Two Humanities/Social Science electives	6.0
	Free elective	3.0

Term Credits **15.0**

Term 8

HSAD 331 [WI (p. 299)]	Non-profits and Health Care	3.0
ORGB 300 [WI (p. 299)]	Organizational Behavior	4.0
	Humanities/Social Science elective	3.0
	Health Services Administration (HSAD) electives	3.0
	Free elective	3.0

Term Credits **16.0**

Term 9

HSAD 332 [WI (p. 299)]	Health-Care Marketing	3.0
HSAD 345	Ethics in Health Care Management	3.0
	Health Services Administration (HSAD) elective	3.0
	Humanities/Social Science elective	3.0
	Free elective	3.0

Term Credits **15.0**

Term 10

	Two Humanities/Social Science electives	6.0
	Health Services Administration (HSAD) electives	6.0
	Free elective	3.0

Term Credits **15.0**

Term 11

HSAD 335 [WI (p. 299)]	Health-Care Policy	3.0
SOC 235	Sociology of Health and Illness (recommended)	3.0
	Health Services Administration (HSAD) electives	6.0
	Free elective	3.0

Term Credits **15.0**

Term 12

HSAD 317	Religious Views on Health Care	3.0
HSAD 340	Leadership in Health Services Administration	3.0
	Health Services Administration (HSAD) elective	3.0
	Free elective	4.0

Term Credits **13.0**

Total Credit: 180.0-184.0

* Students may select from Biology (BIO), Chemistry (CHEM) or Anatomy (ANAT) courses. However, any course selected must include a laboratory component. Additional natural science subject options may be considered with the approval of the student's advisor.

Dual/Accelerated Degree

Accelerated Dual Degree BS/MPH in Health Services Administration/Masters of Public Health

The Health Services Administration program and the Master of Public Health program in the School of Public Health offer an accelerated dual degree option. Participants can earn both a BS degree in Health Services Administration and a Master of Public Health (MPH) degree in five years.

In this accelerated dual degree program, students participate in the Health Services Administration program for three years (nine academic quarters and one co-operative experience). After three years of undergraduate study students begin their graduate studies in the Master of Public Health program. Nineteen (19.0) quarter credits from the first year of graduate study will be credited toward completion of the students' Bachelor of Science degrees. After the successful completion of the first year of graduate study, students receive their BS. When students successfully complete the remainder of their graduate studies (typically one additional year), they will receive the MPH degree.

Students in this accelerated, dual degree program apply to the graduate Masters of Public Health Program (<http://catalog.drexel.edu/graduate/schoolofpublichealth/publichealth>) during the fall quarter of their junior year. They then follow the same application procedures as other applicants, including being interviewed by the graduate faculty. (Any student who does not meet the entrance requirements of the graduate program will be able to complete the fourth year of the Health Services Administration program and receive a BS degree.)

Students in the Master of Public Health program complete 64.0 graduate quarter credits to meet the requirements of the master's program. The accelerated, dual degree program represents an acceleration of only the undergraduate portion of the student's curriculum.

For additional information, visit the College of Nursing and Health Professions Accelerated Dual Degree Programs (<https://www.drexel.edu/cnhp/academics/undergraduate/BS-MPH-Dual-Degree-Program>) page.

HSAD BS/MPH 3 + 2 Program

Degree Requirements

(*Sample plan of study is listed below requirements*)

English Sequence

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Biology Courses

BIO 107 & BIO 108	Cells, Genetics & Physiology and Cells, Genetics and Physiology Laboratory	4.0
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BIO 109 & BIO 110	Biological Diversity, Ecology & Evolution and Biological Diversity, Ecology and Evolution Laboratory	4.0
Computing Course		
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
Mathematics Sequence		
CS 161	Introduction to Computing	3.0
Informatics Course		
HSCI 204	Clinical Health Informatics	3.0
Drexel Experience		
UNIV NH101	The Drexel Experience	2.0
Core Health Services Administration (HSAD) Courses		
HSAD 210	Health-Care Ethics I	3.0
HSAD 309	Advanced Health-Care Ethics	3.0
HSAD 310	Introduction to Health-Systems Administration	3.0
HSAD 321	Health-Care Human Resources	3.0
HSAD 322	Health-Care Law	3.0
HSAD 330	Financial Management in Health Care	3.0
HSAD 331 [WI (p. 299)]	Non-profits and Health Care	3.0
HSAD 332 [WI (p. 299)]	Health-Care Marketing	3.0
HSAD 334	Management of Health Services	3.0
HSAD 335 [WI (p. 299)]	Health-Care Policy	3.0
HSAD 340	Leadership in Health Services Administration	3.0
Nine Health Services Administration (HSAD) Electives		27.0
Business Courses		
ACCT 115	Financial Accounting Foundations	4.0
ECON 240	Economics of Health Care Systems	4.0
ORGB 300 [WI (p. 299)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Humanities and Social Sciences Courses		
ANTH 101	Introduction to Cultural Diversity	3.0
COM 111	Principles of Communication	3.0
COM 230	Techniques of Speaking	3.0
COM 280	Public Relations Principles and Theory	3.0
PHIL 105	Critical Reasoning	3.0
PSCI 110	American Government I	4.0
PSY 101	General Psychology I	3.0
PSY 120	Developmental Psychology	3.0
PSY 240 [WI (p. 299)]	Abnormal Psychology	3.0
PSY 250 [WI (p. 299)]	Industrial Psychology	3.0
SOC 101	Introduction to Sociology	3.0
SOC 115	Social Problems	3.0
SOC 125	Sociology of Aging	3.0
SOC 215	Sociology of Work	3.0
SOC 235	Sociology of Health and Illness	3.0
Free Electives		

Two Free electives		6.0
Credits from the Graduate MPH Program		
PBHL 530	Principles of Epidemiology	4.0
PBHL 540	Prevention Principles and Practices	4.0
PBHL 550	Community Based Prevention Practices	4.0
PBHL 640	Environmental Health	4.0
PBHL 650	Public Policy and Advocacy	3.0
Total Credits		180.0

Sample BS/MPH Plan of Study

"A" Track, one Fall/Winter Co-Op

(The "B" track follows the same sequence, with the exception of having the Co-Op in Spring/Summer of Junior year.)

First Year

Fall		Credits
BIO 107	Cells, Genetics Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
CS 161	Introduction to Computing	3.0
SOC 101	Introduction to Sociology	3.0
UNIV 101	The Drexel Experience	1.0
Term Credits		14.0

Winter

BIO 109	Biological Diversity, Ecology Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
HSAD 310	Introduction to Health-Systems Administration	3.0
MATH 101	Introduction to Analysis I	4.0
PSY 101	General Psychology I	3.0
UNIV 101	The Drexel Experience	1.0
Term Credits		18.0

Spring

ACCT 115	Financial Accounting Foundations	4.0
HSAD 334	Management of Health Services	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 102	Introduction to Analysis II	4.0
PSY 120	Developmental Psychology	3.0
Term Credits		17.0

Summer

Vacation		
Term Credits		0.0

Second Year

Fall		Credits
COM 111	Principles of Communication	3.0
ECON 240	Economics of Health Care Systems	4.0
PSCI 110	American Government I	4.0
SOC 125	Sociology of Aging	3.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		18.0

Winter		
ANTH 101	Introduction to Cultural Diversity	3.0
HSCI 204	Clinical Health Informatics	3.0
PSY 240 [WI (p. 299)]	Abnormal Psychology	3.0
SOC 215	Sociology of Work	3.0
Health Services Administration (HSAD) Electives*		6.0
Term Credits		18.0

Spring		
COM 280	Public Relations Principles and Theory	3.0
HSAD 210	Health-Care Ethics I	3.0
HSAD 330	Financial Management in Health Care	3.0
PHIL 105	Critical Reasoning	3.0
SOC 235	Sociology of Health and Illness	3.0
Free Elective		3.0
Term Credits		18.0

Summer		
COM 230	Techniques of Speaking	3.0
HSAD 321	Health-Care Human Resources	3.0
HSAD 322	Health-Care Law	3.0
HSAD 335 [WI (p. 299)]	Health-Care Policy	3.0
PSY 250 [WI (p. 299)]	Industrial Psychology	3.0
Free Elective		3.0
Term Credits		18.0

Third Year		
Fall		
Co-Op		
Health Services Administration (HSAD) Elective		3.0
Term Credits		3.0

Winter		
Co-Op		
Health Services Administration (HSAD) Elective		3.0
Term Credits		3.0

Spring		
HSAD 331 [WI (p. 299)]	Non-profits and Health Care	3.0
HSAD 332 [WI (p. 299)]	Health-Care Marketing	3.0
ORGB 300 [WI (p. 299)]	Organizational Behavior	4.0
Health Services Administration (HSAD) Electives**		6.0
Term Credits		16.0

Summer		
HSAD 309	Advanced Health-Care Ethics	3.0
HSAD 340	Leadership in Health Services Administration	3.0
SOC 115	Social Problems	3.0
Health Services Administration (HSAD) Electives***		6.0

Free Elective	3.0
Term Credits	
18.0	

Fourth Year	
Fall	
19.0 Credits from the Master of Public Health Program	19.0
Term Credits	
19.0	
Total Credit: 180.0	

* HSAD 316 Health Care across Cultures is a recommended elective.

** HSAD 325 Issues in Health Care System is a recommended elective.

*** HSAD 320 Managed Health Care Managed Health Care is a recommended elective.

Minor in Health Services Administration

The minor in health services administration is designed for students interested in preparing for careers in health services administration while pursuing a major in another area. In addition, the curriculum can prepare students wishing to pursue graduate studies in health-services administration, business administration, public health, and law.

Required Courses

HSAD 210	Health-Care Ethics I	3.0
HSAD 310	Introduction to Health-Systems Administration	3.0
HSAD 334	Management of Health Services	3.0

Complete 1 of the following courses:		3.0
HSAD 330	Financial Management in Health Care*	
HSAD 340	Leadership in Health Services Administration	
HSAD 345	Ethics in Health Care Management	

Complete 4 of the following courses:		12.0
HSAD 309	Advanced Health-Care Ethics	
HSAD 312	Development of World Health Care	
HSAD 313	Evolution of Health Care in the United States	
HSAD 315	Interdisciplinary Health Services	
HSAD 316	Health Care across Cultures	
HSAD 317	Religious Views on Health Care	
HSAD 318	Health and Vulnerable Populations	
HSAD 319	Women and the Health Professions	
HSAD 320	Managed Health Care	
HSAD 323	Health Services and the Elderly	
HSAD 324	Health Technology and Ethical Responsibility	
HSAD 325	Issues in Health Care System	
HSAD 326	Holism and Health Care	
HSAD 328	Health Care for Diverse Groups	
HSAD 329	Health Care and the Media	
HSAD 336	Urban Health Care	
HSAD 337	Health Care/Quality Improvement	
HSAD 341	Risk Management in Healthcare Organizations	
HSAD 342	Children and Health Care	
HSAD 343	Health and Illness in Film	
HSAD 346	Mental Illness in the Media and Arts	
HSAD 351	Ethical Issues in Reproduction	

HSAD 353 Public Health Ethics

Total Credits**24.0**

* Requires ACCT 115 (p. 578) as a prerequisite.

Health-Services Administration Faculty

Michael Dahnke, PhD (*Temple University*). Assistant Clinical Professor. Health-care ethics, religion and health care, and media and health care.

David Hume Flood, PhD (*University of Pennsylvania*) *Health Services Administration Program*. Professor. Medical humanities: an examination of topics in medicine and health care from the perspectives of literature, the arts, and medical ethics.

Stephen F. Gambescia, PhD, MEd, MBA (*Temple University*) *Assistant Dean of Academic and Student Affairs*. Associate Clinical Professor. Health care policy, nonprofits and health care, and health care management and leadership.

Willard Poole Green, PhD (*Temple University*). Professor. Medical ethics, including the role of patient autonomy in the patient-health professional relationship and the interface with medical paternalism; the barriers to informed consent and strategies to overcome them; and the importance of confidentiality in t

Kristine A. Mulhorn, PhD (*University of Delaware*) *Chair, Department of Health Administration*. Assistant Professor. Disability and aging; cross-national methods of functioning.

Constance Karin Perry, PhD, EMT (*University of Buffalo*). Associate Professor. Biomedical ethics and ethical theory. Research interests include autonomy, personhood, feminist ethics, the ethics of animal experimentation, and ethical issues in reproduction and pregnancy.

Michelle Sahl, PhD, MEd, MBA, MBE (*The University of the Sciences in Philadelphia*). Assistant Teaching Professor. Health management and policy: management and leadership of health services organizations, urban health, and the history of health care systems.

Spencer R. Ward, PhD (*University of Nebraska*). Assistant Professor. The use of behavioral techniques to reduce performance anxiety, improve the knowledge acquisition process and promote distance-learning models.

Invasive Cardiovascular Technology

Major: Invasive Cardiovascular Technology

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 185.0

Classification of Instructional Programs (CIP) code: 51.0901

Standard Occupational Classification (SOC) code: 29-2031

Note: Effective Fall Term 2015, students are no longer being accepted into this program.

About the Program

The focus of the Invasive Cardiovascular Technology program is to educate students in the applied science of invasive cardiovascular technology with experience in all aspects of diagnostic and interventional cardiovascular procedures. The BS in Invasive Cardiovascular Technology is a two-year bachelor completion program, designed for

radiology students wishing to advance their careers and skills within the field of radiology.

Mission Statement

The faculty and staff of the Bachelor of Science in Invasive Cardiovascular Technology program strive to provide educational opportunities for students to develop knowledge, skills and attitudes conducive to the challenges within the advanced fields of radiology. The overall mission is to provide men and women with quality training for careers as advanced radiology health care professionals. In addition, the program provides appropriate educational experiences that encompass academic standards that reflect cognitive, physical and behavioral abilities that are necessary in preparing graduates for career success.

The program provides many opportunities for working in small groups with other healthcare professionals. These group communications and activities give the student chances to share their own experiences and learn from the experiences of others. Within the stimulating college environment, the student will be afforded the opportunity to achieve educational and personal growth goals while developing the technical skills necessary for success as cardiovascular professional.

Program Goals

The aims of the Bachelor of Science in Invasive Cardiovascular Technology program are to develop a graduate who is able to:

- Function as a competent entry-level invasive cardiovascular technologist in the cognitive (knowledge), psychomotor (skills) and affective (behavior) learning domains of invasive cardiology.
- Demonstrate proficiency in all aspects of diagnostic and therapeutic procedures.
- Develop an understanding of the biological effects of radiation on humans and utilize the appropriate radiation protection equipment, measures, and recording instruments for specific invasive cardiovascular and vascular procedures.
- Develop the skills and/or the proper handling and processing of digital recording materials.
- Demonstrate knowledge of the composition and appropriate utilization of radiographic contrast media and cardiology medicines.
- Demonstrate a basic knowledge of the pathological process and the common pathology demonstrated by cardiovascular procedures and imaging.

For more information, visit the Radiologic Technology (<https://www.drexel.edu/cnhp/academics/departments/Radiologic-Technology>) page on the College of Nursing and Health Professions' website.

Admission Requirements

Acceptance into the program is contingent upon completion of an accredited associate degree program (or equivalent) in medical radiography. Students who have completed a hospital training program in radiology are allowed 50 quarter units of academic credit on the basis of their registry and must complete additional courses to obtain an associate degree before acceptance.

Requirements for admission to the program include:

- Official copy of current ARRT (American Registry of Radiologic Technologist) certification.
- Official copy of Associate Degree completion in Radiologic Technology and/or Science with with Radiologic Technology.
- Official copy of college transcripts.
- Completion of the following courses with a minimum grade of "C"
 - Anatomy & Physiology I, II, III
 - Introduction to Computing
 - Clinical Health Informatics
 - English I, II, III
 - College-level Math
 - Introduction to Psychology
 - Abnormal Psychology
- Overall GPA of 2.50 or higher
- Compliance with the program technical standards and immunization requirements
- Current cardiopulmonary resuscitation (CPR/BLS) skills at the health care provider level.
- Demonstration of competency in English reading comprehension and spoken English fluency (by the TOEFL and TSE if not born in the U.S.)

For more information, contact the College of Nursing and Health Professions (<http://www.drexel.edu/cnhp>) about the program.

Degree Requirements

Registered Radiology Technologist (ARRT) * 50.0

General Requirements

3-Course English Sequence

ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research 3.0

ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0

ENGL 103 Composition and Rhetoric III: Themes and Genres 3.0

3-Course Sequence in Natural Sciences

ANAT 101 Anatomy & Physiology I 5.0

ANAT 102 Anatomy & Physiology II 5.0

ANAT 103 Anatomy & Physiology III 5.0

Computer Science Course

CS 161 Introduction to Computing 3.0

Mathematics Course

MATH 100 Fundamentals of Mathematics 3.0

2-Course Sequence in Social/Behavior Science

PSY 101 General Psychology I 3.0

PSY 240 [WI] Abnormal Psychology 3.0
(p. 304)]

Informatics Course

HSCI 204 Clinical Health Informatics 3.0

Total Transfer of A.S. to BS course hours: (89.0 Credits)

Invasive Cardiovascular (ICVT) Required Courses

ICVT Core Courses

ICVT 300 Introduction to Cardiology 3.0

ICVT 302 Cardiovascular System 2.0

ICVT 303 Patient Assessment I 3.0

ICVT 304	Cardiac Laboratory Procedures	3.0
ICVT 305	Coronary Anatomy & Imaging	2.0
ICVT 306	ECG & Special Topics	4.0
ICVT 308	Cardiovascular Angiography	3.0
ICVT 309	Hemodynamic Data I	4.0
ICVT 310	Radiation Safety & Equipment	3.0
ICVT 311	Patient Assessment II	2.0
ICVT 312	Clinical Practicum I	8.0
ICVT 406	Disease & Medical Emergencies	3.0
ICVT 407	Cardiovascular Review I	4.0
ICVT 409	Hemodynamic Data II	3.0
ICVT 410	Cardiovascular Review II	5.0
ICVT 411	Special Topics in Cardiology	2.0
ICVT 412	Clinical Practicum II	8.0
ICVT 422	Clinical Practicum III	10.0
ICVT 432	Clinical Practicum IV	8.0

Additional Required Health Sciences Courses

CHEM 108	Health Chemistry I	3.0
HSAD 210	Health-Care Ethics I	3.0
HSAD 315	Interdisciplinary Health Services	3.0
HSCI 301	Pharmacology I	3.0
HSCI 302	Pharmacology II	3.0

Total Credits 184.0

* Acceptance into the program is contingent upon completion of an accredited associate degree program (or equivalent) in medical radiography. Students who have completed a hospital training program in radiology are allowed 50 quarter units of academic credit on the basis of their registry and must complete additional courses to obtain an associate degree before acceptance.

Sample Plan of Study

BS Invasive Cardiovascular Technology

Term 1		Credits
CHEM 108	Health Chemistry I	3.0
HSAD 210	Health-Care Ethics I	3.0
HSAD 315	Interdisciplinary Health Services	3.0
ICVT 300	Introduction to Cardiology	3.0
ICVT 302	Cardiovascular System	2.0
Term Credits		14.0
Term 2		Credits
ICVT 303	Patient Assessment I	3.0
ICVT 304	Cardiac Laboratory Procedures	3.0
ICVT 305	Coronary Anatomy Imaging	2.0
ICVT 306	ECG Special Topics	4.0
ICVT 310	Radiation Safety Equipment	3.0
Term Credits		15.0
Term 3		Credits
ICVT 308	Cardiovascular Angiography	3.0
ICVT 309	Hemodynamic Data I	4.0
ICVT 311	Patient Assessment II	2.0

ICVT 312	Clinical Practicum I	8.0
Term Credits		17.0
Term 4		
HSCI 301	Pharmacology I	3.0
ICVT 409	Hemodynamic Data II	3.0
ICVT 411	Special Topics in Cardiology	2.0
ICVT 412	Clinical Practicum II	8.0
Term Credits		16.0
Term 5		
ICVT 406	Disease Medical Emergencies	3.0
ICVT 407	Cardiovascular Review I	4.0
ICVT 422	Clinical Practicum III	10.0
Term Credits		17.0
Term 6		
HSCI 302	Pharmacology II	3.0
ICVT 410	Cardiovascular Review II	5.0
ICVT 432	Clinical Practicum IV	8.0
Term Credits		16.0
Total Credit: 95.0		

Career Opportunities

Cardiovascular technologists work directly with physicians in hospitals, medical centers, clinics, physician offices, mobile diagnostic units, sales, training, and education. Employment of invasive cardiovascular technologists is expected to grow through the year 2014. This growth is expected as the population ages, because heart conditions tend to develop in the older population.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on post-graduate opportunities.

Radiologic Technology Faculty

Bernadette Jervis, MSED, RT (R) (M) (MR) (*Mountain State University; University of Pennsylvania*). Assistant Clinical Professor. Radiologic technology, mammography, MRI, and counseling psychology.

Michael Pallanti, BS, RT(R), ARRT (*Holy Family University*). Clinical Instructor. Diagnostic radiography, the operating room, and computed tomography.

Lavetta Reliford, MSRS, RT(R), ARRT (*University of Kentucky, LLC; Ottawa University, Midwestern State University*) Department Chair, Radiologic Technology. Assistant Clinical Professor. Radiologic technology and health care management.

Rosemary Thomas, BS, RT(R), ARRT (*Cooper University Hospital*). Clinical Instructor.

Nursing

Major: Nursing

Degree Awarded: Bachelor of Science Degree in Nursing (BSN)

Calendar Type: Quarter

Total Credit Hours: 185.0

Classification of Instructional Programs (CIP) code: 51.3801

Standard Occupational Classification (SOC) code: 29-1141

About the Program

The BS in Nursing (BSN) is a full-time, five year program. This program offers three paid, six-month cooperative education experiences. There is also a full-time, four-year option with one, 6 month co-op experience in the 3rd year of study. Students graduate with a bachelor of science in nursing and eligibility to sit for the RN licensure examination.

The BS in nursing degree is approved by the Pennsylvania State Board of Nursing, the National League for Nursing Accreditation Commission, and the American Association of Colleges of Nursing.

Drexel's nursing curriculum is built to respond to the rapidly changing health care system, as well as to student's needs. Graduates of the baccalaureate program will be prepared to:

- Utilize the growing compendium of knowledge and information sources from nursing and other disciplines to learn, teach, heal the sick, and conserve health.
- Contribute to the profession by sharing knowledge and skills with clients, peers, and other professionals in a variety of methods.
- Utilize multiple technologies that access and manage information to guide professional practice.
- Participate in culturally sensitive health promotion activities that contribute to the community's health and wellness.
- Participate in ongoing educational activities related to personal growth, professional practice, and community service.
- Apply knowledge and skills appropriate to their selected areas of career clinical practice.
- Develop personal potential for leadership in a changing health care environment.
- Integrate ethical concepts and principles, The Code of Ethics for Nurses, and professional standards into practice within professional, academic, and community settings.
- Utilize critical-thinking skills to improve the health outcomes of patients, families, and communities across the continuum of care.

A BSN is awarded at the completion of the program.

For more information about the BSN with Co-Op option at Drexel, visit the Nursing Co-Op Program (<https://www.drexel.edu/cnhp/academics/undergraduate/BSN-Nursing-CO-OP>) page.

Degree Requirements

Students should contact their Academic Advisor for any changes to their plans of study prior to registration due to ongoing curriculum updates.

General requirements

UNIV NH101	The Drexel Experience	2.0
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English Sequence

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0

ENGL 103 Composition and Rhetoric III: Themes and Genres 3.0

Biology/Nutrition courses

BIO 226 Microbiology for Health Professionals 5.0

NFS 220 Normal & Lifespan Nutrition 4.0

NFS 315 Nutrition in Chronic Disease 4.0

Chemistry courses

CHEM 108 Health Chemistry I 3.0

CHEM 103 General Chemistry III 5.0

Humanities and Social Science courses

ECON 240 Economics of Health Care Systems 4.0

PSY 101 General Psychology I 3.0

PSY 120 Developmental Psychology 3.0

SOC 101 Introduction to Sociology 3.0

SOC 125 Sociology of Aging * 3.0

PHIL 251 Ethics 3.0

or PHIL 321 Biomedical Ethics 3.0

Humanities elective 3.0

Social science elective 3.0

Mathematics/Computing/Data Analysis courses

INFO 204 Nursing Informatics 3.0

MATH 108 Mathematics for Nursing Professionals 3.0

PSY 364 Computer-Assisted Data Analysis I * 3.0

Anatomy courses

ANAT 101 Anatomy & Physiology I 5.0

ANAT 102 Anatomy & Physiology II 5.0

ANAT 103 Anatomy & Physiology III 5.0

Nursing courses

NURS 110 Essentials of Relationship-Based Professional Nursing Practice 4.0

NURS 112 Relationship-Based Health Assessment & Promotion 5.0

NURS 200 Principles of Nursing Practice 6.0

NURS 300 Comprehensive Adult Nursing I 6.0

NURS 301 Pharmacology for Nursing I 3.0

NURS 303 Women's Health Nursing 6.0

NURS 304 Nursing of Children 6.0

NURS 305 Comprehensive Adult Nursing II 6.0

NURS 306 Pharmacology for Nursing II 3.0

NURS 308 Mental Health Nursing 6.0

NURS 330 [WI] Research Basis of Nursing 4.0
(p. 306)]

NURS 337 [WI] Genetics in Nursing and Health 3.0
(p. 306)]

NURS 339 Pathophysiology 3.0

NURS 350 Independent Study in Nursing 1.0

NURS 388 Nursing Case Study I 1.0

NURS 400 [WI] Leadership, Management, and Entrepreneurship in Nursing 3.0
(p. 306)]

NURS 401 Comprehensive Adult Nursing III 6.0

NURS 403 Community Public Health Nursing 6.0

NURS 450 Contemporary Gerontological Nursing 6.0

NURS 488 Nursing Case Study II 1.0

NURS 489 Synthesis of Nursing Knowledge 4.0

NURS 490 Senior Project in Nursing 3.0

NURS 492 Senior Seminar in Nursing 3.0

Nursing elective ** 3.0

Free Electives

2 Free electives 6.0

Total Credits 185.0

* Or acceptable alternative course, as determined by the student's Academic Advisor.

** Nursing electives include either NURS 480, NURS 481, NURS 482, or NURS 336.

Sample Plans of Study

Students should contact their Academic Advisor for any changes to their plans of study prior to registration due to ongoing curriculum updates.

BS in Nursing: Co-op Experience Track "A"

Term 1		Credits
ANAT 101	Anatomy Physiology I	5.0
CHEM 108	Health Chemistry I	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSY 101	General Psychology I	3.0
UNIV NH101	The Drexel Experience	1.0
Term Credits		15.0
Term 2		Credits
ANAT 102	Anatomy Physiology II	5.0
CHEM 103	General Chemistry III	5.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 108	Mathematics for Nursing Professionals	3.0
UNIV NH101	The Drexel Experience	1.0
Term Credits		17.0
Term 3		Credits
ANAT 103	Anatomy Physiology III	5.0
BIO 226	Microbiology for Health Professionals	5.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
NURS 110	Essentials of Relationship-Based Professional Nursing Practice	4.0
Term Credits		17.0
Term 4		Credits
INFO 204	Nursing Informatics	3.0
NURS 112	Relationship-Based Health Assessment Promotion	5.0
NURS 200	Principles of Nursing Practice	6.0
Term Credits		14.0
Term 5		Credits
NFS 220	Normal Lifespan Nutrition	4.0
NURS 300	Comprehensive Adult Nursing I	6.0
NURS 301	Pharmacology for Nursing I	3.0
SOC 101	Introduction to Sociology	3.0
Term Credits		16.0

Term 6		
NURS 308	Mental Health Nursing	6.0
NURS 337 [WI (p. 306)]	Genetics in Nursing and Health	3.0
NURS 339	Pathophysiology	3.0
NURS 388	Nursing Case Study I	1.0
PSY 120	Developmental Psychology	3.0
Term Credits		16.0
Term 7		
NFS 315	Nutrition in Chronic Disease	4.0
NURS 305	Comprehensive Adult Nursing II	6.0
NURS 306	Pharmacology for Nursing II	3.0
NURS 488	Nursing Case Study II	1.0
SOC 125	Sociology of Aging	3.0
Term Credits		17.0
Term 8		
NURS 303	Women's Health Nursing	6.0
PSY 364	Computer-Assisted Data Analysis I	3.0
PHIL 321	Biomedical Ethics	3.0
or HSAD 210	Health-Care Ethics I	
Social Science Elective		3.0
Term Credits		15.0
Term 9		
NURS 304	Nursing of Children	6.0
NURS 400 [WI (p. 306)]	Leadership, Management, and Entrepreneurship in Nursing	3.0
Free Elective		3.0
Term Credits		12.0
Term 10		
ECON 240	Economics of Health Care Systems	4.0
NURS 330 [WI (p. 306)]	Research Basis of Nursing	4.0
NURS 401	Comprehensive Adult Nursing III	6.0
Select one of the following:		3.0
NURS 336	Introduction to Complementary Integrative Therapies	
NURS 501	Dimensions of Human Sexuality in Health Illness	
NURS 482	Cultural Dimensions of Nursing Care	
NURS 481	Issues Resolutions in End of Life Care	
Term Credits		17.0
Term 11		
NURS 403	Community Public Health Nursing	6.0
NURS 489	Synthesis of Nursing Knowledge	4.0
Humanities Elective		3.0
Term Credits		13.0
Term 12		
NURS 350	Independent Study in Nursing	1.0
NURS 450	Contemporary Gerontological Nursing	6.0
NURS 492	Senior Seminar in Nursing	3.0

Free Elective	3.0
Term Credits	13.0

Total Credit: 182.0**BS in Nursing: Co-op Experience Track "B"**

Term 1		Credits
ANAT 101	Anatomy Physiology I	5.0
CHEM 108	Health Chemistry I	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSY 101	General Psychology I	3.0
UNIV 101	The Drexel Experience	1.0
Term Credits		15.0
Term 2		
ANAT 102	Anatomy Physiology II	5.0
CHEM 103	General Chemistry III	5.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 108	Mathematics for Nursing Professionals	3.0
UNIV 101	The Drexel Experience	1.0
Term Credits		17.0
Term 3		
ANAT 103	Anatomy Physiology III	5.0
BIO 226	Microbiology for Health Professionals	5.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
NURS 110	Essentials of Relationship-Based Professional Nursing Practice	4.0
Term Credits		17.0
Term 4		
INFO 204	Nursing Informatics	3.0
NURS 112	Relationship-Based Health Assessment Promotion	5.0
NURS 200	Principles of Nursing Practice	6.0
Term Credits		14.0
Term 5		
NFS 220	Normal Lifespan Nutrition	4.0
NURS 300	Comprehensive Adult Nursing I	6.0
NURS 301	Pharmacology for Nursing I	3.0
SOC 101	Introduction to Sociology	3.0
Term Credits		16.0
Term 6		
NURS 308	Mental Health Nursing	6.0
NURS 337 [WI (p. 306)]	Genetics in Nursing and Health	3.0
NURS 339	Pathophysiology	3.0
PSY 120	Developmental Psychology	3.0
Term Credits		15.0
Term 7		
NFS 315	Nutrition in Chronic Disease	4.0
NURS 305	Comprehensive Adult Nursing II	6.0
NURS 306	Pharmacology for Nursing II	3.0
NURS 388	Nursing Case Study I	1.0

SOC 125	Sociology of Aging	3.0
Term Credits		17.0
Term 8		
NURS 303	Women's Health Nursing	6.0
PSY 364	Computer-Assisted Data Analysis I	3.0
PHIL 321 or 251	Biomedical Ethics Ethics	3.0
Social Science Elective		3.0
Term Credits		15.0
Term 9		
NURS 304	Nursing of Children	6.0
NURS 400 [WI (p. 306)]	Leadership, Management, and Entrepreneurship in Nursing	3.0
NURS 488	Nursing Case Study II	1.0
Free Elective		3.0
Term Credits		13.0
Term 10		
ECON 240	Economics of Health Care Systems	4.0
NURS 330 [WI (p. 306)]	Research Basis of Nursing	4.0
NURS 401	Comprehensive Adult Nursing III	6.0
Select one of the following:		3.0
NURS 336	Introduction to Complementary Integrative Therapies	
NURS 501	Dimensions of Human Sexuality in Health Illness	
NURS 482	Cultural Dimensions of Nursing Care	
NURS 481	Issues Resolutions in End of Life Care	
Term Credits		17.0
Term 11		
NURS 403	Community Public Health Nursing	6.0
NURS 489	Synthesis of Nursing Knowledge	4.0
Humanities Elective		3.0
Term Credits		13.0
Term 12		
NURS 350	Independent Study in Nursing	1.0
NURS 450	Contemporary Gerontological Nursing	6.0
NURS 492	Senior Seminar in Nursing	3.0
Free Elective		3.0
Term Credits		13.0
Total Credit: 182.0		

About the Co-op

Cooperative education was designed to provide students with real-world experience in a variety of professional settings before graduation. Co-op integrates full-time work experience in the student's field of study throughout the academic program. The College of Nursing and Health Professions co-op program is one of only two of its kind in the nation.

The nursing co-op provides students with 18 months of cooperative education in addition to the traditional clinical educational experiences.

Through co-op, students will have the opportunity to learn the role of the nurse and unlicensed assistive personnel as well as other daily

professional, political, and social issues in a work environment. Both before and during co-op, students will receive instruction on career management and professional development skills, such as résumé writing, job searches, interviewing skills, maintaining a career portfolio, negotiating salary, and professional behavior in the workplace. The clinical background students gain from co-op, coupled with a knowledge of career management, makes the Drexel option a value-added model of nursing education.

Co-op Descriptions

First Experience

Co-op I: Nursing in Contemporary Health Networks

Students will have cooperative education experiences in managed care settings, pharmaceutical companies, and other non-traditional healthcare work environments where nurses and nursing can effect change. Students will either work under the direction of a professional nurse or another health care professional with a minimum of a baccalaureate degree. Students will not perform any basic nursing skills in this role.

Second Experience

Co-op II: Acute and Chronic Health and Illness

Students on the 4-year track participate in Co-Op II, an education experience in the traditional health care environment that emphasize the delivery of nursing care to adults and adolescents with acute and chronic illnesses. The majority of placements will be in general and specialty medical-surgical units. Students will function in the role as an unlicensed assistive person and their job description will be modeled similarly to unlicensed assistive personnel or nursing externs.

Third Experience

Co-op III: Specialty Nursing Concentration

Students will have cooperative education experiences in a specialty area of their choice which will build upon their previous clinical courses and work experiences. For example, students may elect to specialize in labor and delivery, critical care, or return to work for a pharmaceutical or managed care company. Selection of content area for the Co-op III site will be made by each student in consultation with the student's faculty advisor. Students will be given a suggested reading list and texts to be used for supplemental reading and learning for the specialty co-op area. Students will function in the role as an unlicensed assistive person and their job description will be modeled similarly to the role of unlicensed assistive personnel or nursing externs.

Accelerated Career Entry (ACE) BSN

About the Program

Drexel University offers the Accelerated Career Entry Option (<https://www.drexel.edu/cnhp/academics/undergraduate/Accelerated-Career-Entry-to-Nursing-Program>), a one-year intensive nursing program for students who already have bachelor's or graduate degrees. The program is ideal for working adults or college graduates who want to change careers and earn a new degree in one year. This innovative program is geared to students who will benefit from intense education in nursing science rather than the traditional program, which takes three or four years.

Like their counterparts in the traditional baccalaureate nursing program, graduates of the accelerated program emerge with a set of skills that will serve them well in their chosen profession. Our graduates:

- Utilize the growing compendium of knowledge and information sources from nursing and other disciplines to learn, teach, heal the sick, and conserve health.
- Contribute to the profession by sharing knowledge and skills with clients, peers, and other professionals in a variety of methods.
- Utilize multiple technologies that access and manage information to guide professional practice.
- Participate in culturally sensitive health promotion activities that contribute to the community's health and wellness.
- Participate in ongoing educational activities related to personal growth, professional practice, and community service.
- Apply knowledge and skills appropriate to their selected areas of career clinical practice.
- Develop personal potential for leadership in a changing health care environment.
- Integrate ethical concepts and principles, The Code of Ethics for Nurses, and professional standards into practice within professional, academic, and community settings.
- Utilize critical-thinking skills to improve the health outcomes of patients, families, and communities across the continuum of care.

Admission requirements/Prerequisites

Candidates for admission must be college graduates with a 3.0 overall GPA or a 3.0 GPA in their most-recent 60 semester hours of coursework completed. Admitted students must complete all prerequisites before continuing with the program. Applicants whose native language is not English and/or were born outside of the United States are required to take both the TOEFL (Test of English as a Foreign Language) and the TSE (Test of Spoken English) and achieve a passing score in each.

Prerequisites

Effective for spring quarter 2013-14 (201335) and beyond, the following 8 courses, in semester terms, are prerequisites for the ACE program:

Chemistry with lab	4.0
Developmental Psychology	3.0
Anatomy with lab *	4.0
Physiology with lab *	4.0
Microbiology with lab *	4.0
Human Nutrition	3.0
Statistics	3.0
English	3.0

* The anatomy, physiology, and microbiology courses must have been taken within five years of beginning the program.

Degree Requirements

Students should contact their Academic Advisor for any changes to their plans of study prior to registration due to ongoing curriculum updates.

Required Courses

INFO 204	Nursing Informatics	3.0
NURS 110	Essentials of Relationship-Based Professional Nursing Practice	4.0

NURS 112	Relationship-Based Health Assessment & Promotion	5.0
NURS 200	Principles of Nursing Practice	6.0
NURS 300	Comprehensive Adult Nursing I	6.0
NURS 301	Pharmacology for Nursing I	3.0
NURS 303	Women's Health Nursing	6.0
NURS 304	Nursing of Children	6.0
NURS 305	Comprehensive Adult Nursing II	6.0
NURS 306	Pharmacology for Nursing II	3.0
NURS 308	Mental Health Nursing	6.0
NURS 330 [WI (p. 306)]	Research Basis of Nursing	4.0
NURS 337 [WI (p. 306)]	Genetics in Nursing and Health	3.0
NURS 339	Pathophysiology	3.0
NURS 400 [WI (p. 306)]	Leadership, Management, and Entrepreneurship in Nursing	3.0
NURS 401	Comprehensive Adult Nursing III	6.0
NURS 403	Community Public Health Nursing	6.0
NURS 450	Contemporary Gerontological Nursing	6.0
NURS 492	Senior Seminar in Nursing	3.0

Total Credits **88.0**

RN/BSN Completion Program

Bachelor of Science Degree in Nursing (BSN): 180.0 quarter credits (for Registered Nurses)

The RN/BSN Completion program is an option for nurses from associate degree and diploma nursing programs looking to complete the bachelor of science degree in nursing.

About the Program

The Bachelor of Science in Nursing program continues the education of registered nurses to prepare them for the rapidly changing health care environment. Core courses prepare the graduate for population-based cases and the managed care environment. Support courses, electives, and study in an area of the student's choosing build on foundational educational experiences to facilitate the examination of critical issues from a variety of perspectives.

A BSN is awarded at the completion of the program. Qualified students are encouraged to submatriculate in the MSN program (RN/BSN/MSN pathway) while enrolled in the BSN program.

For more information about this completion program at Drexel, visit the RN/BSN Completion Program (<https://www.drexel.edu/cnhp/academics/undergraduate/RN-to-BSN-Completion-Program>) page.

Admission Requirements/Prerequisites

Admission Requirements

- RN licensure (provisional acceptance will generally be offered pending successful completion of the NCLEX-RN examination)
- Official college transcripts
- College grade point average of 2.0 or better
- High school degree or equivalent

To be eligible for admission to the Bachelor of Science in nursing program, students must have completed 60.0 semester hours (90.0 quarter credits) of college prerequisites, as follows, with a grade of C or better. Students may transfer in up to 90.0 credits. Remaining credits will be evaluated on an individual basis. To graduate, students must have completed 180.0 credits.

The require 60.0 semester hours include:

English (includes one semester of composition)	6.0
Humanities (studio courses not acceptable)	3.0
Anatomy and Physiology	8.0
Microbiology	4.0
Sociology	3.0
Growth and Development	3.0
Psychology	3.0
Nursing	30.0
Total Credits	60.0

Graduates of National League for Nursing (<http://www.nln.org>) (NLN)-accredited associate or diploma nursing programs who meet the criteria of the Pennsylvania Nursing Articulation Model will receive credit for 30 semester hours of nursing, which may be applied toward the program entrance requirements.

Degree Requirements

The College of Nursing and Health Professions faculty uses a variety of teaching and learning methods to facilitate the achievement of a student's personal objectives. Most courses incorporate e-mail and Internet assignments as well as a variety of innovative, active learning assignments. Courses are offered in several stimulating educational formats, including in an online format.

Students should contact their Academic Advisor for any changes to their plans of study prior to registration due to ongoing curriculum updates.

TIER 1 COURSES

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Or transfer in 2 English courses (3 semester credits from a semester school) must include one semester of composition)

Humanities Electives	4.5
Intro to Sociology	4.5
General Psychology	4.5
Developmental Psychology	4.5
Nursing Electives	45.0
Anatomy & Physiology I & II (w/ Labs)	12.0
Microbiology w/ Lab	6.0

TIER 2 COURSES

Into to Computer Science of Communication	3.0
Statistics of the Health Sciences	4.0
Health Care Economics, Macro, or Micro	4.0
Health Care Ethics I or Advanced Health Care Ethics	3.0
Social Science Electives	3.0

Science Electives	5.0
Pharmacology or Advanced Physiology or Pathophysiology	5.0
Open Electives	18.0

TIER 3 COURSES

NURS 324	Intro to Online Learning:Tools for Success	3.0
NURS 325 [WI (p. 306)]	Critical Issues in Nursing	3.0
NURS 330 [WI (p. 306)]	Research Basis of Nursing	4.0
NURS 335	Genetics and Genomics: Application to Nursing Practice	3.0
NURS 340	Transformational Leadership	3.0
NURS 346	Health Assessment	6.0
NURS 375	Nurses Building a Healthy Community	6.0
NURS 380	Complex Systems of Care: Technology, Patient Safety & Quality	4.0
NURS 407	Issues in Aging and Longevity	4.0
NURS 460	Global Health & Policy Issues	6.0
NURS 465	Senior Capstone in Nursing	3.0

Total Credits 180.0

Accelerated RN/BSN/MSN

The RN-BSN-MSN Option is a pathway for students who are currently in the Drexel RN to BSN completion program and are interested in continuing their studies to pursue the MSN.

Admission

For the following tracks, students submit an application to the MSN program in the final term of BSN study:

- MSN in Nursing Education and Faculty Role
- MSN in Clinical Trials
- MSN in Clinical Nurse Leader
- MSN in Leadership in Health Systems Management
- MSN in Innovation & Intra/Entrepreneurship for Advanced Practice Nursing.

Students interested in either the Nurse Anesthesia program or Nurse Practitioner programs may opt for an accelerated option. The following Nurse Practitioner tracks are available:

- Adult-Gerontology Acute Care Nurse Practitioner (online track)
- Adult-Gerontology Primary Care Nurse Practitioner (<http://catalog.drexel.edu/graduate/collegeofnursingandhealthprofessions/adultgerontologyprimarycarecon>) (online track)
- Family/Individual Across the Life Span Nurse Practitioner (<http://catalog.drexel.edu/graduate/collegeofnursingandhealthprofessions/familynursepractitionercon>) (online track)
- Pediatric Acute Care Nurse Practitioner (<http://catalog.drexel.edu/graduate/collegeofnursingandhealthprofessions/pediatricacutecon>) (online track)
- Pediatric Primary Care Nurse Practitioner (<http://catalog.drexel.edu/graduate/collegeofnursingandhealthprofessions/pediatricprimarycarecon>) (online track)
- Psychiatric Mental Health Nurse Practitioner (<http://catalog.drexel.edu/graduate/collegeofnursingandhealthprofessions/psychiatricmentalhealthpractitionercon>) (online track)

- Women's Health/Gender Related Nurse Practitioner (<http://catalog.drexel.edu/graduate/collegeofnursingandhealthprofessions/womensnursepractitionercon>) (online track)

For both the Nurse Anesthesia and the Nurse Practitioner programs, students submit an application when close to completing their BSN degrees. The BSN students must meet the admission requirements for the MSN program. Specific admission criteria are outlined on the Admission Requirements RN to BSN to MSN Option (<http://drexel.edu/cnhp/academics/graduate/MSN-Bridge>) page.

Students may not register for graduate courses until they are accepted in the program. Additional information is available on the RN-BSN-MSN (<http://drexel.edu/cnhp/academics/graduate/MSN-Bridge>) program page.

Student in any of the MSN Nurse practitioner tracks may be admitted from any state, except New York. In addition, students taking an online course with a clinical component or practicum cannot do the clinical or practicum portion of the course within the state of Maryland at this time. If a student is a licensed registered nurse in Maryland, the student may complete a clinical or practicum in Virginia and/or Delaware, which share a nurse compact licensure with Maryland. Drexel University is in the process of applying for a certificate of approval to operate in Maryland.

Clinical Affiliations

Clinical Placement Sites

The Undergraduate Nursing Programs have an extensive network of clinical placement sites, including:

Stephen and Sandra Sheller 11th Street Family Health Services

Abington Memorial Hospital

Albert Einstein Medical Center

ARIA Health Torresdale

Belmont Behavioral Health

Bryn Mawr Hospital of Main Line Health

Chandler Hall Health Services

Chestnut Hill Hospital

Children's Hospital of Philadelphia

Cooper University Hospital

Crozer-Chester Medical Center

Delaware County Memorial Hospital

Doylestown Hospital

Einstein Medical Center Montgomery

Fairmount Behavioral Health

Hahnemann University Hospital

Holy Redeemer Health System

Hospital of the University of Pennsylvania

Inspira Health Network Woodbury

Kennedy Health

Kirkbride Center

Lankenau Medical Center

Mercy Philadelphia Hospital

Methodist Hospital

Nazareth Hospital

Norcom Community Center

Norris Square Civic Association

Northeast Treatment Centers

Our Brother's Place

Paoli Hospital

Paul's Run Retirement Community

Pennsylvania Hospital

Presbyterian Medical Center

School District of Philadelphia

St. Christopher's Hospital for Children

St. Joseph's Manor

St. Mary Medical Center

Shriner's Hospital for Children

The Ridge at Whitemarsh

Thomas Jefferson University Hospital

Watermark at Logan Square

Wellington Terrace at Hershey's Mill

Wesley Enhanced Living

* RN/BSN Online Distance-Learning students will have clinical placements at sites convenient to their locations.

Nursing Faculty

Lisa B. Aiello-Laws, RN, MSN, AOCNS, APN-C (*University of Pennsylvania*). Assistant Clinical Professor. Adult oncology and cancer genetics.

Scott D. Alcott, MSN (*Drexel University*). Assistant Clinical Professor. Nursing informatics, leadership, technology, and on-line learning.

Kristen Altdoerffer, MSN, CRNP, BSN, RN (*Drexel University*). Assistant Clinical Professor. Pediatric and adolescent nursing.

Barbara Amendolia, DrNP, NNP, APN-BC (*Drexel University*). Assistant Clinical Professor. Neonatology, specifically feeding difficulties and respiratory diseases of the newborn.

Katherine Kaby Anselmi, PhD, JD, CRNP (*University of Pennsylvania*)
Assistant Dean of Accreditation/Regulatory Affairs & Online Innovation

. Associate Clinical Professor. Nursing, law, family nurse practitioner, women's health nurse practitioner.

Lew Bennett, CRNA, MSN (*Temple University*) *Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

Suzan Blacher, MSN, CARN, CCIT (*Drexel University*) *RN-BSN Program*. Assistant Clinical Professor.

Joan Rosen Bloch, PhD, CRNP (*University of Pennsylvania*). Associate Professor. Maternal and infant health outcomes with a particular focus on racial and ethnic perinatal health disparities.

Susan M. Burke, PhD, RN, CPNP-BC (*The Catholic University of America*). Associate Clinical Professor. Pediatric primary care, health disparities in children, families under stress, children with special health care needs transitioning to adulthood.

Barbara Celia, MSN, EdD (*University of Pennsylvania; Rutgers University*). Assistant Clinical Professor. Pain management and access to health care.

Paul Thomas Clements, RN (*University of Pennsylvania*). Associate Clinical Professor. Forensic, child, adolescent and family mental health nursing.

Jennifer Coates, MSN, MBA, CRNP, BC (*The University of Pennsylvania*). Assistant Clinical Professor. Critical care nurse practitioner.

Ferne Cohen, CRNA, EdD (*Drexel University*) *Associate Chair, Nurse Anesthesia Department*. Assistant Clinical Professor. Clinical and didactic education of nurse anesthesia students.

John T. Cornele, MSN, RN, CNE, EMT-P (*Drexel University*) *Director CICSP*. Instructor. Airway management, nursing and paramedic educational issues, PDA implementation topics, simulation development, use of standardized patients and the art and science of moulage.

Frances H. Cornelius, PhD, MSN (*Drexel University; Wayne State University*) *Chair, MSN Department*. Clinical Professor. Environmental justice, community and public health instructional technology, distance learning, mobile learning, informatics.

Linda Dayer-Berenson, PhD, MSN, CRNP, CNE, FAANP (*Rutgers University - formerly UMDNJ-SHRP*). Associate Clinical Professor. Adult health, pharmacology, cultural competence and pain management.

Diane DePew, DSN, RN (*University of Alabama, Birmingham*). Assistant Clinical Professor. Evaluation, competency, test development and item writing, continuing education, accreditation, educational design, leadership management.

Jill Derstine, EdD, RN, FAAN (*University of Pennsylvania*). Associate Clinical Professor. Nursing education and rehabilitation nursing.

Rose Ann DiMaria-Ghalili, PhD, MSN, BSN, CNSC (*New York University, School of Education, Division of Nursing*). Associate Professor. Nutrition and surgical recovery to improve the care of older adults undergoing surgery; nutrition assessment, inflammation, and health outcomes.

Gloria Donnelly, PhD (*Bryn Mawr College*) *Dean of the College of Nursing & Health Professions*. Professor. Nursing education and a variety of mental health topics including assertiveness, stress and change.

Jane Donovan, MSN, RNC (*Villanova University*). Assistant Clinical Professor. Women's health

H. Michael Dreher, PhD, RN, FAAN (*Widener University*). Professor. Sleep, sleep in HIV illness, practice knowledge development, legal issues in nursing education.

Brian Fasolka, MSN, RN, CEN (*DeSales University*). Assistant Clinical Professor. Emergency nursing, adult health nursing, and nursing education.

Theresa Fay-Hillier, RN, MSN (*University of Pennsylvania*). Assistant Clinical Professor. Child, adolescent and family mental health nursing.

Kathleen Fisher, PhD, CRNP (*Pennsylvania State University*). Associate Clinical Professor. Health care for vulnerable populations, decision making in vulnerable populations (i.e. individuals with intellectual disability.)

Alecia Schneider Fox, PhD (Candidate) (*Widener University*) *Senior Director Nursing Faculty Affairs and Clinical Education*. Assistant Clinical Professor. Emergency, critical care, trauma, organ transplant and advanced nursing practice. Serves as the Faculty Advisor for the Drexel Chapter of the Student Nurses Association of Pennsylvania.

Sandra A. Friedman, MSN, CNM (*Yale University*). Assistant Clinical Professor. Interdisciplinary team simulation and debriefing, health assessment and health promotion, nurse midwifery with specialty in adolescent health, nurse managed health center administration.

Mary Gallagher-Gordon, PhD, MSN, RN, CNE (*Drexel University*) *Senior Director of Contracts, Compliance and Academic Community Initiatives*. Assistant Clinical Professor. Informatics, patient safety and nursing education, NCLEX review.

Ellen Giarelli, EdD, CRNP (*University of Pennsylvania; Rutgers University*) *Director of Post-baccalaureate Certificate Program in the Integrated Nursing Care of Autism Spectrum Disorder*. Associate Professor. Genetic/genomic nursing care, self-management of chronic disorders, autism spectrum disorder.

Karen Goldschmidt, MSN, RNC (*Wilmington University*) *Department Chair, RN-BSN Completion Department*. Assistant Clinical Professor. Professional issues, nursing education, staff development, scholarly writing.

Maureen Gonzales, MSN, CRNP (*University of Pennsylvania*) *Public Health Nurse*. Assistant Clinical Professor. Women's health.

Elizabeth Gonzalez, PhD, PMHCNS-BC (*New York University*) *Department Chair, Doctoral Nursing Program*. Associate Clinical Professor. Chronic stress, geropsychiatry, depression among the elderly, minority health issues and cross-cultural research among family caregivers of relatives with Alzheimer's disease.

Mary K. Green, MSN, RN, BC (*Drexel University*). Assistant Clinical Professor. Community public health nursing, maternal child health nursing.

Donna Gribbin, RN, DNP, CNE (*Duquesne University*). Assistant Clinical Professor. Medical-surgical nursing, simulation, nursing education.

Cynthia Hambach, MSN, RN, CCRN (*Widener University*). Assistant Clinical Professor. Critical care nursing.

Elizabeth Hammond-Ritschard, RN, MSN (*Cedar Crest College*). Assistant Clinical Professor. Adult health nursing, nursing education.

Thomas L. Hardie, EdD, RN, PMHCNS-BC (*Columbia University, Teachers College*). Associate Professor. Psychiatric nursing, cancer survivorship, treatment research outcomes in substance abuse

Margaret M. Harkins, DNP, MBE, MSN, GNP-BC (*Chatham University*). Assistant Clinical Professor. Gerontology, hospice/palliative care, clinical bioethics.

Angela C. Hawes, MSN, RN (*University of Pennsylvania*). Assistant Clinical Professor. Child and family health nursing.

Karyn Holt, PhD, RN, CNM (*Georgetown University; Touro University*) *Director of Online Quality, CNHP, Division of Nursing*. Associate Clinical Professor.

Lisa Johnson, DrNP, CRNP, ACNP (*Drexel University*). Assistant Clinical Professor. Surrogate end-of-life decision making within minority populations in the acute care setting; ethnourishing.

Dana C. Kemery, RN, MSN (*Drexel University*). Assistant Clinical Professor. Emergency nursing (adult and pediatric), nursing education.

Michelle Kensey, MSN, RN (*University of Pennsylvania*) *Chair of Undergraduate Women's Health, Perinatal Clinical Nurse Specialist*. Assistant Clinical Professor.

Priscilla Killian, MSN, RNC, MHPNP (*LaSalle University*). Assistant Clinical Professor. Global and public health, health promotion, disease prevention in a community setting and the integration of psychiatric and primary care services to the persistently mentally ill living in the community setting.

Cindy M. Little, PhD, WHNP, CNS (*Virginia Commonwealth University in Richmond, VA*). Assistant Clinical Professor. Women's health, obstetrics and clinical genetics.

Jean S. MacFadyen, PhD, RN (*University of Pennsylvania*). Assistant Clinical Professor. Intra-Entrepreneurship in advance practice nursing, gerontology, leadership, transcultural nursing.

Mary Kay Maley, RN, MSN, APN (*University of Medicine and Dentistry of New Jersey*). Assistant Clinical Professor. Family health, faith community nursing, health promotion/disease prevention and mindfulness-based stress reduction.

Kimberley McClellan, MSN, WHNP-BC, FNP-BC, CRNP (*Drexel University*). Assistant Clinical Professor. Nursing, women's health, family practice.

Pamela McGee, MSN, FNP-BC, CNE (*University of Pennsylvania*). Assistant Clinical Professor. Medical/surgical nursing, gerontology, primary care, family nurse practitioner.

Marylou K. McHugh, RN, EdD (*Teachers College; Columbia University*). Associate Clinical Professor. Nursing, contemporary nursing faculty track.

Kristen McLaughlin, MSN, RN, CPNP-PC (*University of Pennsylvania*). Assistant Clinical Professor. Pediatric nurse practitioner.

Cheryl Mele, MSN, CRNP (*University of Pennsylvania*). Assistant Clinical Professor. Pediatric critical care clinical specialist, pediatric nurse practitioner, acute-chronic and neonatal nurse practitioner.

Faye (Pearlman) Meloy, PhD, MSN, MBA (*Drexel University*) *Associate Dean, Prelicensure BSN Programs*. Associate Clinical Professor. Clinical practice; education; health policy and planning; community service; human resources and health care administration.

Sally K. Miller, PhD, CRNP (*Walden University*). Clinical Professor. Adult-gerontology primary and acute care nurse practitioner, family nurse practitioner, advanced pathophysiology, advanced pharmacology.

Kymberlee Montgomery, DrNP, CRNP (*Drexel University*) *Chair, NP Programs*. Assistant Clinical Professor. Medicine, women's health nurse practitioner, education, interprofessional education.

Dana Murphy-Parker, MS, CRNP, PMHNP-BC (*University of Colorado*) *Track Director, Psychiatric Nurse Practitioner Program*. Assistant Clinical Professor.

Louise G. Murray, MSN, CRNP, FNP-BC (*Drexel University*). Assistant Clinical Professor. Family nurse practitioner.

Maura A. Nitka, MSN, RN, CPN, APN (*Drexel University*). Assistant Clinical Professor. Pediatric nursing.

Carol Okupniak, MSN, RN (*Thomas Jefferson University*). Assistant Clinical Professor. Nursing women's health, nursing leadership, informatics.

Jennifer Olszewski, MSN CRNP (*LaSalle University*) *Director of the Adult-Gerontology Primary Nurse Practitioner Program*. Assistant Clinical Professor. Critical care, patient safety, interdisciplinary education

Alis Kotler Panzera, DrNP, WHNP-BC, RN (*Drexel University*). Assistant Clinical Professor. Nursing, women's health nurse practitioner.

Carol M. Patton, PhD, RN, FNP-BC, CRNP, CNE (*University of Pittsburgh School of Public Health*). Associate Clinical Professor. Family nurse practitioner; health promotion/disease prevention across the life span, primary, secondary and tertiary health promotion across the lifespan; health outcomes, health policy, ethics, quality and safety initiatives, QSEN, high reliability organizations.

Cheryl Portwood, MSN, RN, CNA-BC (*University of Pennsylvania*). Clinical Assistant Professor. Medical-surgical, critical care, and neonatal intensive care; distance learning; leadership management; health policy.

Bobbie Posmontier, PhD, CNM, PMHNP-BC (*University of Pennsylvania*). Assistant Professor. Labor and delivery, midwifery, postpartum care, neonatal intensive care, improving access to care for women with postpartum depression, family psychiatric nurse practitioner.

Alice Marie Poyss, PhD, MSN (*University of Pennsylvania*). Associate Clinical Professor. Nursing intervention/outcome studies and nursing treatment/outcome studies; program evaluation, and effects of alternate teaching styles with student learning.

Brenda Reap-Thompson, MSN, RN (*Villanova University*). Assistant Clinical Professor. Adult health/nursing education; safety and legal issues in nursing and test development.

Mary Jean Ricci, MSN, RN, BC (*University of Pennsylvania*) *Adjunct Faculty Coordinator*. Assistant Clinical Professor. Community public health, medical-surgical nursing.

Patricia A. Riccio, PhD, RN (*University of California, Los Angeles*). Assistant Clinical Professor. Research methods and biostatistics.

Leland Rockstraw, PhD, RN (*Drexel University*) Assistant Dean, *Clinical Simulation and Practice*. Associate Clinical Professor. Adult orthopedic/surgical, emergency care, critical care, and trauma/surgery intensive care.

Al Rundio, Jr., PhD, DNP, RN, APRN, NEA, BC (*University of Pennsylvania*) Interim Associate Dean for Advanced Practice Nursing Programs, Chair of DNP Program. Clinical Professor. Nursing graduate leadership and management track.

Jo Ann Runewicz, EdD, RN, C, MSN (*Nova SE University*). Assistant Clinical Professor. Gerontology, adult health and education.

Jane Greene Ryan, PhD (*Widener University*). Assistant Clinical Professor. Nursing women's health.

Donna Sabella, PhD, MEd, MSN, PMHNP-BC (*University of Pennsylvania*) Director of Global Studies. Assistant Clinical Professor. Cultural competence, human trafficking, mental health, forensic nursing, working with vulnerable populations.

Deanna Lynn Schaffer, MSN, RN, CNE, ACNS-BC (*MCP Hahnemann University*) Chair of the BSN Co-Op Program. Assistant Clinical Professor.

Joanne Schwartz, PhD, CRNP, CNE (*Villanova University*) Chair of the Accelerated BSN Department. Assistant Clinical Professor.

Joanne Serembus, EdD, RN, CCRN (Alum), CNE (*Widener University*). Associate Clinical Professor. Critical care nursing, adult health nursing, nursing education, curriculum development and patient safety.

Susan Solecki, MSN (*Hahnemann University*). Assistant Clinical Professor. Nursing women's health, adult health, and occupational health.

Ann Thiel-Barrett, DNP, RN, FNP-BC, CNE (*Chatham University*). Assistant Clinical Professor. Family health nursing.

Elizabeth Tomaszewski, DNP, CCRN, CRNP, ACNP-BC, ACNPC (*Chatham University*). Assistant Clinical Professor. Critical care; end of life care; advance practice nursing.

Donna Trinkaus, MSN, RN (*DeSales University*). Assistant Clinical Professor. Critical care nursing, adult health nursing, infection control and nursing education

AtNena Tucker, DNP, FNP-BC (*University of South Alabama*). Assistant Clinical Professor. Research in emergency medicine, critical care, health care administration.

Jeannine Uribe, PhD, RN (*University of Pennsylvania*) Community Clinical Coordinator. Assistant Clinical Professor. Public health nursing; international, professional collaboration, philanthropic health care projects, urban public health issues and caring for immigrant populations.

Roberta Waite, EdD, MSN (*Widener University; University of Pennsylvania*) Assistant Dean of Academic Integration and Evaluation of Community Programs. Associate Professor. Psychiatric nursing; depression and ADHD in minority adults, and the effects of adverse childhood experiences on adult health in minority adults.

Louise Ward, PhD, CRNP, CNE (*Binghamton University*). Associate Clinical Professor. Public health nursing.

Lori Wheeler, MSN, RN (*West Chester University*). Assistant Clinical Professor. Adult health nursing, community health nursing, and nursing education.

Regina Willard, MSN, RN (*Drexel University*). Assistant Clinical Professor. Nursing, cardiology, acute care nurse practitioner.

Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE, CHSE (*Rutgers University*) Assistant Dean for Special Projects, Simulation & CNE Accreditation. Associate Clinical Professor. Simulation informatics and technology, perianesthesia, pain management, critical care, trauma, emergency preparedness.

Virginia Wilson, RN, MSN, NEA-BC, NE-BC (*Widener University*). Assistant Clinical Professor. Leadership and management.

Regina Wright, MSN, CEN (*University of Pennsylvania*). Assistant Clinical Professor. Care of the adult patient with complex health problems (medical/surgical concentration); professional role development; approaches to adult learning behaviors.

Mary Ann Zimmer, MSN, CPN (*Villanova University*). Assistant Clinical Professor. Pediatrics, adult medical-surgical nursing, nursing education.

Janet Zimmerman, MSN, BSN (*University of Colorado*). Assistant Clinical Professor. Clinical trials, nursing care of veterans.

Patti Rager Zuzelo, EdD, RN, ACNS-BC, ANP-BC, FAAN (*Widener University*). Clinical Professor. Advanced practice nursing, leadership and management, nursing education, clinical nurse specialist (adult health) and adult nurse practitioner.

Nutrition and Foods

Major: Nutrition and Foods

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 184.5

Classification of Instructional Programs (CIP) code: 30.0901

Standard Occupational Classification (SOC) code: 29-1031

About the Program

The nutrition and foods curriculum emphasizes the relationship between food, food choices, nutrient metabolism, and medical nutrition therapy to meet health and nutrient needs of individuals and groups. The major prepares students to pursue career opportunities in dietetics and research.

The BS in Nutrition and Foods program requires four years of study and the completion of at least 180.0 credits. The curriculum is designed to provide a sound basis for careers in dietetics and the application of the principles of nutrition and food science to the nutritional care of individuals and groups—such as in school food service or community nutrition—or to provide a sound basis for careers in the food and pharmaceutical industries.

The study of the biochemical nature of nutrients and foods, their interaction with the environment, and their eventual metabolic fate is a strong career path for more research-minded students and provides a unique base for graduate study.

About the Nutrition Program

Dietetics is the practical application of nutrition in the prevention and treatment of disease. Dietetics is an exciting and challenging profession because there are many diseases that are related to nutrition, such as heart disease, high blood pressure, stroke, cancer, diabetes and obesity.

The nutrition program at Drexel University is referred to as a Didactic Program in Dietetics (DPD) because we provide classroom training for students who want to become Registered Dietitians/Nutritionists (RD/RDN). Our Didactic Program in Dietetics is currently granted accreditation by the Accreditation Council For Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics:

Academy of Nutrition and Dietetics
120 S. Riverside Plaza
Suite 2000
Chicago, IL 60606
800-877-1600 x5400
www.eatright.org (<http://www.eatright.org>)

The Academy of Nutrition and Dietetics (AND) is the nation's largest organization of food and nutrition professionals, most of whom are Registered Dietitians (RD) or Registered Dietitian Nutritionists (RDN).

To become an RD/RDN, students must complete a:

- Minimum of a bachelor's degree with course work approved by ACEND. Coursework typically includes food and nutrition sciences, chemistry, biochemistry, physiology, microbiology, community nutrition, nutrition education, foodservice systems management and business.
- An accredited, supervised practice program, also called a dietetic internship, at a health-care facility, community agency or foodservice corporation. The internship provides at least 1200 hours of hands-on training.
- Pass a national examination administered by the Commission on Dietetic Registration.

After successfully completing the BS program in Nutrition and all DPD-required courses with a C or better, students will receive a BS degree and a DPD Verification Statement. The Verification Statement is a certificate documenting completion of an approved/accredited Didactic Program in Dietetics. Students need both a minimum of Bachelor's degree and a Verification Statement to be eligible for a supervised practice program or internship.

During the senior year, most students will apply for admission into a dietetic internship. Most dietetic internships last 8 to 9 months. To have a good chance of getting accepted into a dietetic internship, students should do the following:

- Maintain a cumulative GPA greater than 3.0 (this includes college courses regardless of where taken).
- Work several hundred hours in dietetics-related work and volunteer experience (especially in the food and nutrition departments at hospitals and nursing homes and in community programs such as WIC).
- Participate in activities that demonstrate leadership.

Mission, Goals, and Outcome Measures

The mission of the Drexel University Didactic Program in Dietetics is to integrate a foundation in the nutrition sciences with courses in the humanities to provide the knowledge, skills, and professional values (such as ethics) needed for successful entry into dietetic internships, graduate school, and/or dietetics employment. The learning environment is structured to allow students opportunities for experiential learning, including co-operative education, participation in research, and use of current technologies.

GOAL 1

To provide quality didactic instruction and learning experiences to prepare graduates to be accepted into dietetic internships and graduate schools, and/or work in the field of dietetics.

- 75% of graduating BS students and 90% of graduating MS students will apply to an accredited dietetic internship.
- 80% of students who apply to dietetic internships are accepted.
- 75% of students who apply to graduate school are accepted.
- Of those graduates seeking employment in nutrition and food-related careers, 80% will be employed within 6 months of program completion.
- On surveys to internship directors, graduate school advisors, and employers, the mean rating of each of 10 learning outcomes will exceed the rating of "3" (satisfactory).
- On surveys to students one year after graduation, the mean rating of each of 10 learning outcomes will meet or exceed the rating of "3" (satisfactory) or better.
- On course evaluation responses, 90% of the knowledge and skill statements identified in the course syllabi will be rated as competent.

GOAL 2

To prepare graduates who are accepted into accredited internship programs to become competent entry-level dietitians.

- The program's first time pass rate on the entry level exam is 80% or above.

GOAL 3

Through recruitment efforts, encouragement, motivation, and support, faculty and staff will increase the number of students and the diversity of students who enter and complete the didactic program in dietetics.

- At least 10% of DPD students will be from underrepresented groups.
- At least 90% of students will complete the program within 150% of the expected time frame for the program (BS full-time = 4 years; BS part-time = 5-7 years).

For more information, visit the College's Nutrition and Sciences (<https://www.drexel.edu/cnhp/academics/undergraduate/BS-Nutrition-and-Foods>) web page.

Admission/Graduation Requirements

Admission Requirements

Drexel takes into consideration a number of criteria when determining admission, including the applicant's application, transcripts, courses in progress, two recommendations, standardized test scores, essay, and special interests (list of extracurricular activities, employment, etc.). Applicants to the Nutrition and Foods program must have completed four years of high school mathematics (algebra I and II, geometry, and trigonometry) and two years of a laboratory science (biology, chemistry, or physics). Applicants should have a strong interest in, and aptitude for, the basic sciences that are required in the program.

To be considered as a transfer student, candidates should have completed a minimum of 24 college credits. Drexel operates on a rolling admission basis, which means that students will be notified about the admission decision as soon as possible after their files are complete. Visit the Admissions (<http://drexel.edu/undergrad/academics/majors>) web site for more information and to apply online.

Graduation Requirements

To receive a BS in Nutrition and Foods, students in the program must complete a plan of study of all required courses and enough elective courses to total at least 180.0 credits. An overall GPA of 2.0 or higher for all coursework undertaken at Drexel University must be earned to receive a BS. A "C" or better is necessary in all courses required by the Didactic Program in Nutrition in order to receive a verification statement.

For the current academic calendar, visit Drexel University Academic Calendars (<http://drexel.edu/drexelcentral/courses/calendars>).

Degree Requirements

Communications and English

COM 230	Techniques of Speaking	3.0
COM 345	Intercultural Communication	3.0
or COM 310	Technical Communication	
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Physical and Biological Sciences

ANAT 101	Anatomy & Physiology I	5.0
ANAT 102	Anatomy & Physiology II	5.0
ANAT 103	Anatomy & Physiology III	5.0
BIO 122	Cells and Genetics	4.5
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality & Composition	1.0

Humanities and Social Sciences

ANTH 101	Introduction to Cultural Diversity	3.0
or SOC 101	Introduction to Sociology	
PSY 101	General Psychology I	3.0

Management and Computing

CS 161	Introduction to Computing	3.0
HRM 455	Hospitality Human Resources Management	3.0
ORGB 300 [WI (p. 315)]	Organizational Behavior	4.0

Foods, Food Safety, and Food Production

CULA 115	Culinary Fundamentals	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
FDSC 350	Experimental Foods: Product Development	3.0
HRM 215	Commercial Food Production	4.0

Mathematics and Statistics

MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
STS 345	Statistics for the Health Sciences	4.0

Nutrition and Food Sciences

NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
NFS 203	Nutrition II: Nutrition in the Lifecycle	4.0

NFS 230	Intermediate Nutrition	4.0
NFS 265	Professional Issues in Nutrition and Foods	3.0
NFS 345	Foods and Nutrition of World Cultures	3.0
NFS 370	Foodservice Systems Management	4.0
NFS 391	Community Nutrition	4.0
NFS 415	Advanced Nutrition I: Macronutrition	4.0
NFS 416	Advanced Nutrition II: Micronutrients	4.0
NFS 431	Nutrition Counseling	4.0
NFS 443	Medical Nutrition Therapy I	3.0
NFS 444	Medical Nutrition Therapy II	3.0
NFS 445	Medical Nutrition Therapy III	3.0
NFS 475	Advanced Seminar in the Dietetics Profession	3.0
NFS 494	Senior Project I	2.0
NFS 495	Senior Project II	2.0
NFS 496	Senior Project III	2.0

Additional Requirements

UNIV NH101	The Drexel Experience	2.0
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Free Electives 30.0

Total Credits 184.5

Sample Plan of Study

BS Nutrition and Foods: 4 YR UG (with one co-op spring/summer junior year)

Term 1		Credits
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSY 101	General Psychology I	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition Food	1.0
UNIV NH101	The Drexel Experience	2.0
Term Credits		14.5
Term 2		Credits
CHEM 102	General Chemistry II	4.5
CS 161	Introduction to Computing	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 101	Introduction to Analysis I	4.0
Term Credits		14.5
Term 3		Credits
CHEM 103	General Chemistry III	5.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FDSC 154	Foods: Composition, Interaction and Formulation	4.0
MATH 102	Introduction to Analysis II	4.0
Term Credits		16.0
Term 4		Credits
ANAT 101	Anatomy Physiology I	5.0
BIO 122	Cells and Genetics	4.5
NFS 230	Intermediate Nutrition	4.0
Free Elective		3.0
Term Credits		16.5

Term 5		
ANAT 102	Anatomy Physiology II	5.0
CULA 115	Culinary Fundamentals	3.0
FDSC 270	Microbial Food Safety and Sanitation	4.0
NFS 215	Nutritional Chemistry	3.0
NFS 217	Nutrient Quality Composition	1.0
Term Credits		16.0
Term 6		
ANAT 103	Anatomy Physiology III	5.0
COM 345	Intercultural Communication	3.0
NFS 203	Nutrition II: Nutrition in the Lifecycle	4.0
NFS 265	Professional Issues in Nutrition and Foods	3.0
Term Credits		15.0
Term 7		
ANTH 101 or SOC 101	Introduction to Cultural Diversity Introduction to Sociology	3.0
COM 230	Techniques of Speaking	3.0
STS 345	Statistics for the Health Sciences	4.0
Free Elective		6.0
Term Credits		16.0
Term 8		
HRM 215	Commercial Food Production	4.0
FDSC 350	Experimental Foods: Product Development	3.0
NFS 415	Advanced Nutrition I: Macronutrition	4.0
Free Elective		6.0
Term Credits		17.0
Term 9		
NFS 416	Advanced Nutrition II: Micronutrients	4.0
ORGB 300 [WI (p. 315)]	Organizational Behavior	4.0
Free Elective		6.0
Term Credits		14.0
Term 10		
NFS 391	Community Nutrition	4.0
NFS 443	Medical Nutrition Therapy I	3.0
NFS 475	Advanced Seminar in the Dietetics Profession	3.0
NFS 494	Senior Project I	2.0
Free Elective		3.0
Term Credits		15.0
Term 11		
NFS 370	Foodservice Systems Management	4.0
NFS 431	Nutrition Counseling	4.0
NFS 444	Medical Nutrition Therapy II	3.0
NFS 495	Senior Project II	2.0
Free Elective		3.0
Term Credits		16.0
Term 12		
HRM 455	Hospitality Human Resources Management	3.0
NFS 345	Foods and Nutrition of World Cultures	3.0
NFS 445	Medical Nutrition Therapy III	3.0
NFS 496	Senior Project III	2.0

Free Elective	3.0
Term Credits	14.0

Total Credit: 184.5

Minor in Nutrition

The minor in nutrition is designed for students interested in enhancing their major with an application in human nutrition. The nutrition minor should be especially attractive to students in the premedical, biological, and behavioral neurological sciences, as it provides a background for enhanced employment and post-baccalaureate study opportunities in areas closely allied to their basic disciplines.

The minor consists of 25.0 credits. Interested students should consult with a nutrition and food science faculty member to schedule courses appropriate for their background and goals.

Required courses

NFS 200	Nutrition I: Principles of Nutrition	4.0
or NFS 230	Intermediate Nutrition	
NFS 203	Nutrition II: Nutrition in the Lifecycle	4.0
NFS 315	Nutrition in Chronic Disease	4.0

Select four of the following courses: 12.0-14.0

NFS 320	Pediatric Nutrition	
NFS 325	Nutrition & Exercise Physiology	
NFS 415	Advanced Nutrition I: Macronutrition	
NFS 416	Advanced Nutrition II: Micronutrients	
NFS 446	Perspectives in World Nutrition	
NFS 480	Special Studies in Nutrition and Food	

Total Credits 24.0-26.0

Career Opportunities

Possible career opportunities in dietetics include the following:

- *Clinical Dietitians* are specialists in food nutrition services in hospitals, outpatient clinics, and private practices. They assess patient nutrition, develop dietary plans, provide patient counseling, and monitor patient progress.
- *Community Dietitians* work in public health agencies, health and fitness clubs, and day care centers. They counsel people on food choices and direct programs in nutrition awareness and disease prevention.
- *Management Dietitians* specialize in food service systems or clinical management. They work in hospitals, nursing homes, school food service, cafeterias, and restaurants. They manage personnel, plan and conduct employee training programs, design food systems, and plan budgets.
- *Business Dietitians* work in the food industry in product development and marketing, public relations, food styling, and menu design.
- *Consultant Dietitians* are independent business people who work as consultants to nursing homes, sports team, and other clients.

Facilities

The Center for Integrated Nutrition and Performance (CINP), located in the Daskalakis Athletic Center, provides a variety of nutrition services to the Drexel community, including workshops, lectures, support for athletic

teams, and individual counseling. An employee weight loss program is available through CINP.

Food preparation laboratories feature state-of-the-art equipment for both experimental and quantity food production.

Bioscience teaching laboratories are available with networked computers and advanced digital image analysis capabilities. Both teaching and research laboratories contain a range of equipment including microscopes, centrifuges, chromatographs, spectrophotometers, scintillation counters, culture chambers, and densitometers.

Nutrition Sciences Faculty

Nyree Dardarian, MS, RD, LDN (*Drexel University*) *Nutrition and Foods. Director, Center for Integrated Nutrition & Performance; Coordinator, Individualized Supervised Practice Pathway.* Instructor. Energy expenditure.

Angelo Del Parigi, MD (*University of Bari, Italy*) *Courtesy Appointment.* Visiting Research Professor.

Beth L. Leonberg, MS, MA, RD (*Colorado State University, Rowan University*) *Director, Didactic Program in Dietetics.* Instructor. Pediatric nutrition.

Brandy-Joe Milliron, PhD (*Arizona State University*). Assistant Professor. The development and evaluation of modifications in the natural environment to promote healthier living; farm to table school initiatives;

Donna H. Mueller, PhD (*Temple University*) *Registered Dietitian, Nutrition and Foods.* Associate Professor. Clinical nutrition; pediatric nutrition; nutrition in pulmonary diseases, especially cystic fibrosis; nutrition in developmental delay; dental nutrition; dietetic education and professional development.

Juan Muniz, PhD (*Oregon State University*) *Laboratory Manager.* Assistant Research Professor. Food microbiology; community-based research to assess pesticide levels in homes; prevention of health effects of pesticides for indigenous farmworkers.

Jennifer Nasser, PhD (*Rutgers University*). Associate Professor. Dopamine-mediated mechanisms of food intake regulation in humans and its impact on metabolic homeostasis, especially as it applies to obesity, eating disorders and aging.

Jennifer Quinlan, PhD (*North Carolina State University*). Associate Professor. Food microbiology; microbiological quality and safety of produce, dairy and meat products in markets in high vs. low socioeconomic areas, *Bacillus* and *Clostridium* spores in food processing.

Barry Ritz, PhD (*Drexel University*) *Courtesy Appointment.* Visiting Research Professor.

Vicki Schwartz, MS (*Drexel University*) *Nutrition and Foods.* Assistant Clinical Professor. Advanced nutrition, clinical nutrition, nutrition support.

Alison Ventura, PhD (*Pennsylvania State University*). Assistant Professor. Factors that contribute to the development of eating behaviors and dietary preferences during infancy and early childhood.

Stella Lucia Volpe, PhD, RD, LDN, FACSM (*Virginia Polytechnic Institute and State University*) *Chair, Nutrition Sciences.* Professor. Prevention

of obesity and diabetes across the lifespan; mineral metabolism and exercise; energy balance; sports nutrition.

Interdepartmental Faculty

Rose Ann DiMaria-Ghalili, PhD, MSN, BSN, CNSC (*New York University, School of Education, Division of Nursing*). Associate Professor. Nutrition and surgical recovery to improve the care of older adults undergoing surgery; nutrition assessment, inflammation, and health outcomes.

Michael Lowe, PhD (*Boston College*). Professor. Prevention and treatment of eating disorders and obesity; effects of appetitive responsiveness and dietary restraint on eating regulation; psychobiology of obesity-proneness; empirical foundations of unconscious processes.

Margaret O'Neil, PT, PhD, MPH (*MCP Hahnemann University; Duke University; University of North Carolina at Chapel Hill*). Associate Professor. Measurement of and interventions to improve physical activity and fitness levels and promote participation in children and youth with who are overweight/obese and those with physical disabilities (especially cerebral palsy).

Patricia A. Shewokis, PhD (*University of Georgia*). Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy (fNIR) and electroencephalography (EEG) and methodology and research design.

Radiologic Technology

Major: Radiologic Technology

Degree Awarded: Associate of Science (AS)

Calendar Type: Quarter

Total Credit Hours: 104.0

Classification of Instructional Programs (CIP) code: 51.0907

Standard Occupational Classification (SOC) code: 29-2034

Note: Effective Fall Term 2015, students are no longer being accepted into this program.

About the Program

The major in radiologic technology prepares students to perform actual diagnostic X-ray examinations vital to the diagnosis and treatment of patients.

The Associate in Science Degree Radiology is the branch of medicine that uses various forms of radiation, such as X-rays, to provide information for the prevention, diagnosis, and treatment of disease. Radiologic technologists aid physicians by performing radiologic examinations necessary to diagnose conditions and treat patients.

Mission Statement

The mission of the radiologic technology program is to provide:

- a progressive academic and clinical educational environment for qualified students to prepare them as competent and compassionate radiologic health care providers;
- the knowledge and skills needed to meet and/or exceed minimum entry level requirements to perform radiologic technology.

Goals

Goal 1: Recruit and select qualified individuals with potential for success.

Student Learning Objectives

- Graduation rates will meet or exceed program standards.
- Graduates will indicate overall satisfaction with the program.
- Employers will indicate overall satisfaction with graduate's performance.
- Students will be able to pass the national ARRT certification examination.

Goal 2: Students/Graduates will demonstrate the knowledge and skills of a clinically competent radiographer.

Student Learning Objectives

- Students will use proper radiation safety principles for the protection of patients, selves, and others.
- Students will demonstrate competency with positioning skills.

Goal 3: Students/Graduates will demonstrate effective communication, critical thinking and problem-solving skills.

Student Learning Objectives

- Students will be able to effectively explain examination procedures to patients and/or family members.
- Students will provide appropriate patient care.
- Students will be effective in utilizing skills to solve problems, correctly assess patient conditions, and are adaptable to changing situations to meet patient's needs in the clinical environment.
- Students are effective in communicating with patients, supervisors, and others and are able to effectively express themselves both "oral" and "written".

Goal 4: Students/Graduates will recognize the significance of professional growth and development.

Student Learning Objectives

- Students will participate in professional growth and development activities.
- Students will pursue further training in a radiographic special modality and/or a Baccalaureate Program.
- Students will perform ethically and professionally in the clinical setting as outlined in the Code of Ethics.

Accreditation

The program is accredited by:

The Joint Review Committee on Education in Radiologic Technology (JRCERT)
20 North Wacker Drive
Suite 2850
Chicago, IL. 60606
312-704-5300

Options for Study

The program was established to prepare specialist trained in the art and science of medical imaging who participate in the care of other human

beings and do so as competent, sensitive, caring individuals who carry out their charge in such a way so as to maintain the dignity of human life. The program is committed to providing a quality educational opportunity that prepares individuals to be competent for entry-level staff radiographic employment. A quality and comprehensive curriculum is maintained through competent faculty who utilize quality facilities. Instruction begins with classroom exercises, leading to laboratory experiences and clinical applications.

The Radiology Technology Program of the College of Nursing and Health Professions is a 21-month program leading to an Associate of Science (AS) Degree.

For more information, visit the Radiologic Technology (<https://www.drexel.edu/cnhp/academics/undergraduate/AS-Radiologic-Technology>) page on the College of Nursing and Health Professions web site.

For information on tuition and fees, please visit the billing page for 2015-2016 Full-Time Undergraduate Programs (<http://drexel.edu/drexelcentral/billing/billing/1516-rates>).

Degree Requirements

Degree Requirements

UNIV NH101	The Drexel Experience	2.0
	Humanities Elective	3.0

English Sequence

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Mathematics and Computer Science Courses

MATH 100	Fundamentals of Mathematics	3.0
CS 161	Introduction to Computing	3.0

Psychology Requirements

PSY 101	General Psychology I	3.0
PSY 240 [WI (p. 319)]	Abnormal Psychology	3.0

Anatomy & Physiology Courses

ANAT 101	Anatomy & Physiology I	5.0
ANAT 102	Anatomy & Physiology II	5.0
ANAT 103	Anatomy & Physiology III	5.0
ANAT 202	Sectional Anatomy	3.0

Radiologic Technology Courses

RADI 100	Introduction to Radiologic Technology	2.0
RADI 102	Introduction to Radiologic Principles II	1.0
RADI 132	Radiologic Physics I	3.0
RADI 133	Radiologic Physics II	3.0
RADI 140	Imaging Systems in Radiography	3.0
RADI 150	Principles of Radiographic Exposure I	2.0
RADI 153	Principles of Radiographic Exposure II	2.0
RADI 154	Radiographic Exposure III	2.0
RADI 201	Medical Imaging	2.0
RADI 203	Principles of Exposure IV	2.0
RADI 204	Principles of Radiation Protection	2.0

RADI 215	Radiation Biology	3.0
RADI 221	Quality Assurance	2.0
RADI 222	Pathology	3.0
RADI 223	Registry Review	1.0
RADI 164	Radiologic Procedures I	3.0
RADI 165	Radiographic Procedures II	3.0
RADI 166	Radiographic Procedures III	3.0
RADI 200	Radiologic Procedures IV	3.0
RADI 202	Radiologic Procedures V	1.0
RADI 193	Methods of Patient Care I	2.0
RADI 194	Methods of Patient Care II	1.0
RADI 195	Clinical Practicum I	1.0
RADI 196	Clinical Practicum II	1.0
RADI 197	Clinical Practicum III	1.0
RADI 198	Clinical Practicum IV	2.0
RADI 291	Clinical Practicum V	2.0
RADI 292	Clinical Practicum VI	2.0
RADI 293	Clinical Practicum VII	2.0
Total Credits		104.0

Sample Plan of Study

AS Radiologic Technology Program

	Credits	
Term 1		
MATH 100	Fundamentals of Mathematics	3.0
RADI 100	Introduction to Radiologic Technology	2.0
RADI 150	Principles of Radiographic Exposure I	2.0
RADI 164	Radiologic Procedures I	3.0
RADI 193	Methods of Patient Care I	2.0
RADI 195	Clinical Practicum I	1.0
UNIV NH101	The Drexel Experience	1.0
Term Credits		14.0
Term 2		
ANAT 101	Anatomy Physiology I	5.0
RADI 102	Introduction to Radiologic Principles II	1.0
RADI 140	Imaging Systems in Radiography	3.0
RADI 153	Principles of Radiographic Exposure II	2.0
RADI 165	Radiographic Procedures II	3.0
RADI 194	Methods of Patient Care II	1.0
RADI 196	Clinical Practicum II	1.0
UNIV NH101	The Drexel Experience	1.0
Term Credits		17.0
Term 3		
ANAT 102	Anatomy Physiology II	5.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
RADI 132	Radiologic Physics I	3.0
RADI 154	Radiographic Exposure III	2.0
RADI 166	Radiographic Procedures III	3.0
RADI 197	Clinical Practicum III	1.0
Term Credits		17.0
Term 4		

ANAT 103	Anatomy Physiology III	5.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
RADI 133	Radiologic Physics II	3.0
RADI 198	Clinical Practicum IV	2.0
Term Credits		13.0
Term 5		
ANAT 202	Sectional Anatomy	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
RADI 200	Radiologic Procedures IV	3.0
RADI 203	Principles of Exposure IV	2.0
RADI 215	Radiation Biology	3.0
RADI 291	Clinical Practicum V	2.0
Term Credits		16.0
Term 6		
PSY 101	General Psychology I	3.0
RADI 201	Medical Imaging	2.0
RADI 202	Radiologic Procedures V	1.0
RADI 204	Principles of Radiation Protection	2.0
RADI 222	Pathology	3.0
RADI 292	Clinical Practicum VI	2.0
Term Credits		13.0
Term 7		
CS 161	Introduction to Computing	3.0
PSY 240 [WI (p. 319)]	Abnormal Psychology	3.0
RADI 221	Quality Assurance	2.0
RADI 223	Registry Review	1.0
RADI 293	Clinical Practicum VII	2.0
Humanities Elective		3.0
Term Credits		14.0

Total Credit: 104.0

Clinical Rotations

Students in the Radiologic Technology program must attend all of the clinical rotation sites. Clinical practicum times can vary from 8:30 a.m. to 8:30 p.m. depending on the quarter. Every Radiology student participates in an evening trauma rotation within their summer quarter (1:00 p.m. to 8:30 p.m.).

Hahnemann University Hospital (<http://www.hahnemannhospital.com/CWSContent/hahnemannhospital>)
Broad and Vine Streets
Philadelphia, PA 19102

Mercy Fitzgerald Hospital (<http://www.mercyhealth.org/fitzgerald>)
1500 Lansdowne Avenue
Darby, PA 19023

Chestnut Hill Hospital (<http://www.chhealthsystem.com>)
8835 Germantown Avenue
Philadelphia, PA 19118

American Open MRI and CT Center (<http://www.american-open.org>)
100 North President Boulevard, Suite 301
Bala Cynwyd, PA 19004

Career Opportunities

Upon completion of the program the graduates may continue their education in the area of radiation therapy, nuclear medicine, ultrasound, MRI, CAT scan, interventional radiation, mammography, or education and management.

Employment opportunities abound in hospitals, doctors' offices, mobile radiography, agencies, sales, application specialists and research.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on post-graduate opportunities.

Radiologic Technology Faculty

Bernadette Jervis, MSED, RT (R) (M) (MR) (*Mountain State University; University of Pennsylvania*). Assistant Clinical Professor. Radiologic technology, mammography, MRI, and counseling psychology.

Michael Pallanti, BS, RT(R), ARRT (*Holy Family University*). Clinical Instructor. Diagnostic radiography, the operating room, and computed tomography.

Lavetta Reliford, MSRS, RT(R), ARRT (*University of Kentucky, LLC; Ottawa University, Midwestern State University*) Department Chair, Radiologic Technology. Assistant Clinical Professor. Radiologic technology and health care management.

Rosemary Thomas, BS, RT(R), ARRT (*Cooper University Hospital*). Clinical Instructor.

Minor in Addictions Counseling

The minor in addictions counseling is designed to provide students with an understanding of current best-practice approaches in counseling interventions aimed at assisting people in recovery from substance use disorders. This minor appeals to students in a wide range of Drexel majors, including psychology, criminal justice, health services administration, sociology, health sciences, education, general humanities and social science, nutrition and foods, as well as other fields of study.

Academic Requirements

The minor requirements includes 15.0 credits in five required courses and 9.0 credits in three courses selected from a list of ten electives. Students may elect to begin coursework in this minor at any point in their undergraduate education. It is strongly suggested that students pursuing this minor consult with faculty in the Behavioral Health Counseling (<https://www.drexel.edu/cnhp/academics/departments/Behavioral-Health>) program for advice in selecting electives that will best meet their goals in this minor.

Required Courses

BACS 220	Counseling Theory and Practice	3.0
BACS 234	Introduction to Addictive Disorders	3.0
BACS 304	Cognitive and Behavioral Counseling I	3.0
BACS 310	Recovery and Relapse Prevention	3.0
BACS 367	Advanced Counseling Intervention	3.0
Select three of the following:		9.0
BACS 232	Ethics and Professional Responsibility	
BACS 255	Multicultural Counseling	
BACS 301	Group Counseling I	

BACS 312	Case Management Methods	
BACS 325	Psychopharmacology for Counselors	
BACS 368	Addictions Counseling with Special Populations	
BACS 370	Problem Gambling Interventions	
BACS 401	Assessment and Treatment Planning	
BACS 412	Group Counseling II	
BACS 414	Co-Occurring Disorders	

Total Credits

24.0

Minor in Psychiatric Rehabilitation

The minor in psychiatric rehabilitation is designed to provide students with an understanding of how people with serious mental illnesses learn skills and acquire resources that promote recovery and wellness. The curriculum covers a variety of evidence-based practices that support healthy living, learning, working, and socializing. This minor appeals to students in a wide range of Drexel majors, including psychology, criminology and justice studies, health services administration, sociology, health sciences, education, general humanities and social science, nutrition and foods, as well as other fields of study.

Academic Requirements

The minor requires completion of 24.0 credits, comprised of 15.0 credits in five required courses and 9.0 credits in three courses selected from a list of twelve electives. Students may elect to begin coursework in this minor at any point in their undergraduate education. It is strongly suggested that students pursuing this minor consult with faculty in the Behavioral Health Counseling program for advice in selecting electives that will best meet their goals in this minor.

Required Courses

BACS 220	Counseling Theory and Practice	3.0
BACS 236	Psychiatric Rehabilitation Principles and Practices	3.0
BACS 320	Crisis and Brief Intervention	3.0
BACS 325	Psychopharmacology for Counselors	3.0
BACS 420	Psychiatric Rehabilitation Competencies	3.0
Select three of the following:		9.0

BACS 200	Foundation of Behavioral Health Care	
BACS 230	Genetics and Mental Health	
BACS 234	Introduction to Addictive Disorders	
BACS 255	Multicultural Counseling	
BACS 301	Group Counseling I	
BACS 304	Cognitive and Behavioral Counseling I	
BACS 401	Assessment and Treatment Planning	
BACS 404	Cognitive and Behavioral Counseling II	
BACS 405	Family-Focused Interventions	
BACS 411	Forensic Behavior Health Service	
BACS 412	Group Counseling II	
BACS 414	Co-Occurring Disorders	

Total Credits

24.0

Certificate in Medical Billing and Coding

Certificate Level: Undergraduate

Admission Requirements: High school transcript minimum

Certificate Type: Certificate

Number of Credits to Completion: 18.0

Instructional Delivery: Online

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Aid eligible

Classification of Instructional Program (CIP) Code: 51.0713

Standard Occupational Classification (SOC) Code: 29-2071

This online certificate program is designed for those who want to begin medical billing and coding careers or prepare for certification exams in these areas. Students will learn principles of medical coding related to the three main coding manuals: CPT, ICD-9-CM, and HCPCS. The curriculum covers principles of medical billing and coding for in-patient and outpatient hospitals.

Required Courses

MBC 201	Medical Billing I	3.0
MBC 202	Medical Billing II	3.0
MBC 301	Physician-Based Medical Coding I	3.0
MBC 302	Physician-Based Medical Coding II	3.0
MBC 303	Hospital-Based Medical Coding I	3.0
MBC 304	Hospital-Based Medical Coding II	3.0

If a student has placed out of any of the above courses, he or she can substitute any of the following courses (provided that the prerequisites are met):

MBC 101	Medical Terminology for Billers and Coders
MBC 250	Medical Billing Software
MBC 350	Physician-Based Chart Auditing
MBC 360	Hospital-Based Case Studies

Total Credits **18.0**

Additional Information

CONTACT:

DREXEL UNIVERSITY ONLINE

Email: info@drexel.com

Phone: 877-215-0009

Goodwin College of Professional Studies

In today's competitive job market, education is a smart investment in your future. Goodwin responds to the demands of today's learner by offering programs that tailor a student's learning experience to their career aspirations. Our General Studies degree-completion program is ideal for transfer students who already possess an associate's degree or just have existing college credits. It is also ideal for students who wish to chart their own path toward a college degree.

Major

- Communication and Applied Technology (p. 324)
- General Studies (p. 325)
- Professional Studies (p. 326)

Communication and Applied Technology

Major: Communications and Applied Technology

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.0207

Standard Occupational Classification (SOC) code: 43-1011

About the Program

Note: Effective Winter Term 2014, students are no longer being accepted into this program.

The Bachelor of Science in Communications and Applied Technology is a multidisciplinary program designed for individuals who want to increase their knowledge of all aspects of business communications and relevant communication technologies, while understanding the business principles that are necessary to achieve corporate goals.

The major offers a multidisciplinary approach combining theoretical and applied learning principles and encompasses the spectrum of internal and external communications that organizations utilize in their management and marketing functions. The program is tailored to meet the needs of people who sell, communicate, and manage in industries that are heavily customer oriented and are involved in or affected by world markets. The goal of the program is to increase students' understanding of communication, management, applicable technology, business, the world economy, and relationships within their corporate culture.

Curriculum

To complete the Bachelor of Science degree in Communications and Applied Technology, students must earn a minimum of 180.0 quarter credits comprising the following:

- English Composition
- Humanities
- Social Sciences
- Physical Sciences
- Mathematics
- Business

- Computing Technology
- Customer Operations

Degree Requirements

English Composition Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Mathematics Requirements

MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0

College Requirements

GSTD 200	Lifelong Learning Theory & Practice	3.0
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Natural Science Electives * 9.0

Liberal Studies Electives ** 33.0

Free Electives 36.0

Business Minor Requirements ***

Select six of the following: 24.0

ACCT 115	Financial Accounting Foundations	
BLAW 201	Business Law I	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
FIN 301	Introduction to Finance	
MKTG 301	Introduction to Marketing Management	
ORGB 300 [WI (p. 324)]	Organizational Behavior	
OPM 200	Operations Management	
STAT 201	Introduction to Business Statistics	

Communications and Applied Technology

CAT 201 [WI (p. 324)]	Interpersonal Communication	3.0
CAT 302	Customer Service Theory and Practice	3.0
CAT 303	Client Relations Management	3.0
CAT 360	Applied Organizational Research	3.0
CAT 491	Senior Project in Communications and Applied Technology I	3.0
CAT 492	Senior Project in Communications and Applied Technology	3.0
COM 111	Principles of Communication	3.0
COM 230	Techniques of Speaking	3.0
COM 240	New Technologies In Communication	3.0
COM 270 [WI (p. 324)]	Business Communication	3.0
COM 330	Professional Presentations	3.0
COM 335	Electronic Publishing	3.0
COM 370 [WI (p. 324)]	Advanced Business Writing	3.0
CT 230	Web Development I	3.0
CT 240	Web Development II	3.0

CT 385	Web Development III ****	3.0
PHIL 323	Organizational Ethics	3.0
PROJ 301	Introduction to Project Management	3.0
PRST 303	Interpersonal Skills for Virtual Teams	3.0
Total Credits		180.0

* Students select 9.0 credits from any of the following sciences: ANAT, BIO, CHEM, ENVR, FDSC, NFS, PHEV, PHYS. Courses from other departments may be considered with advisor approval.

** Africana studies, anthropology, fine arts (history of architecture, art, film, music, theatre), foreign language, history, linguistics, literature, philosophy, political science, psychology, sociology, women's studies, writing.

*** No more than 2 transferred courses may be used to complete the minor. A grade of C (2.0) or better must be earned in each course in the Minor in Business.

**** After completion of CT 230, CT 240 and CT 385, students can sit for the Certified Internet Webmaster (CIW) exam. Additional self-study may be necessary.

General Studies

Major: General Studies

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 24.0102

Standard Occupational Classification (SOC) code: 11-9199

About the Program

The Bachelor of Science (BS) in General Studies is the ideal degree completion program for self-directed students who desire a program they can tailor to their personal and professional interests. The program covers the fundamentals of a university education while allowing students to exhibit intellectual interest and discipline across a broad range of college-level coursework. A general studies degree informs employers of a graduate's ability to think creatively when problem solving and work independently at a high level with a minimum of direction.

General studies students have more options for courses which apply to their degree requirements when they register for a given term. The flexibility to study subjects which have produced some of the greatest ideas, innovations and art in recorded history, can be both a personally and professionally rewarding benefit of a general studies degree.

Designed for individuals with a diverse college background and varied educational interests that cannot be captured in a single degree program. Students have the opportunity to experiment in a variety of academic subjects through a generous amount of free electives.

The ability to include minors (<http://catalog.drexel.edu/minors>) within the General Studies major can be of great value to working adults who are seeking advancement or a change in their employment. Adult learners looking to improve their earning potential often find that a degree makes them eligible for higher-level positions within their organizations or others.

The Goodwin General Studies degree completion program offers students evening and online options to make it as convenient as possible for working adults to take advantage of the opportunity to return to school and complete their college degree.

Advising

Students in the BS in General Studies program are advised by an academic advisor (determined alphabetically by last name) who serves as an important resource to students as they progress and manage their educational and career goals.

Students receive one-on-one personal advisement to ensure that educational and professional objectives are met within the course of study.

For more information on this major, visit Goodwin College's General Studies (http://goodwin.drexel.edu/mep/ug_ptgstd.php) web page.

Degree Requirements

This program is designed for individuals with a diverse college background and varied educational interests that cannot be captured in a single degree program. In consultation with their academic advisor, students have the opportunity to experiment in a variety of academic subjects through a generous amount of free electives. An attractive feature is that students can complete minors (<http://catalog.drexel.edu/minors>) en route to their degree.

College Requirements

GSTD 200	Lifelong Learning Theory & Practice	3.0
GSTD 491	Senior Project in General Studies	3.0

English and Speech Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0

Mathematics Requirements

MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0

Computing Requirement *

Select one of the following:		3.0
CS 161	Introduction to Computing	
CS 171	Computer Programming I	
CT 220	Database I	
CT 230	Web Development I	
PRST 211	Computer Applications for Professionals	
PRST 212	Creative Studies in the World Wide Web	
Additional computing course options, with Advisor approval		

Upper Level Course Requirements

As students choose electives from the categories below, a minimum of 36.0 credits must be upper-level courses (typically 300-level and above).

Natural Science Electives

Students select 9.0 credits from the following: ANAT, BIO, CHEM, FDSC, NFS, PHEV, PHYS. Courses from other departments may be considered with advisor approval.

Specialization Requirements

Students must complete 45.0 credits within an area of specialization. 45.0
The specialization is a set of courses built around a cohesive area of study. An academic advisor must pre-approve the specialization. The specialization will not appear on the student transcript.

Liberal Studies Requirements

Students must complete 36.0 credits in Liberal Studies, covering 36.0
a range of subject areas in the humanities and/or social sciences: anthropology, psychology, sociology, political science, history, philosophy, religion, literature and fine arts. (Arts history or appreciation courses, rather than applied courses.)

Free Electives 60.0

Total Credits 180.0

* Courses older than three years will not be transferred into the curriculum.

Co-op/Career Opportunities

A well-rounded education results in an enriched view of the world. Full-time students majoring in General Studies find careers in diverse areas, taking skills they learn at Drexel to their future endeavors.

Some General Studies students are already established in their careers and simply need a bachelor's degree to move into higher positions within their organizations and industries and/or to pursue a master's degree.

Goodwin College's General Studies BS degree is designed for students planning to pursue graduate studies in various professional areas.

Professional Studies

About the Program

Note: Effective Winter Term 2014, students are no longer being accepted into this program.

The Bachelor of Science in Professional Studies program is a multidisciplinary major that prepares students to move into the professional ranks of an organization. Coursework for the major is constructed around five domains that are central to modern professional life—social science (understanding people in a diverse world), critical thinking, creativity, communication, and business. The curriculum is designed to enable students to become professionals in their field of choice, building on their prior education and experience.

The program is designed for aspiring professionals in any industry. Students are encouraged to take the technical knowledge they already possess in their fields, and learn to utilize it as creative and innovative leaders and communicators.

Career Opportunities

The program helps students from a variety of industries improve their professional skills and strengthen their position in the job market. Industries with employees that may benefit from the Professional Studies include, but are not limited to:

- Telecommunications
- Aerospace
- Pharmaceutical
- Retail

Opportunities for Professional Studies graduates include:

- Career advancement within students' current organizations and industries
- Preparation to pursue a master's degree in a variety of areas

Degree Requirements

English Composition Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
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ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
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ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
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Corporate Communication Requirements

COM 111	Principles of Communication	3.0
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COM 230	Techniques of Speaking	3.0
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COM 270 [WI (p. 326)]	Business Communication	3.0
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Mathematics Requirements

MATH 181	Mathematical Analysis I	3.0
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MATH 182	Mathematical Analysis II	3.0
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MATH 183	Mathematical Analysis III	3.0
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College Requirements

GSTD 200	Lifelong Learning Theory & Practice	3.0
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Natural Science Requirements

Students select 9.0 credits from the following: ANAT, BIO, CHEM, FDSC, NFS, PHEV, or PHYS. Courses from other departments may be considered with Departmental approval.	9.0
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Humanities and Social and Behavioral Science Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
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PHIL 323	Organizational Ethics	3.0
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PSY 101	General Psychology I	3.0
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SOC 101	Introduction to Sociology	3.0
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Select one of the following:	3.0
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PSY 140	Approaches to Personality	
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PSY 150	Introduction to Social Psychology	
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PSY 240 [WI (p. 326)]	Abnormal Psychology	
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PSY 244	Culture and Personality	
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Select one of the following:	3.0
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SOC 110	Sociology of the Future	
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SOC 210	Race, Ethnicity and Social Inequality	
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SOC 230	Gender and Society	
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Students select one international or intercultural course. Suggested courses include the following:	3.0
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COM 345	Intercultural Communication	
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GSTD 150	Introduction to World Religions	
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Humanities Elective *	3.0
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Business Minor Requirements **

Select six of the following	24.0
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ACCT 115	Financial Accounting Foundations	
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BLAW 201	Business Law I	
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ECON 201	Principles of Microeconomics	
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ECON 202	Principles of Macroeconomics	
FIN 301	Introduction to Finance	
MKTG 301	Introduction to Marketing Management	
ORGB 300 [WI (p. 326)]	Organizational Behavior	
OPM 200	Operations Management	
STAT 201	Introduction to Business Statistics	
Professional Studies Core		
CAT 201 [WI (p. 326)]	Interpersonal Communication	3.0
CAT 302	Customer Service Theory and Practice	3.0
CAT 360	Applied Organizational Research	3.0
CRTV 301	Foundations in Creativity	3.0
CRTV 302	Tools and Techniques in Creativity	3.0
CRTV 303	Creativity in the Workplace	3.0
PROJ 301	Introduction to Project Management	3.0
PRST 211	Computer Applications for Professionals	3.0
PRST 212	Creative Studies in the World Wide Web	3.0
PRST 303	Interpersonal Skills for Virtual Teams	3.0
PRST 330	Career & Professional Development	3.0
PRST 440	Policy Analysis	3.0
PRST 450	Creative Leadership for Professionals	3.0
PRST 491 [WI (p. 326)]	Professional Portfolio I (not available online)	3.0
PRST 492 [WI (p. 326)]	Professional Portfolio II (not available online)	3.0
Free Electives ****		48.0
Depending on transfer credits and professional goals, students may use free electives to pursue a minor/certificate. Students should see their advisor for details.		
Total Credits		180.0

* Students select one humanities elective, such as English (ENGL); history (HIST); philosophy (PHIL); fine arts, or a foreign language course.

** No more than 2 transferred courses may be used to complete the minor. A grade of C (2.0) or better must be earned in each courses in the Minor in Business.

LeBow College of Business

About the College

The mission of the LeBow College of Business is to integrate Drexel University's technological prominence with experience-based education to develop world-class leaders and advance knowledge through research. At the undergraduate level, this objective is accomplished by providing high-quality educational programs that integrate theory and practice. Drexel's highly regarded co-operative education program in which students interchange periods of academic study and full-time, off-campus employment with partner companies, sets us apart from other business schools

The College and its distinguished faculty are committed to advancing the science and practice of management through basic, applied, and instructional research in the various disciplines of business. The College maintains strong connections to business professions and the community through participation in professional organizations, a commitment to community service, and dedication to providing opportunities for lifelong learning. Drexel's LeBow College of Business—fully accredited by AACSB-International—offers four distinct undergraduate degrees, twelve majors, ten minors and three certificate programs.

Majors

- Accounting (p. 330)
- Business Analytics (co-major) (p. 333)
- Business and Engineering (p. 337)
- Entrepreneurship (p. 340)
- Finance (p. 344)
- General Business (p. 347)
- Legal Studies (p. 353)
- Management Information Systems (p. 355)
- Marketing (p. 359)
- Operations and Supply Chain Management (p. 362)
- Organizational Management (co-major) (p. 366)
- Technology Innovation Management (co-major) (p. 368)

Minors

- Accounting (p. 333)
- Business Administration (p. 352)
- Business Analytics (p. 336)
- Entrepreneurship (p. 342)
- Finance (p. 346)
- Legal Studies (p. 355)
- Management Information Systems (p. 358)
- Marketing (p. 361)
- Operations Management (p. 365)
- Organizational Management (p. 367)
- Technology Innovation Management (p. 369)

Certificates

- Brand and Reputation Management (p. 370)
- Social Responsibility in Business (p. 370)

About the College

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About the Curriculum

BS in Business Administration Program

The Bachelor of Science in Business Administration program is designed to prepare students for managerial positions in business and other institutions. To accomplish this, the undergraduate curriculum has the following characteristics and goals:

- An early exposure to the structure and functions of business enterprises
- The bridging of theory and concepts with professional practice
- The integration of material across disciplines within business as well as between business and other fields
- The enhancement of effective communication, problem-solving, and interpersonal skills
- Coverage of the ethical issues inherent in a business setting
- Coverage of the global, political, social, and legal/regulatory environment in which businesses operate
- Coverage of the impact of technology and technological changes on the operation of the business enterprise
- An emphasis on career preparation
- Opportunities for experiential learning through traditional co-op programs and other "hands-on" opportunities

BS in Business and Engineering Program

The Business and Engineering Degree Program contains a broad-based business and engineering curriculum, enabling graduates to work successfully in technically oriented business positions. Students complete a set of broad functional business core courses along with a firm foundation in science, mathematics, and engineering. Students also study more deeply the areas of accounting, economics, finance, information systems, law, marketing, organizational behavior, entrepreneurship, operations, and statistics along with the functional areas of engineering.

Graduates of this program will be well prepared to participate in innovative technological efforts in business.

The Business and Engineering Degree Program gives students the opportunity to:

- Develop a breadth and depth of knowledge in functional business areas such as accounting, economics, entrepreneurship, finance, information systems, law, marketing, organizational behavior, operations, and statistics.
- Complete a broad education in engineering disciplines after completing a firm foundation in science and mathematics.
- Develop skills in technical communication and critical reasoning.
- Study ethical issues faced by managers and engineers, and understand technology from a historical perspective.
- Apply acquired skills from co-op work experiences to further enhance their knowledge base.
- Study entrepreneurship from a management and finance perspective for preparation in innovative technological efforts.
- Learn the operational aspects of business operations to improve the functioning of technically oriented businesses

BS in Economics Program

The Bachelor of Science in Economics program is designed to provide students with an understanding of the market system, as well as economic institutions, policies and development. In addition to this deep coverage of economics, the major includes liberal arts and sciences requirements. The program is flexible, allowing the student to customize the curriculum and choose areas of emphasis including concentrations in business economics or mathematical economics, as well as to select a coordinating field from other majors and minors at Drexel. The BS in Economics program provides excellent training for graduate school in economics.

BA in Economics Program

The Bachelor of Arts in Economics introduces students to modern economics within the context of a broad-based liberal arts curriculum. The degree is oriented toward students with interest in the less quantitative features of economics and a broader liberal arts education, particularly in areas offered by the College of Arts and Sciences. The degree gives students the flexibility to major or minor in a coordinate field outside of economics.

The Economics program:

- Provides a deep understanding of economics and broad training in arts and sciences.
- Enables students to apply acquired skills from co-op work experiences to further enhance their knowledge base.
- Prepares students for a wide variety of opportunities after graduations ranging from; corporate positions, consulting, government agencies, business, and law.
- Is a rigorous program that develops students' critical thinking and problem solving skills.

Degree Requirements

The Business Administration curriculum requires a minimum of 180.0 credits. The Business & Engineering curriculum requires a minimum of 185 credits. The Economics curriculum requires a minimum of 187.0

credits. The courses in each curriculum may be grouped into three categories:

General Education

The liberal arts comprise 50 percent or more of total credits required. Courses in communications, economics, English, history, mathematics, natural science, political science, psychology, sociology, and statistics teach students to think effectively and to communicate ideas to others. In addition, they provide a good understanding of the economic, social, and political systems within which we live and business operates.

Common Body of Knowledge in Business

Courses in accounting, business strategy and social responsibility, finance, law, organizational behavior, management information systems, production management, and marketing introduce students to all the functional areas of business, the quantitative aspects of decision-making, and the behavioral factors common to all organizational structures.

Major (BSBA) or Coordinated Field (BSECON & BAECON)

The curriculum permits students to pursue one or more majors within the (BSBA) programs. The major coursework and the common body of knowledge in business together comprise not more than 50 percent of the total credits required for graduation. In the Economic programs, students must select a coordinated field to augment the general education and economics course work.

Writing-Intensive Course Requirements

In order to graduate, all students must pass three writing-intensive courses after their freshman year. Two writing-intensive courses must be in a student's major. The third can be in any discipline. Students are advised to take one writing-intensive class each year, beginning with the sophomore year, and to avoid "clustering" these courses near the end of their matriculation. Transfer students need to meet with an academic advisor to review the number of writing-intensive courses required to graduate.

A "WI" next to a course in this catalog may indicate that this course can fulfill a writing-intensive requirement. For the most up-to-date list of writing-intensive courses being offered, students should check the Writing Intensive Course List (http://drexel.edu/engphil/about/DrexelWritingCenter/wiCourses/course_list) on the Drexel University Writing Center (<http://www.drexel.edu/engphil/writingcenter>) page. Students scheduling their courses in Banner/DrexelOne can also conduct a search for courses with the attribute "WI" to bring up a list of all writing-intensive courses available that term.

Cooperative Education

The five-year cooperative education programs consist of 12 terms in college and six terms in co-operative employment. During the freshman year, students spend three terms in school (fall, winter, and spring) and have a summer vacation. For each of the next three years, students alternate two terms in school with two terms of co-op. The senior year consists of three terms in college with no cooperative employment.

The four-year cooperative education program consists of 12 terms in college and two terms in cooperative employment. The two terms of co-op experience take place in the third year.

The non-cooperative four-year program comprises 12 terms in school with vacations during the summers.

Cooperative education, academic eligibility requirements, acceptance of transfer students, and placement services are described in detail in other sections of this catalog. Students wishing to prepare for admission to professional schools may obtain preprofessional counseling from the Office of Preprofessional Programs, 215.895.2437.

Special Programs

Accelerated/Dual Degrees

LeBow College offers an accelerated BS/MBA and BS/MS degree programs that provides academically qualified students with the opportunity to earn both a bachelor's degree and an MBA or MS in Accounting in the time normally required for the undergraduate degree at Drexel University. The program combines the advantage of practical work experience in the renowned Drexel Co-op with the graduate credentials of our nationally recognized programs.

LeBow College also offers a five-year dual-degree program with the European Business School (ESB) at Reutlingen University in Germany. This exciting dual degree program allows undergraduate students to earn degrees from both Drexel University's LeBow College of Business and Reutlingen University's European School of Business. In total students will spend 18 months in Germany completing two semesters of study and one semester on Co-op.

Drexel in London

The College's *Drexel in London Program* offers flexible schedules for study abroad, ranging from six-week summer sessions to six-month (two-term) combined study and co-operative education programs in which students can earn up to 18 credits and fulfill one of their co-op requirements. The program's emphasis is on international business in general, with a particular focus on the United Kingdom and the European Union. Business course selections each year will be selected from the list of courses that constitute the international business concentration, but students in other concentrations may participate in the program. Housing is provided in South Kensington, one of central London's most desirable residential sections. Drexel in London applications are administered by the Study Abroad (<http://www.drexel.edu/studyabroad>) office, 215.571.3558.

Business Learning Community (BLC)

LeBow College's Business Learning Community (BLC) is a way of life at Drexel University - a cohort of freshman business students who live and attend classes together. The BLC was recently recognized by AACSB Accreditation Committee as a "strength and effective practice of the LeBow College of Business." The program is designed to ease transition to university life, (<http://catalog.drexel.edu/>) enhance student academic performance, (<http://catalog.drexel.edu/>) provide opportunities for student engagement and networking and improve the overall student experience.

LeBow BRIDGE

BRIDGE is a LeBow College of Business undergraduate program that provides support to students in four critical areas: academic excellence, financial literacy and social engagement and community service. BRIDGE scholars receive the tools to be successful through advising programs related to academics, financial skills, professional development, cultural awareness and community service.

Students work together to build relationships within a dynamic and diverse group experience. Mentors are also available to BRIDGE scholars to provide guidance and ensure a positive college experience. After freshman year, BRIDGE scholars can serve as peer mentors to underclassmen.

Global Classroom

The LeBow Global Classroom program prepares candidates to become 21st Century Executives, able to tackle the toughest business challenges in our increasingly globalized business world. Each year a select cohort of 20 high-potential students from around the world enters this rigorous global education experience to acquire the complex set of skills and attitudes to thrive in an increasingly uncharted and globalized marketplace. The learning community experience is akin to a "Global Classroom".

Peer Leader Program

LeBow College's Peer Leader Program is an outstanding learning experience for sophomore business students. Through a highly competitive application process, (<https://nextcatalog.drexel.edu>) top-performing LeBow students with extraordinary leadership potential are identified, (<https://nextcatalog.drexel.edu>) selected, (<https://nextcatalog.drexel.edu>) trained and paired with UNIV 101 instructors to serve as mentors for new freshmen both inside and outside the classroom.

Summer Institutes

LeBow Summer Institutes offer an introduction to business education through exceptional summer programs designed for outstanding high school students with an interest in business. LeBow Summer Institutes offer the opportunity to maximize and develop the business and leadership skills sought after by employers and college admissions officers.

Accounting

Major: Accounting

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.0301

Standard Occupational Classification (SOC) code: 13-2011

About the Program

The LeBow College of Business's accounting major is designed to provide basic conceptual accounting and business knowledge for careers in accounting and taxation in many settings. Courses cover accounting, auditing, tax preparation, and related topics. Students learn how accounting produces information for making decisions about organizations.

The greatest range of career opportunities are in public, private and government accounting. Professional accountants are normally certified as public accountants (CPA) or managerial accountants (CMA) after passing professional examinations. The University's co-op program provides an advantage to accounting students who plan to practice locally. Time spent working in co-op internship positions as a student is often accepted as part of the two years of accounting experience required

for the Certified Public Accountant certificate in Pennsylvania and many other states.

Students planning to take the CPA exam must take additional accounting coursework. Interested students should contact the Department of Accounting (<http://www.lebow.drexel.edu/Faculty/Departments/Accounting>) at the beginning of the third year to ensure ample time to fulfill such requirements.

Degree Requirements

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 330)]	Business Communication	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 330)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
English literature elective ENGL 200 through ENGL 399		3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education Electives

Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.

Society and Culture		
Communication, English, Fine Arts, International Area Studies, Language or Philosophy		3.0
Social Science		
Anthropology, History, Sociology, Political Science, Psychology		3.0
Science		
Computer Science, Information Systems, Science		3.0

Additional General Education Electives

Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science

Business Requirements

ACCT 115	Financial Accounting Foundations	4.0
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ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0
BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 330)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Major Requirements

Eight required courses (See Major Requirements list below) 32.0

Free Electives 20.0

Total Credits 180.0

Required Accounting Major Courses

ACCT 321	Financial Reporting I	4.0
ACCT 322	Financial Reporting II	4.0
ACCT 323	Financial Reporting III	4.0
ACCT 329	Advanced Accounting	4.0
ACCT 331	Cost Accounting	4.0
ACCT 341	Principles of Auditing	4.0
TAX 341	Individual Income Taxes	4.0
TAX 342	Business Income Taxes	4.0

Total Credits 32.0

A minimum of 20 Elective (BUSN/ Non BUSN) credits are required to fulfill degree completion. Students planning to take the CPA exam should review the educational requirements established by the State Board of Accountancy in the state in which they plan to sit for the examination. Students are qualified to sit for the examination in Pennsylvania by meeting the degree requirements above. Students planning to apply for a CPA license in Pennsylvania have to obtain the equivalent of 150 semester (225 quarter) credit hours, including 36 semester (54 quarter) credit hours in accounting subjects.

Sample Plan of Study

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

MATH 101	Introduction to Analysis I	4.0	ORGB	Organizational Behavior	4.0
UNIV	The Drexel Experience	1.0	300 [WI	(p. 330)]	
B101 [WI			ACCT 323	Financial Reporting III	4.0
(p. 330)]			PHIL 105	Critical Reasoning	3.0
			General education elective		3.0
	Term Credits	16.0		Term Credits	14.0
Term 2			Term 9		
BUSN 102	Foundations of Business II	4.0	ACCT 329	Advanced Accounting	4.0
ECON 202	Principles of Macroeconomics	4.0	TAX 341	Individual Income Taxes	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	General education elective		3.0
MATH 102	Introduction to Analysis II	4.0	Free electives		4.0
	Term Credits	15.0		Term Credits	15.0
Term 3			Term 10		
ACCT 115	Financial Accounting Foundations	4.0	ACCT 331	Cost Accounting	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	ACCT 341	Principles of Auditing	4.0
PSY 101	General Psychology I	3.0	UNIV B201	Career Management	1.0
Social science elective		3.0	General education elective		3.0
Society and culture elective		3.0	Free elective		4.0
	Term Credits	16.0		Term Credits	16.0
Term 4			Term 11		
ACCT 116	Managerial Accounting Foundations	4.0	TAX 342	Business Income Taxes	4.0
STAT 201	Introduction to Business Statistics	4.0	MGMT 450	Strategy and Competitive Advantage	4.0
History (HIST) elective		3.0	General education elective		3.0
Select one of the following:		3.0	Free electives		4.0
BIO 100	Applied Cells, Genetics Physiology			Term Credits	15.0
or 101	Applied Biological Diversity, Ecology Evolution		Term 12		
CHEM 151	Applied Chemistry		Select one of the following:		4.0
PHYS 151	Applied Physics		BUSN 451	Business Consulting	
	Term Credits	14.0	STAT 202	Business Statistics II	
Term 5			MGMT 451	Management Simulation	
BLAW 201	Business Law I	4.0	MGMT 260	Introduction to Entrepreneurship	
COM 270 [WI	Business Communication	3.0	Free electives		8.0
(p. 330)]			Fine arts elective		3.0
INTB 200	International Business	4.0		Term Credits	15.0
Select one of the following:		3.0	Total Credit: 180.0		
BIO 100	Applied Cells, Genetics Physiology				
or 101	Applied Biological Diversity, Ecology Evolution				
CHEM 151	Applied Chemistry				
PHYS 151	Applied Physics				
	Term Credits	14.0			
Term 6					
ACCT 321	Financial Reporting I	4.0			
MKTG 301	Introduction to Marketing Management	4.0			
OPM 200	Operations Management	4.0			
ENGL 200 - ENGL 399 course		3.0			
	Term Credits	15.0			
Term 7					
ACCT 322	Financial Reporting II	4.0			
FIN 301	Introduction to Finance	4.0			
MIS 200	Management Information Systems	4.0			
Science elective		3.0			
	Term Credits	15.0			
Term 8					

Co-op/Career Opportunities

Public, private, and government accounting provide the greatest range of career possibilities. Professional accountants are normally certified as public accountants (CPA) or managerial accountants (CMA) after passing the appropriate professional examinations.

Drexel's co-op program provides an added advantage to accounting students who plan to practice locally; time spent working in co-op positions as a student is often accepted as part of the two years of accounting experience needed for CPA certification in Pennsylvania.

Drexel's accounting graduates accept positions in public accounting, private industry, government, and nonprofit organizations. Many also choose to continue their studies in graduate schools, pursuing such degrees as the MBA, master's in taxation, or the PhD.

Overall, Drexel's graduates enjoy a high placement rate. International business graduates are employed in a variety of corporate settings,

including the pharmaceutical, banking and telecommunication industries. Some students pursue graduate studies or find employment in multilateral governmental organizations.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Accounting Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
Select four of the following:		16.0
ACCT 321	Financial Reporting I	
ACCT 322	Financial Reporting II	
ACCT 323	Financial Reporting III	
ACCT 331	Cost Accounting	
ACCT 341	Principles of Auditing	
TAX 341	Individual Income Taxes	
TAX 342	Business Income Taxes	
Total Credits		24.0

Accounting and Tax Faculty

Hsihui Chang, PhD (*University of Minnesota*) Department of Accounting and Tax, KPMG Endowed Chair and Department Head. Professor.

Hui Lam Choy, PhD (*University of Rochester*). Associate Professor. Financial accounting.

Anthony P. Curatola, PhD (*Texas A&M University*) Joseph F. Ford Professor of Accounting. Professor. Federal and state income tax policy, retirement income taxation, fringe benefits taxation, educational savings and tax incentives, federal and state income tax research.

Patricia L. Daniel Derrick, PhD (*The George Washington University*). Assistant Clinical Professor.

Hubert Glover, PhD (*Texas A&M University*) Department of Accounting and Tax. Associate Clinical Professor. International financial reporting.

Barbara Murray Grein, PhD (*Kenan-Flagler Business School, University of North Carolina*) Department of Accounting and Tax. Associate Professor. Auditing, auditor selection, audit adjustments, audit fees, corporate governance, financial reporting.

Curtis M. Hall, MBA (*University of Arizona*). Assistant Professor. Strategic cost management; corporate governance; capital markets research in accounting; human capital investment.

Kevin K. Jones, EDB (*Georgia State University*). Assistant Clinical Professor.

Natalya V. Khimich, PhD (*University of California at Berkeley*). Assistant Professor. Equity valuation, earnings quality, and accounting for innovation and intangible assets.

Stacy Kline, MBA (*Temple University*) Department of Accounting and Tax. Clinical Professor. Individual, corporation; S corporation and partnership taxation.

Gordon Ndubizu, PhD (*Temple University*) Department of Accounting and Tax. Professor. Financial accounting.

Duri Park, MS (PhD expected in 2013) (*Ohio State University*). Assistant Professor. Financial accounting, insider trading, investments, and cash holdings.

Bernhard Reichert, PhD, CPA (*University of Texas at Austin*) Department of Accounting and Tax. Assistant Professor. Behavioral research in accounting and experimental economics.

Mark Vargus, PhD (*Wharton School, University of Pennsylvania*) Department of Accounting and Tax. Assistant Professor. Capital market research and executive compensation.

Jennifer Wright, MTA Master of Tax Accounting (*Villanova University*) Department of Accounting and Tax. Associate Clinical Professor.

Business Analytics

Major: Business Analytics

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 184.0

Classification of Instructional Programs (CIP) code: 52.1301

Standard Occupational Classification (SOC) code: 11-1021

The Business Analytics program is a "co-major"

About the Program

How does a company design an effective social media campaign for its brand new product? How does a bank make credit card offers or detect fraud? How does a chain store stock its shelves with just the right products at the right price? Technology has made it possible to collect, store, process and analyze massive data sets that can help businesses make better decisions. However, there remains a gap that can only be filled by those with a background in business analytics. From the junior analyst providing daily reports on production to the CEO seeking to transform his or her business, all are looking for guidance and talent in business analytics.

LeBow students are uniquely positioned to address descriptive, diagnostic, predictive, prescriptive and pre-emptive questions across the business analytics lifecycle from the corporate generation of data through

the application and impact on managerial and leadership decision-making and innovation.

Ranked second in a Computerworld survey on the most difficult skills to find, Business Analytics expertise is not only scarce, but in demand. McKinsey Global Institute reports that the United States could face a shortage of between 140,000 and 190,000 individuals who possess Business Analytics skills and an additional 1.5 million managers with the skills to implement the results.

Example business analytics jobs include, BA Strategy Consultants, Business Intelligence and Performance Management Consultants, Advanced Analytics, Optimization Consultants.

Because students in this major are required to choose a co-major in one of the functional areas of business, the curriculum enables students to tailor the program to their interests and anticipated career path.

Students complete the business analytics major in conjunction with one of the following co-majors:

- Accounting
- Entrepreneurship
- Finance
- Legal Studies
- Management Information Systems
- Marketing
- Operations & Supply Chain Management

An additional distinguishing feature of the business analytics major is the required senior project (BUSN 460) where students work in small teams on real business analytics projects from LeBow College's corporate partners. The projects require students to bring together all the key elements of the business analytics curriculum to derive business insights for a company's current business challenges. Experiencing this data driven decision-making process is invaluable career preparation.

Degree Requirements

General Education Requirements

COM 270 [WI (p. 333)]	Business Communication	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 333)]	The Drexel Experience	2.0
English Literature elective		3.0
Fine Arts elective		3.0
History elective		3.0
Science Requirement		6.0

Select two courses from the following:

BIO 100	Applied Cells, Genetics & Physiology
or BIO 101	Applied Biological Diversity, Ecology & Evolution

CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	
General Education electives *		21.0
Business Requirements		
ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
BUSN 101	Foundations of Business I	4.0
BUSN 102	Foundations of Business II	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 333)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
STAT 202	Business Statistics II	4.0
Primary Major Courses **		32.0
Business Analytics Requirements		
BUSN 260	Introduction to Business Analytics	4.0
BUSN 460	Business Analytics Senior Project	4.0
MIS 349	Predictive Business Analytics with Relational Database Data	4.0
OPR 320	Linear Models for Decision Making	4.0
Advanced Statistics Course		
Select one of the following:		4.0
ECON 350 [WI (p. 333)]	Applied Econometrics	
STAT 331	Introduction to Data Mining for Business	
STAT 335	Introduction to Experimental Design	
MKTG 366	Customer Analytics	
MKTG 367	Data-Driven Digital Marketing	
Advanced Modeling Course		
Select one of the following:		4.0
ECON 301	Microeconomics	
OPR 330	Advanced Decision Making and Simulation	
Total Credits		184.0

* Students select seven (21.0 credits) of additional general education electives with a minimum of one course in each of the following categories:

- Society and Culture (Communication, English, Fine Arts, International Area Studies, Language, Philosophy)
- Social Science (Anthropology, History, Sociology, Political Science, Psychology)
- Math and Science (Computer Science, Information Systems, Math, Science)

** Students completing the Business Analytics co-major must do so in conjunction with a primary business major. Students must select a primary major from the following list:

- Accounting
- Entrepreneurship
- Finance
- Legal Studies
- Management Information Systems
- Marketing
- Operations & Supply Chain Management
- Technology and Innovation Management

Sample Plan of Study

Term 1	Credits
BUSN 101 Foundations of Business I	4.0
ECON 201 Principles of Microeconomics	4.0
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101 Introduction to Analysis I	4.0
UNIV B101 [WI] (p. 333)	1.0
Term Credits	16.0
Term 2	
BUSN 102 Foundations of Business II	4.0
ECON 202 Principles of Macroeconomics	4.0
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102 Introduction to Analysis II	4.0
Term Credits	15.0
Term 3	
ACCT 115 Financial Accounting Foundations	4.0
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
PSY 101 General Psychology I	3.0
Select one of the following:	3.0
BIO 100 Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151 Applied Chemistry	
PHYS 151 Applied Physics	
General Education elective	3.0
Term Credits	16.0
Term 4	
ACCT 116 Managerial Accounting Foundations	4.0
BLAW 201 Business Law I	4.0
COM 270 [WI] Business Communication (p. 333)	3.0
STAT 201 Introduction to Business Statistics	4.0
Term Credits	15.0
Term 5	
INTB 200 International Business	4.0
STAT 202 Business Statistics II	4.0
MIS 200 Management Information Systems	4.0
Select one of the following:	3.0

BIO 101 Applied Biological Diversity, Ecology Evolution or 100 Applied Cells, Genetics Physiology	
CHEM 151 Applied Chemistry	
PHYS 151 Applied Physics	
Term Credits	15.0
Term 6	
Any 200-399 English (ENGL) course	3.0
FIN 301 Introduction to Finance	4.0
MKTG 301 Introduction to Marketing Management	4.0
OPM 200 Operations Management	4.0
Term Credits	15.0
Term 7	
MIS 343 Database Design and Implementation	4.0
ORGB 300 [WI] (p. 333)	4.0
PHIL 105 Critical Reasoning	3.0
Primary Major Course 1*	4.0
Term Credits	15.0
Term 8	
History elective	3.0
OPR 320 Linear Models for Decision Making	4.0
Primary Major Course 2*	4.0
Science elective	3.0
Term Credits	14.0
Term 9	
Society and Culture elective	3.0
Primary Major Course 3*	4.0
Primary Major Course 4*	4.0
MIS 349 Predictive Business Analytics with Relational Database Data	4.0
Term Credits	15.0
Term 10	
Fine Arts elective	3.0
UNIV B201 Career Management	1.0
Select one of the following advanced statistic courses:	4.0
STAT 331 Introduction to Data Mining for Business	
STAT 335 Introduction to Experimental Design	
ECON 350 [WI] (p. 333)	
Applied Econometrics	
Primary Major Course 5*	4.0
General education elective	3.0
Term Credits	15.0
Term 11	
Primary Major course 7*	4.0
Primary Major Course 6*	4.0
MGMT 450 Strategy and Competitive Advantage	4.0
Advanced modeling course - Select one of the following:	4.0
OPR 330 Advanced Decision Making and Simulation	
MKTG 366 Customer Analytics	
ECON 301 Microeconomics	
Term Credits	16.0

Term 12

Primary Major course 8*	4.0
Social Science elective	3.0
General education elective	3.0
General education elective	3.0
BUSN 460 Business Analytics Senior Project	4.0
Term Credits	17.0

Total Credit: 184.0

* See degree requirements (p. 334) for a list of business majors that may be completed in conjunction with the business analytics major.

Minor in Business Analytics

How does a company design an effective social media campaign for its brand new product? How does a bank make credit card offers or detect fraud? How does a chain store stock its shelves with just the right products at the right price? Technology has made it possible to collect, store, process and analyze massive data sets that can help businesses make better decisions. However, there remains a gap that can only be filled by those with a background in business analytics. From the junior analyst providing daily reports on production to the CEO seeking to transform his or her business, all are looking for guidance and talent in business analytics.

LeBow students are uniquely positioned to address descriptive, diagnostic, predictive, prescriptive and pre-emptive questions across the business analytics lifecycle from the corporate generation of data through the application and impact on managerial and leadership decision-making and innovation.

Ranked second in a Computerworld survey on the most difficult skills to find, Business Analytics expertise is not only scarce, but in demand. McKinsey Global Institute reports that the United States could face a shortage of between 140,000 and 190,000 individuals who possess Business Analytics skills and an additional 1.5 million managers with the skills to implement the results.

The Business Analytics minor at LeBow consists of basic courses in statistics, operations research, and management information systems as well as advanced courses in management information systems, statistics/econometrics, and modeling. The curriculum enables students to tailor the program to their interests and anticipated career path as students are required to choose a co-major in one of the functional areas of business.

One of the distinguishing features of the business analytics minor is the required senior project (BUSN 460) where students work in small teams on real business analytics projects from LeBow College's corporate partners. The projects require students to bring together all the key elements of the business analytics curriculum to derive business insights for a company's current business challenges. Experiencing this data driven decision making process is invaluable career preparation.

BUSN 260	Introduction to Business Analytics	4.0
MIS 349	Predictive Business Analytics with Relational Database Data	4.0
OPR 320	Linear Models for Decision Making	4.0
BUSN 460	Business Analytics Senior Project	4.0
Advanced Statistics Courses (select one of the following):		4.0
ECON 350 [WI Applied Econometrics (p. 333)]		

STAT 331	Introduction to Data Mining for Business	
MKTG 366	Customer Analytics	
MKTG 367	Data-Driven Digital Marketing	
STAT 335	Introduction to Experimental Design	
Advanced Modeling Course (select one of the following):		4.0
ECON 301	Microeconomics	
OPR 330	Advanced Decision Making and Simulation	
Total Credits		24.0

Decision Sciences Faculty

Edward Arnheiter, PhD (*University of Massachusetts, Amherst*) *Department of Decision Sciences*. Clinical Professor. Quality implementation and management, supply chain, statistical quality control, six sigma.

Avijit Banerjee, PhD (*The Ohio State University*) *Department of Decision Sciences*. Professor. Supply chain management; operations planning and scheduling; inventory control.

Hande Yurttan Benson, PhD (*Princeton University*) *Department of Decision Sciences*. Associate Professor. Nonlinear optimization, interior-point methods.

Oben Ceryan, PhD (*University of Michigan Ann Arbor*) *Department of Decision Sciences*. Assistant Professor. Pricing revenue management; inventory control; production planning and control supply chain management.

Neil Desnoyers, MS (*Drexel University*) *Department of Decision Sciences*. Assistant Clinical Professor. Decision sciences.

Seung-Lae Kim, PhD (*Penn State University*) *Department of Decision Sciences*. Professor. Production planning and control; inventory control; Just-In-Time (JIT) and Supply Chain Management (SCM).

Benjamin Lev, PhD (*Case Western Reserve University*) *Department Head, Department of Decision Sciences*. Professor. Operations research/management science, statistics, applications, engineering management.

Merrill W. Liechty, PhD (*Duke University*) *Department of Decision Sciences*. Associate Clinical Professor. Bayesian statistics, portfolio selection, higher moment estimation.

Arunkumar Madapusi, PhD (*University of North Texas Denton*) *Department of Decision Sciences*. Assistant Clinical Professor. Manufacturing technology development; quality management; supply chain management; interface with information systems.

Hazem Diab Maragah, PhD (*Louisiana University*) *Department of Decision Sciences*. Associate Professor. Statistical quality control, total equity management, applied statistics.

Bruce D. McCullough, PhD (*University of Texas*) *Department of Decision Sciences*. Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Thomas P. McWilliams, PhD (*Stanford University*) *Department of Decision Sciences*. Professor. Statistical quality control; sequential analysis.

Fariborz Y. Partovi, Ph.D. (*The Wharton School, University of Pennsylvania*) *Department of Decision Sciences*. Professor. The use of

analytical hierarchy process and quality function deployment for strategic decisions in manufacturing and service organizations.

Wenjing Shen, PhD (*University of Michigan*) *Department of Decision Sciences*. Assistant Professor. The interface of operations management and marketing; inventory management; supply chain management.

Min Wang, PhD (*Columbia University*) *Department of Decision Sciences*. Assistant Professor.

Emeritus Faculty

Robert E. Laessig, PhD (*Cornell University*) *Department of Decision Sciences*. Professor Emeritus. Management systems integration.

Business and Engineering

Major: Business and Engineering

Degree Awarded: Bachelor of Science in Business and Engineering (BSBE)

Calendar: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 52.0101

Standard Occupational Classification (SOC) code: 11-1021

About the Program

The major in business and engineering combines two of Drexel's most exciting programs, linking business and engineering to provide students with expertise in both fields.

The program contains a curriculum combining coursework in both business and engineering, enabling graduates to work successfully in technically oriented business positions. Students complete a set of broad functional business core courses along with a firm foundation in science, mathematics, and engineering. Students also study quantitative decision making within a business context, technology innovation management, and operations management. They complete a minor in business as well as a concentration in engineering. Graduates of this program will be well prepared to participate in innovative technological efforts in business.

The major gives students the opportunity to learn important concepts in functional business areas such as accounting, economics, finance, information systems, law, marketing, organizational behavior, operations, and statistics.

Mission

The Bachelor of Science in Business and Engineering program provides students the opportunity to:

- Learn important concepts in functional business areas such as accounting, economics, finance, information systems, law, marketing, organizational behavior, operations, and statistics.
- Study in more depth the areas of operations, technology innovation management, and other functional business areas.
- Complete a course of studies in an engineering discipline after completing a firm foundation in science and mathematics.
- Develop skills in technical communication and critical reasoning.
- Study ethical issues faced by managers and engineers, and understand technology from a historical perspective.
- Apply acquired skills in co-op work experiences to further enhance their knowledge base.

- Study entrepreneurship from a management and finance perspective for preparation in innovative technological efforts.
- Learn the operational aspects of business operations to improve the functioning of technically oriented businesses.

About the Business Minors

All Business and Engineering students are required to complete a business minor under the curriculum, and they will have the ability to choose from any of the business minors that are currently offered by the LeBow College of Business.

- Accounting (p. 333)
- Business Analytics
- Economics
- Finance
- International Economics (p. 389)
- Legal Studies (p. 355)
- Management Information Systems (p. 358)
- Marketing (p. 361)
- Operations & Supply Chain Management (p. 365)
- Organizational Management (p. 367)
- Technology Innovation Management (p. 369)

About the Engineering Concentrations

All Business and Engineering students are required to complete an engineering concentration under the curriculum, and they will have the ability to choose from the following:

- Chemical Engineering
- Civil Engineering
- Electrical and Computer Engineering
- Mechanical Engineering
- General Engineering

Additional Information

For additional information about the program or to schedule an appointment, please contact the Department of Decision Sciences and MIS (<http://www.lebow.drexel.edu/Faculty/Departments/Decision>).

Degree Requirements

General Education Requirements

COM 310 [WI (p. 337)]	Technical Communication (WI)	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHIL 105	Critical Reasoning	3.0
Select one of the following:		3.0-4.0
HIST 285	Technology in Historical Perspective	

PHIL 301	Business Ethics	
PHIL 315	Engineering Ethics	
UNIV B101 [WI (p. 337)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
Science and Computing Requirements		
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
Business Requirements		
ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
BUSN 101	Foundations of Business I	4.0
BUSN 102	Foundations of Business II	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 201	Introduction to Technology Innovation Management	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 201	Introduction to Marketing Management	4.0
OPM 321	Planning and Control of Operations	4.0
ORGB 300 [WI (p. 337)]	Organizational Behavior (WI)	4.0
STAT 205	Statistical Inference I	4.0
STAT 206	Statistical Inference II	4.0
Business and Engineering Focus		
Quantitative Decision Making in Business		
OPR 320	Linear Models for Decision Making	4.0
Select one of the following:		4.0
MKTG 366	Customer Analytics	
MKTG 367	Data-Driven Digital Marketing	
OPR 330	Advanced Decision Making and Simulation	
STAT 325	Six-Sigma Quality Implementation	
STAT 331	Introduction to Data Mining for Business	
Technology Innovation Management		
Select one of the following:		4.0
MGMT 301	Designing Innovative Organizations	
MGMT 302	Competing in Technology Industries	
MGMT 364	Technology Management	
MIS 250	Introduction to Enterprise Application Software Using SAP - Logistics	
Operations Management		
Select one of the following:		4.0
MIS 361	Information System Project Management	
OPM 315	Service Operations Management	
OPM 325	Advanced Planning and Control of Operations	
Engineering Requirements		
ENGR 101	Engineering Design Laboratory I	2.0

ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 220	Fundamentals of Materials	4.0
Business Minor *		16.0-20.0
Engineering Concentration **		15.0-16.0
Total Credits		182.0-188.0

* Students must take 4-5 LeBow courses to complete the requirements of a business minor. Students must select a minor from the following list:

- Accounting
- Economics
- Entrepreneurship
- Finance
- International Economics
- Legal Studies
- Management Information Systems
- Marketing
- Operations & Supply Chain Management
- Technology Innovation Management

** Students must select an engineering concentration and complete all five courses required for it:

- Electrical and Computer Engineering: ECE 200, ECE 201, ECEL 301 [WI (p. 337)], ECE 203, ECES 301
- Mechanical Engineering: ENGR 210, MEM 201, MEM 202, MEM 220, MEM 371
- Civil Engineering: ENGR 210, CAEE 201, CAEE 210, CAEE 211, MEM 202
- Chemical Engineering: ENGR 210, CHE 201, CHE 202, CHE 206, (CHE 301 or CHE 307)
- General Engineering: Any 5 courses from those listed for the above concentrations

Sample Plan of Study

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
UNIV B101 [WI (p. 337)]	The Drexel Experience	1.0
Term Credits		16.0
Term 2		
BUSN 102	Foundations of Business II	4.0
CHEM 101	General Chemistry I	3.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
MATH 122	Calculus II	4.0
Term Credits		17.5

Term 3

CHEM 102	General Chemistry II	4.5
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0

Term Credits 17.5
Term 4

ACCT 115	Financial Accounting Foundations	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 102	Fundamentals of Physics II	4.0
STAT 205	Statistical Inference I	4.0

Term Credits 15.0
Term 5

ACCT 116	Managerial Accounting Foundations	4.0
ENGR 232	Dynamic Engineering Systems	3.0
MIS 200	Management Information Systems	4.0
STAT 206	Statistical Inference II	4.0

Term Credits 15.0
Term 6

ECON 201	Principles of Microeconomics	4.0
ENGR 220	Fundamentals of Materials	4.0
OPM 321	Planning and Control of Operations	4.0
OPR 320	Linear Models for Decision Making	4.0

Term Credits 16.0
Term 7

ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
Engineering Concentration*		3.0

Term Credits 15.0
Term 8

COM 310 [WI (p. 337)]	Technical Communication	3.0
MGMT 201	Introduction to Technology Innovation Management	4.0
ORGB 300 [WI (p. 337)]	Organizational Behavior	4.0
PHIL 105	Critical Reasoning	3.0
Engineering Concentration*		3.0

Term Credits 17.0
Term 9

Select one of the following:		3.0
HIST 285	Technology in Historical Perspective	
PHIL 301	Business Ethics	
PHIL 315	Engineering Ethics	
BLAW 201	Business Law I	4.0
INTB 200	International Business	4.0
Engineering Concentration*		3.0

Term Credits 14.0
Term 10

Select one of the following:		4.0
MKTG 366	Customer Analytics	
MKTG 367	Data-Driven Digital Marketing	
OPR 330	Advanced Decision Making and Simulation	
STAT 325	Six-Sigma Quality Implementation	
STAT 331	Introduction to Data Mining for Business	

Engineering Concentration* 3.0

Business Minor* 4.0

UNIV B201 Career Management 1.0

Term Credits 12.0
Term 11

Select one of the following:		4.0
MGMT 301	Designing Innovative Organizations	
MGMT 302	Competing in Technology Industries	
MGMT 364	Technology Management	
MIS 250	Introduction to Enterprise Application Software Using SAP - Logistics	

Select one of the following: 4.0

MGMT 301 Designing Innovative Organizations

MGMT 302 Competing in Technology Industries

MGMT 364 Technology Management

MIS 250 Introduction to Enterprise Application Software Using SAP - Logistics

Select one of the following: 4.0

MIS 361 Information System Project Management

OPM 315 Service Operations Management

OPM 325 Advanced Planning and Control of Operations

Engineering Concentration* 3.0

Business Minor* 4.0

Term Credits 15.0
Term 12

MGMT 450 Strategy and Competitive Advantage 4.0

Business Minor* 8.0

Term Credits 12.0

Total Credit: 182.0

* See degree requirements (p. 337).

Decision Sciences Faculty

Edward Arnheiter, PhD (*University of Massachusetts, Amherst*) *Department of Decision Sciences*. Clinical Professor. Quality implementation and management, supply chain, statistical quality control, six sigma.

Avijit Banerjee, PhD (*The Ohio State University*) *Department of Decision Sciences*. Professor. Supply chain management; operations planning and scheduling; inventory control.

Hande Yurttan Benson, PhD (*Princeton University*) *Department of Decision Sciences*. Associate Professor. Nonlinear optimization, interior-point methods.

Oben Ceryan, PhD (*University of Michigan Ann Arbor*) *Department of Decision Sciences*. Assistant Professor. Pricing revenue management; inventory control; production planning and control supply chain management.

Neil Desnoyers, MS (*Drexel University*) *Department of Decision Sciences*. Assistant Clinical Professor. Decision sciences.

Seung-Lae Kim, PhD (*Penn State University*) Department of Decision Sciences. Professor. Production planning and control; inventory control; Just-In-Time (JIT) and Supply Chain Management (SCM).

Benjamin Lev, PhD (*Case Western Reserve University*) Department Head, Department of Decision Sciences. Professor. Operations research/management science, statistics, applications, engineering management.

Merrill W. Liechty, PhD (*Duke University*) Department of Decision Sciences. Associate Clinical Professor. Bayesian statistics, portfolio selection, higher moment estimation.

Arunkumar Madapusi, PhD (*University of North Texas Denton*) Department of Decision Sciences. Assistant Clinical Professor. Manufacturing technology development; quality management; supply chain management; interface with information systems.

Hazem Diab Maragah, PhD (*Louisiana University*) Department of Decision Sciences. Associate Professor. Statistical quality control, total equity management, applied statistics.

Bruce D. McCullough, PhD (*University of Texas*) Department of Decision Sciences. Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Thomas P. McWilliams, PhD (*Stanford University*) Department of Decision Sciences. Professor. Statistical quality control; sequential analysis.

Fariborz Y. Partovi, Ph.D. (*The Wharton School, University of Pennsylvania*) Department of Decision Sciences. Professor. The use of analytical hierarchy process and quality function deployment for strategic decisions in manufacturing and service organizations.

Wenjing Shen, PhD (*University of Michigan*) Department of Decision Sciences. Assistant Professor. The interface of operations management and marketing; inventory management; supply chain management.

Min Wang, PhD (*Columbia University*) Department of Decision Sciences. Assistant Professor.

Emeritus Faculty

Robert E. Laessig, PhD (*Cornell University*) Department of Decision Sciences. Professor Emeritus. Management systems integration.

Entrepreneurship

Major: Entrepreneurship

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.0701

Standard Occupational Classification (SOC) code: 11-1021; 11-9199

Note: Effective Fall Term 2015, students are no longer being accepted into this program. Students interested in an Entrepreneurship major are encouraged to visit the programs available through the Close School of Entrepreneurship (p. 44).

About the Program

Entrepreneurs and the new ventures they create fuel the economy. Entrepreneurs recognize market opportunities that others fail to see. A thriving population of entrepreneurs is essential to progress. Drexel's tradition of technological excellence and entrepreneurial

spirit provide LeBow with an opportunity to offer a distinctive *interdisciplinary* entrepreneurship curriculum in the Philadelphia region. The entrepreneurship faculty bring a unique blend of research, experiences and teaching in this area. In addition, LeBow is able to integrate the resources and offerings of the Baiada Institute (<http://www.lebow.drexel.edu/Centers/Baiada>) into our curriculum.

The major in entrepreneurship is designed for students interested in starting their own ventures, working for start-up companies, or pursuing traditional jobs with large corporations and consulting firms that may involve launching new business units, joint ventures, and creating strategic alliances.

The entrepreneurship major provides students with an opportunity to have a hands-on experience to study and work at the Baiada Institute. Moreover, the curriculum includes courses in finance, law and marketing that are geared toward the issues in entrepreneurship.

Degree Requirements

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 340)]	Business Communication	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 340)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
English literature elective ENGL 200 through ENGL 399		3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education Electives

Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.

Society and Culture		
Communication, English, Fine Arts, International Area Studies, Language or Philosophy		3.0
Social Science		
Anthropology, History, Sociology, Political Science, Psychology		3.0
Science		
Computer Science, Information Systems, Science		3.0

Additional General Education Electives

Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science 12.0

Business Requirements

ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0
BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 340)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Major Requirements

Eight required courses (See Major Requirements list below) 32.0

Free Electives 20.0

Total Credits 180.0

Required Entrepreneurship Major Courses

MGMT 260	Introduction to Entrepreneurship	4.0
MGMT 363	Directed Study in Entrepreneurship	4.0
MGMT 364	Technology Management	4.0
MGMT 365	Business Plan for Entrepreneurs	4.0
Select four of the following:		16.0
BLAW 346	Entrepreneurial Law	
FIN 335	Entrepreneurial Finance	
MKTG 347	New Product Development	
MKTG 364	Marketing for New Ventures	
ORGB 420	Negotiations and Conflict Resolution	

Total Credits 32.0

Sample Plan of Study

Term 1	Credits
BUSN 101	Foundations of Business I 4.0
ECON 201	Principles of Microeconomics 4.0

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV B101 [WI (p. 340)]	The Drexel Experience	1.0

Term Credits 16.0

Term 2

BUSN 102	Foundations of Business II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ECON 202	Principles of Macroeconomics	4.0
MATH 102	Introduction to Analysis II	4.0

Term Credits 15.0

Term 3

ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
	Society and culture elective	3.0
	General education elective	3.0

Term Credits 16.0

Term 4

ACCT 116	Managerial Accounting Foundations	4.0
STAT 201	Introduction to Business Statistics	4.0
	History (HIST) elective	3.0
	Select one of the following:	3.0

BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

Term Credits 14.0

Term 5

BLAW 201	Business Law I	4.0
COM 270 [WI (p. 340)]	Business Communication	3.0
MGMT 260	Introduction to Entrepreneurship	4.0
	Select one of the following:	3.0

BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

Term Credits 14.0

Term 6

INTB 200	International Business	4.0
MIS 200	Management Information Systems	4.0
OPM 200	Operations Management	4.0
ENGL 200 - ENGL 399 course		3.0

Term Credits 15.0

Term 7

FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0

ORGB 300 [WI (p. 340)]	Organizational Behavior	4.0
Science elective		3.0
Term Credits		15.0
Term 8		
PHIL 105	Critical Reasoning	3.0
Select two of the following:		8.0
BLAW 346	Entrepreneurial Law	
FIN 335	Entrepreneurial Finance	
MKTG 347	New Product Development	
MKTG 364	Marketing for New Ventures	
ORGB 420	Negotiations and Conflict Resolution	
Free electives		4.0
Term Credits		15.0
Term 9		
MGMT 365	Business Plan for Entrepreneurs	4.0
Fine arts elective		3.0
Social science elective		3.0
General education electives		3.0
General education electives		3.0
Term Credits		16.0
Term 10		
Select one of the following:		4.0
BLAW 346	Entrepreneurial Law	
FIN 335	Entrepreneurial Finance	
MKTG 347	New Product Development	
MKTG 364	Marketing for New Ventures	
ORGB 420	Negotiations and Conflict Resolution	
MGMT 363	Directed Study in Entrepreneurship	4.0
UNIV B201	Career Management	1.0
General education elective*		3.0
Free electives		3.0
Term Credits		15.0
Term 11		
MGMT 364	Technology Management	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
Select one of the following:		4.0
BLAW 346	Entrepreneurial Law	
FIN 335	Entrepreneurial Finance	
MKTG 364	Marketing for New Ventures	
MKTG 347	New Product Development	
ORGB 420	Negotiations and Conflict Resolution	
Free elective		3.0
Term Credits		15.0
Term 12		
Free electives		14.0
Term Credits		14.0
Total Credit: 180.0		

* See degree requirements (p. 340).

Career Opportunities

The entrepreneurship concentration prepares students for a wide range of job opportunities.

- *Traditional jobs with large corporations and consulting firms:* Careers may involve joint venture or strategic alliances that require the creation and launch of new business units.
- *Employment in new ventures:* Because they are able to make valuable contributions, individuals with an academic background in entrepreneurial studies are in demand among start-ups and growing new ventures.
- *Entrepreneurs:* Increasingly, students are interested in starting their own ventures. At Drexel, this is evidenced by the popularity of our Baiada Business Plan Competition and the incubating companies in the Baiada Center for Technology Entrepreneurship (<http://www.lebow.drexel.edu/Centers/Baiada>).

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Entrepreneurship

Note: Effective Fall Term 2015, students are no longer being accepted into this program. Students interested in an Entrepreneurship major are encouraged to visit the programs available through the Close School of Entrepreneurship (p. 44).

The minor in entrepreneurship is designed for students from a range of backgrounds who are interested in starting their own ventures, working for start-up companies, or pursuing traditional jobs with large corporations and consulting firms that may involve launching new business units, joint ventures, and creating strategic alliances.

The curriculum draws upon Drexel University's tradition of technological excellence and the offerings of the Baiada Institute. Coupled with the student co-op experience, the program provides a distinctive curriculum that may encompass real entrepreneurial issues.

Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

ACCT 115	Financial Accounting Foundations	4.0
MGMT 260	Introduction to Entrepreneurship	4.0

MGMT 364	Technology Management	4.0
MGMT 365	Business Plan for Entrepreneurs	4.0
Select two of the following: *		8.0
BLAW 346	Entrepreneurial Law	
FIN 301	Introduction to Finance	
FIN 335	Entrepreneurial Finance	
MKTG 347	New Product Development	
MKTG 364	Marketing for New Ventures	
MGMT 363	Directed Study in Entrepreneurship **	
ORGB 300 [WI Organizational Behavior (p. 340)]		
Total Credits		24.0

* Students select two of the following (or 8 credits of courses from a different college/school with approval from the Department of Management).

** For seniors only, with permission from the Head of the Department of Management (<http://www.lebow.drexel.edu/Faculty/Departments/Management>).

Facilities

Management Faculty

Shanti Dewi Anak Agung Istri, PhD (*Georgia Institute of Technology*). Assistant Professor. Technology commercialization; technology entrepreneurship.

Murugan Anandarajan, PhD (*Drexel University*) *Head of Department, Management*. Professor. Individual Internet usage behavior (specifically abuse and addiction); Application of artificial intelligence techniques in forensic accounting and ophthalmology.

Orakwue B. Arinze, PhD (*London School of Economics*). Professor. Client/Server computing; Enterprise Application Software (EAS)/ Enterprise Resource Planning Software (ERP); knowledge-based and decision support applications in operations management.

Suresh Chandran, PhD. Associate Clinical Professor. Corporate entrepreneurship; corporate social responsibility; global management; intellectual property and employee rights.

Qizhi Dai, PhD (*University of Minnesota*). Associate Professor. Business to Business E-Commerce; information technology adoption; economic analysis of information systems.

Donna Marie De Carolis, PhD (*Temple University*) *Dean, Close School of Entrepreneurship*. Professor. Pharmaceutical/biotechnology industries; entrepreneurship; technology & strategy; technology commercialization, strategic alliances; social capital.

David Gefen, PhD (*Georgia State University*). Professor. Strategic IT management; IT development and implementation management; research methodology; managing the adoption of large IT systems, such as MRP II, ERP, and expert systems; research methodology.

Azi Gera, PhD (*University of Maryland*). Assistant Professor. Business planning, new venture performance and survival, social networking, cognition and strategy, determinants of firm performance, attention based view, business angles and VC firms, interfirm signaling, private equity investments.

Cuneyt Gozu, PhD (*University of Albany*). Associate Clinical Professor.

Jeffrey H. Greenhaus, PhD (*New York University*) *William A. Mackie Professor of Management*. Professor. Career management, career decision making, work-family linkages, managing diversity, career and adult life development, organizational behavior/human resources, job design, models of work motivation and job attitudes, human resource staffing.

Mazhar Islam, PhD (*University of Minnesota*). Assistant Professor. New markets in emerging countries, alliances, corporate entrepreneurship, emerging countries, pharmaceutical and biotechnology industry, technological innovation, transaction cost economics.

Robert W. Keidel, PhD (*Wharton School, University of Pennsylvania*). Clinical Professor. Organization design and change, management of technology, strategic cognition.

Keisha Liggett-Nichols, EDB (*Georgia State University*). Associate Clinical Professor. Corporate entrepreneurship, determinants of firm performance, evidence-based management.

Frank Linnehan, PhD (*Temple University*) *Interim Dean, LeBow College of Business*. Professor. Affirmative action; workforce diversity; equal employment; school-to-work transitions for younger workers. Research focuses on issues of race and diversity in the workplace.

Yu-Chieh Lo, PhD (*University of Southern California*). Assistant Professor. Organization theory, technology entrepreneurship.

Mark Loschiavo, MS (*University of Kentucky*). Clinical Professor. Business planning; new venture performance and survival; strategic management; strategic thinking; technology entrepreneurship.

Dali Ma, PhD (*University of Chicago*). Assistant Professor. Status dynamics, social networks, founding team formation; venture capital syndication; family business; Chinese private entrepreneurship.

Michele K. Masterfano, DBA (*Argosy University of Sarasolta*). Associate Clinical Professor. Entrepreneurship/small business administration, business planning, social capital, social networking.

Mary Mawritz, PhD (*University of Central Florida*). Assistant Professor. Abusive supervision; deviant behavior; leadership.

Suchet Nadkarni, PhD (*University of Kansas*). Associate Professor. Strategic management, cognition and strategy.

V. K. Narayanan, PhD (*University of Pittsburgh*) *Deloitte Touche Jones Stubbs Professor; Associate Dean of Research, Department of Management*. Corporate and business strategy; management of technology and innovation; strategy implementation; macro environmental analysis; knowledge management; competitor analysis and intelligence.

Haemin Park, PhD (*University of Washington*). Assistant Professor. Corporate entrepreneurship; IPO; knowledge-based view of the firm; new venture performance and survival; technology entrepreneurship; venture capital.

Christian Resick, PhD (*Wayne State University*). Associate Professor. Linkages between CEO personality with organizational culture, climate, and effectiveness; cross-cultural studies of ethical leadership beliefs and behaviors; roles of team leadership and member personality in building shared cognition and effective teamwo

Stanley Ridgley, PhD (*Duke University*). Assistant Clinical Professor. Business communication; cognition and strategy; competitive intelligence; determinants of firm performance; new markets in emerging countries; Russian business culture.

Raja Roy, PhD (*University of Pittsburgh*). Assistant Professor. Technology entrepreneurship, determinants of firm performance, technological change, technological innovation.

Samir Shah, DPS (*Pace University*). Associate Clinical Professor.

Sidney R. Siegel, PhD (*Drexel University*). Professor. Organizational change, development and behavior.

Daniel Tzabbar, PhD (*University of Toronto*). Assistant Professor. Business planning, social capital, technology entrepreneurship, alliances, human capital, innovation management, strategic management.

Joan Weiner, PhD (*The Wharton School, University of Pennsylvania*). Professor. Business ethics, leadership, communication and decision making; educational innovation; health system management design.

Jonathan C. Ziegert, PhD (*University of Maryland*). Associate Professor. Leadership; team dynamics; group performance; attraction and recruitment; discrimination.

Emeritus Faculty

Milton Silver, PhD (*Columbia University*). Professor Emeritus. Strategic planning and control systems, analysis and design of information systems, and executive and management development and training.

Finance

Major: Finance

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.0801

Standard Occupational Classification (SOC) code: 11-3031; 13-2031;

13-2041; 13-2051

About the Program

Students with a major in finance obtain a thorough understanding of the basic concepts, principles, operating procedures, and analytical techniques in the various areas of finance.

Throughout the finance curriculum, students develop and apply quantitative skills for financial decision making within the business environment.

This major prepares students for careers in private business firms, including positions involving forecasting and budgeting for financial resources, cost-effectiveness analysis, control of expenditures, evaluation and financing of new projects, and evaluation of alternative methods of financing; in the investment field, including positions in banks, brokerage houses, and financial institutions that participate in the various money and capital markets; and in the public sector, including positions at the federal, state, and local government levels.

For more information about the program, contact the Department of Finance (<http://www.lebow.drexel.edu/academics/disciplines/finance>).

Major Requirements

All core mathematics and statistics courses should be completed before embarking on the upper-level finance major courses. A second course in business statistics, STAT 202, must be completed as a prerequisite for the major's required courses.

Because of the relevance of financial accounting to the field of finance, it is strongly recommended that finance students also complete ACCT 321 and ACCT 322 (Financial Accounting I and II) as two of their free electives.

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 344)]	Business Communication	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 344)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
English literature elective ENGL 200 through ENGL 399		3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education Electives

Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.

Society and Culture		
Communication, English, Fine Arts, International Area Studies, Language or Philosophy		3.0
Social Science		
Anthropology, History, Sociology, Political Science, Psychology		3.0
Science		
Computer Science, Information Systems, Science		3.0

Additional General Education Electives

Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science

Business Requirements

ACCT 115	Financial Accounting Foundations	4.0
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ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0
BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 344)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Major Requirements

Eight required courses (See Major Requirements list below) 32.0

Free Electives 20.0**Total Credits** 180.0**Required Finance Major Courses**

FIN 302	Intermediate Corporate Finance	4.0
FIN 321	Investment Securities & Markets	4.0
FIN 325	Financial Institutions and Markets	4.0
Select five of the following:		20.0
FIN 323	Risk Management	
FIN 330	Derivative Securities	
FIN 332	Investment Analysis	
FIN 335	Entrepreneurial Finance	
FIN 338	Money and Capital Markets	
FIN 340	Seminar in Finance	
FIN 341	Applied Portfolio Management	
FIN 342	Advanced Portfolio Management	
FIN 346	Global Financial Management	

Total Credits 32.0**Sample Plan of Study**

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0

UNIV B101 [WI (p. 344)]	The Drexel Experience	1.0
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Term Credits 16.0**Term 2**

BUSN 102	Foundations of Business II	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0

Term Credits 15.0**Term 3**

ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
	Society and culture course *	3.0
	General Education elective *	3.0

Term Credits 16.0**Term 4**

ACCT 116	Managerial Accounting Foundations	4.0
STAT 201	Introduction to Business Statistics	4.0
	History (HIST) elective	3.0
	Select one of the following:	3.0
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

Term Credits 14.0**Term 5**

BLAW 201	Business Law I	4.0
COM 270 [WI (p. 344)]	Business Communication	3.0
STAT 202	Business Statistics II	4.0
	Select one of the following:	3.0
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

Term Credits 14.0**Term 6**

FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 344)]	Organizational Behavior	4.0
	Social Science Elective	3.0

Term Credits 15.0**Term 7**

FIN 302	Intermediate Corporate Finance	4.0
MIS 200	Management Information Systems	4.0
OPM 200	Operations Management	4.0

Science Elective *		3.0
Term Credits		15.0
Term 8		
FIN 321	Investment Securities Markets	4.0
PHIL 105	Critical Reasoning	3.0
Free Electives		8.0
Term Credits		15.0
Term 9		
FIN 325	Financial Institutions and Markets	4.0
INTB 200	International Business	4.0
Free Elective		4.0
General Education Elective *		3.0
Term Credits		15.0
Term 10		
FIN Major Course (see major requirements for list)		4.0
FIN Major Course (see major requirements for list)		4.0
Free Electives		4.0
General Education Elective *		3.0
Term Credits		15.0
Term 11		
FIN Major Course (see major requirements for list)		4.0
FIN Major Course (see major requirements for list)		4.0
UNIV B201	Career Management	1.0
ENGL 200 Through ENGL 399		3.0
Fine Arts Elective		3.0
Term Credits		15.0
Term 12		
MGMT 450	Strategy and Competitive Advantage	4.0
FIN Major Course (see major requirements for list)		4.0
Free Elective		4.0
General Education Elective *		3.0
Term Credits		15.0
Total Credit:		180.0

* See degree requirements (p. 344).

Co-op/Career Opportunities

The finance program at Drexel prepares students for careers in corporate financial management, the investment field, and the public sector. It also provides excellent basic preparation for various types of professional certification, including chartered financial analyst (CFA) and certified financial planner (CFP). In money and capital markets, finance students often find careers in banking, securities analysis, and portfolio management. In government, many choose to work for regulatory agencies.

Typical positions include financial analyst, capital budgeting officer, credit analyst, merger and acquisition manager, bank trust officer, portfolio analyst, and securities broker.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) for more detailed information on co-op and post-graduate opportunities.

Minor in Finance Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
FIN 301	Introduction to Finance	4.0
FIN 302	Intermediate Corporate Finance	4.0
FIN 321	Investment Securities & Markets	4.0
FIN 325	Financial Institutions and Markets	4.0
Total Credits		24.0

Finance Faculty

David A. Becher, PhD (*Pennsylvania State University*) *Department of Finance*. Associate Professor. Mergers and acquisitions, corporate governance, financial institutions.

Erik Benrud, PhD, FRM, CAIA, CFA (*University of Virginia*) *Department of Finance*. Clinical Professor. Economics/managerial economics: game theory; finance: alternative investments, derivatives.

Jie Cai, PhD (*University of Iowa*) *Department of Finance*. Assistant Professor. Investment banking, mergers and acquisitions, corporate finance and corporate governance.

Thomas Chi-Nan Chiang, PhD (*The Pennsylvania State University*) *Marshall M. Austin Professor of Finance*. Professor. International finance; time series analysis of financial data; econometric modeling & forecasting; financial markets; international risk management; monetary theory; macroeconomics; emerging markets; and global country funds.

Naveen Daniel, PhD (*Arizona State University*). Assistant Professor. Corporate governance, mutual funds, hedge funds.

Daniel Dorn, PhD (*Columbia University*) *Department of Finance*. Associate Professor. Capital markets and investments; behavioral finance.

Casey Dougal, PhD (*University of North Carolina, Chapel Hill*). Assistant Professor. Empirical asset pricing, financial media, behavioral finance, and urban economics.

Eliezer M. Fich, PhD (*New York University*) *Department of Finance*. Associate Professor. Empirical topics in corporate finance.

Michael Joseph Gombola, PhD (*University of South Carolina*) *Head of the Department of Finance*. Professor. Stock offerings and repurchases, mergers, acquisitions, and restructuring; working capital management, time series analysis; options and derivatives, financial statement analysis.

Amy Laura Kratchman, MBA (*Drexel University*) *Department of Finance*. Clinical Associate Professor. Portfolio management, specifically related to fixed income securities; investment management for pension and mutual fund companies, and fixed income securities.

Edward Nelling, PhD, CFA (*University of Pennsylvania-Wharton*) *Department of Finance*. Associate Professor. Investments; corporate finance; real estate finance.

Gregory Nini, PhD (*The Wharton School, University of Pennsylvania*). Assistant Professor. Creditor control rights, corporate governance, and firm value; insurance economics.

Patricia Robak, PhD (*Lehigh University*) *Department of Finance*. Clinical Associate Professor. Investments, money and banking, international finance.

Diana Sandberg, MS (*Drexel University*) *Department of Finance*. Clinical Associate Professor. Portfolio management, derivatives, investment management.

Samuel H. Szewczyk, PhD (*Pennsylvania State University*) *Department of Finance*. Associate Professor. Corporate governance, mergers and acquisitions, financial engineering, investment banking, financial institutions.

George Tsetsekos, PhD (*The University of Tennessee*) *Dean, LeBow College of Business*. Professor. Valuation and corporate restructuring, treasury and risk/hedging operations, investment banking, securitization, emerging capital markets, multinational finance, bank asset-liability management.

Ralph Walkling, PhD (*University of Maryland*) *Stratakis Professor of Corporate Governance, Department of Finance*. Professor. Corporate governance, mergers and acquisitions.

General Business

Major: General Business

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.0101

Standard Occupational Classification (SOC) code: 11-1021; 11-2022; 11-3011; 11-9199

About the Program

The major in general business is designed for students who do not want to specialize in any one area but want a more extensive exposure to all the various areas of business.

Students selecting the major in general business should choose eight courses from at least five of the following fields: accounting (ACCT), economics (ECON), finance (FIN), human resource management (HRMT), international business (INTB), legal studies (BLAW), management (MGMT), marketing (MKTG), management information

systems (MIS), business statistics (STAT), organizational behavior (ORGB), operations research (OPR) and operations management (OPM).

Degree Requirements

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 347)]	Business Communication	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 347)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
English literature elective ENGL 200 through ENGL 399		3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education Electives

Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.

Society and Culture		
Communication, English, Fine Arts, International Area Studies, Language or Philosophy		3.0
Social Science		
Anthropology, History, Sociology, Political Science, Psychology		3.0
Science		
Computer Science, Information Systems, Science		3.0

Additional General Education Electives

Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science

Business Requirements

ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0
BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 347)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	
Major Requirements		
Eight required courses (See Major Requirements list below)		32.0
Free Electives		20.0
Total Credits		180.0

General Business Major

Business Administration: Plan of Study

Term		Credits
Term 1		
BUSN 101	Foundations of Business I	4.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV	The Drexel Experience	1.0
B101 [WI (p. 347)]		
Term Credits		16.0
Term 2		
BUSN 102	Foundations of Business II	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
Term Credits		15.0
Term 3		
ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
General education elective		3.0
Select one of the following:		3.0
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	

PHYS 151	Applied Physics	
Term Credits		16.0
Term 4		
ACCT 116	Managerial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
COM 270 [WI (p. 347)]	Business Communication	3.0
STAT 201	Introduction to Business Statistics	4.0
Term Credits		15.0
Term 5		
INTB 200	International Business	4.0
MIS 200	Management Information Systems	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	
Select one of the following:		3.0
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	
Term Credits		15.0

Term		Credits
Term 6		
FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
English Literature elective (ENGL 200 - 399)		3.0
Term Credits		15.0
Term 7		
Major Elective 1		4.0
Major Elective 2		4.0
PHIL 105	Critical Reasoning	3.0
ORGB 300 [WI (p. 347)]	Organizational Behavior	4.0
Term Credits		15.0
Term 8		
Major Elective 3		4.0
Major Elective 4		4.0
Fine Arts Elective		3.0
History (HIST) Elective		3.0
Science Elective		3.0
Term Credits		17.0
Term 9		
Major Elective 6		4.0
Social Science Elective		3.0
Society and Culture Elective		3.0
Major Elective 5		4.0
Term Credits		14.0
Term 10		
Major Elective 7		4.0

Free Electives	7.0
UNIV The Drexel Experience	1.0
B101 [WI (p. 347)]	
General Education elective	3.0
Term Credits	15.0
Term 11	
Major Elective 8	4.0
General Education	3.0
MGMT 450 Strategy and Competitive Advantage	4.0
Free Elective	3.0
Term Credits	14.0
Term 12	
General Education	3.0
Free Electives	10.0
Term Credits	13.0
Total Credit: 180.0	

Interdepartmental Faculty

Marco Airaud, PhD (*University of Pennsylvania Philadelphia*). Assistant Professor. Computational economics, international economics, macroeconomics and monetary economics.

Murugan Anandarajan, PhD (*Drexel University*) *Head of Department, Management*. Professor. Individual Internet usage behavior (specifically abuse and addiction); Application of artificial intelligence techniques in forensic accounting and ophthalmology.

Rolph E. Anderson, PhD (*University of Florida*) *Royal H. Gibson Sr. Professor of Marketing*. Professor. Personal selling and sales management; multivariate data analysis; customer relationship management (CRM); customer satisfaction and customer loyalty.

Trina Larsen Andras, PhD (*University of Texas at Austin*) *Head of the Department of Marketing; Academic Director, Center for Corporate Research Management*. Professor. International marketing, marketing channels management, cross-cultural communication.

Orakwue B. Arinze, PhD (*London School of Economics*). Professor. Client/Server computing; Enterprise Application Software (EAS)/ Enterprise Resource Planning Software (ERP); knowledge-based and decision support applications in operations management.

Edward Arnheiter, PhD (*University of Massachusetts, Amherst*) *Department of Decision Sciences*. Clinical Professor. Quality implementation and management, supply chain, statistical quality control, six sigma.

Avijit Banerjee, PhD (*The Ohio State University*) *Department of Decision Sciences*. Professor. Supply chain management; operations planning and scheduling; inventory control.

David A. Becher, PhD (*Pennsylvania State University*) *Department of Finance*. Associate Professor. Mergers and acquisitions, corporate governance, financial institutions.

Hande Yurttan Benson, PhD (*Princeton University*) *Department of Decision Sciences*. Associate Professor. Nonlinear optimization, interior-point methods.

Jie Cai, PhD (*University of Iowa*) *Department of Finance*. Assistant Professor. Investment banking, mergers and acquisitions, corporate finance and corporate governance.

Oben Ceryan, PhD (*University of Michigan Ann Arbor*) *Department of Decision Sciences*. Assistant Professor. Pricing revenue management; inventory control; production planning and control supply chain management.

Hsuhui Chang, PhD (*University of Minnesota*) *Department of Accounting and Tax, KPMG Endowed Chair and Department Head*. Professor.

Hui Lam Choy, PhD (*University of Rochester*). Associate Professor. Financial accounting.

Roger D. Collons, JD, PhD (*George Washington University; Georgia State University*) *Department of Legal Studies*. Professor. Patent law, preservation of wealth.

Anthony P. Curatola, PhD (*Texas A&M University*) *Joseph F. Ford Professor of Accounting*. Professor. Federal and state income tax policy, retirement income taxation, fringe benefits taxation, educational savings and tax incentives, federal and state income tax research.

Mian Dai, PhD (*Northwestern University*). Assistant Professor. Managerial economics and strategy.

Qizhi Dai, PhD (*University of Minnesota*). Associate Professor. Business to Business E-Commerce; information technology adoption; economic analysis of information systems.

Naveen Daniel, PhD (*Arizona State University*). Assistant Professor. Corporate governance, mutual funds, hedge funds.

Patricia L. Daniel Derrick, PhD (*The George Washington University*). Assistant Clinical Professor.

Donna Marie De Carolis, PhD (*Temple University*) *Dean, Close School of Entrepreneurship*. Professor. Pharmaceutical/biotechnology industries; entrepreneurship; technology & strategy; technology commercialization, strategic alliances; social capital.

Neil Desnoyers, MS (*Drexel University*) *Department of Decision Sciences*. Assistant Clinical Professor. Decision sciences.

Daniel Dorn, PhD (*Columbia University*) *Department of Finance*. Associate Professor. Capital markets and investments; behavioral finance.

Casey Dougal, PhD (*University of North Carolina, Chapel Hill*). Assistant Professor. Empirical asset pricing, financial media, behavioral finance, and urban economics.

Michaela Draganska, PhD (*Kellogg School of Management, Northwestern University*). Associate Professor. Advertising strategy, product assortment decisions, new product positioning, distribution channels.

Anne Duchene, PhD (*Ecole Nationale des Ponts et Chaussees, France*) *Department of Economics and International Business*. Assistant Professor. Microeconomics, industrial organization, law and economics.

Larry Duke, MBA (*Harvard Business School*). Associate Clinical Professor. International marketing and strategy, new product development, business-to-business marketing, marketing of financial services.

Eliezer M. Fich, PhD (*New York University*) *Department of Finance*. Associate Professor. Empirical topics in corporate finance.

Richard P. Freedman, JD, LL.M. (*Temple University*) *Head of the Department of Legal Studies*. Associate Professor. Taxation, corporate and business matters, real estate, estate planning, estate administration and elder law.

David Gefen, PhD (*Georgia State University*). Professor. Strategic IT management; IT development and implementation management; research methodology; managing the adoption of large IT systems, such as MRP II, ERP, and expert systems; research methodology.

Azi Gera, PhD (*University of Maryland*). Assistant Professor. Business planning, new venture performance and survival, social networking, cognition and strategy, determinants of firm performance, attention based view, business angles and VC firms, interfirm signaling, private equity investments.

Hubert Glover, PhD (*Texas A&M University*) *Department of Accounting and Tax*. Associate Clinical Professor. International financial reporting.

Michael Joseph Gombola, PhD (*University of South Carolina*) *Head of the Department of Finance*. Professor. Stock offerings and repurchases, mergers, acquisitions, and restructuring; working capital management, time series analysis; options and derivatives, financial statement analysis.

Cuneyt Gozu, PhD (*University of Albany*). Associate Clinical Professor.

Jeffrey H. Greenhaus, PhD (*New York University*) *William A. Mackie Professor of Management*. Professor. Career management, career decision making, work-family linkages, managing diversity, career and adult life development, organizational behavior/human resources, job design, models of work motivation and job attitudes, human resource staffing.

Barbara Murray Grein, PhD (*Kenan-Flagler Business School, University of North Carolina*) *Department of Accounting and Tax*. Associate Professor. Auditing, auditor selection, audit adjustments, audit fees, corporate governance, financial reporting.

Curtis M. Hall, MBA (*University of Arizona*). Assistant Professor. Strategic cost management; corporate governance; capital markets research in accounting; human capital investment.

Shawkat M. Hammoudeh, PhD (*University of Kansas*) *Department of Economics and International Business*. Professor. Applied econometrics, financial economics, international economics, natural resource economics.

Teresa D. Harrison, PhD (*University of Texas at Austin*) *Department of Economics and International Business*. Associate Professor. Econometrics, public finance, industrial organization, empirical microeconomics including health and nonprofit organizations.

Yanliu Huang, PhD (*The Wharton School, University of Pennsylvania*). Assistant Professor. Consumer in-store decision making, consumer planning, health marketing, memory and learning.

Mazhar Islam, PhD (*University of Minnesota*). Assistant Professor. New markets in emerging countries, alliances, corporate entrepreneurship, emerging countries, pharmaceutical and biotechnology industry, technological innovation, transaction cost economics.

Paul E. Jensen, PhD (*Penn State University*) *Associate Dean, College of Business*. Associate Professor. International trade. Primary research

interest is international trade, particularly in empirical studies of international trade patterns.

Bang Nam Jeon, PhD (*Indiana University*) *Department of Economics and International Business*. Professor. Financial economics, world financial market linkages, foreign direct investment flows in the Asia-Pacific economies, the Korean economy: currency crisis, FDI, and macroeconomic issues, regional economic integration and newly industrializing economies: the

Kevin K. Jones, EDB (*Georgia State University*). Assistant Clinical Professor.

Stephen Joyce, MA (*Temple University*) *Department of Economics and International Business*. Assistant Clinical Professor. Education and human capital.

Robert W. Keidel, PhD (*Wharton School, University of Pennsylvania*). Clinical Professor. Organization design and change, management of technology, strategic cognition.

Natalya V. Khimich, PhD (*University of California at Berkeley*). Assistant Professor. Equity valuation, earnings quality, and accounting for innovation and intangible assets.

Seung-Lae Kim, PhD (*Penn State University*) *Department of Decision Sciences*. Professor. Production planning and control; inventory control; Just-In-Time (JIT) and Supply Chain Management (SCM).

Stacy Kline, MBA (*Temple University*) *Department of Accounting and Tax*. Clinical Professor. Individual, corporation; S corporation and partnership taxation.

Daniel Korshun, PhD (*Boston University*). Assistant Professor. Brand and corporate reputation management, corporate social responsibility, internal marketing, marketing strategy, relationship marketing.

Edward C. Koziara, PhD (*University of Wisconsin*) *Department of Economics and International Business*. Professor Emeritus. Applied micro and macro economics.

Amy Laura Kratchman, MBA (*Drexel University*) *Department of Finance*. Clinical Associate Professor. Portfolio management, specifically related to fixed income securities; investment management for pension and mutual fund companies, and fixed income securities.

Rosalie S. Kreider, JD (*Villanova University*) *Department of Legal Studies*. Clinical Professor. Business law, international business law.

Hyokjin Kwak, PhD (*University of Georgia*) *Department of Marketing*. Associate Professor. Advertising effects, consumer behaviors and e-commerce.

Robert E. Laessig, PhD (*Cornell University*) *Department of Decision Sciences*. Professor Emeritus. Management systems integration.

Christopher A. Laincz, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Bijou Yang Lester, PhD (*University of Pennsylvania*) *Department of Economics and International Business*. Professor. Behavioral characteristics of shopping on-line, economic issues of electronic

commerce, contingent employment and part-time work, the economy and suicide.

Benjamin Lev, PhD (*Case Western Reserve University*) *Department Head, Department of Decision Sciences*. Professor. Operations research/management science, statistics, applications, engineering management.

Merrill W. Liechty, PhD (*Duke University*) *Department of Decision Sciences*. Associate Clinical Professor. Bayesian statistics, portfolio selection, higher moment estimation.

Keisha Liggett-Nichols, EDB (*Georgia State University*). Associate Clinical Professor. Corporate entrepreneurship, determinants of firm performance, evidence-based management.

Frank Linnehan, PhD (*Temple University*) *Interim Dean, LeBow College of Business*. Professor. Affirmative action; workforce diversity; equal employment; school-to-work transitions for younger workers. Research focuses on issues of race and diversity in the workplace.

Yu-Chieh Lo, PhD (*University of Southern California*). Assistant Professor. Organization theory, technology entrepreneurship.

Mark Loschiavo, MS (*University of Kentucky*). Clinical Professor. Business planning; new venture performance and survival; strategic management; strategic thinking; technology entrepreneurship.

Dali Ma, PhD (*University of Chicago*). Assistant Professor. Status dynamics, social networks, founding team formation; venture capital syndication; family business; Chinese private entrepreneurship.

Vibhas Madan, PhD (*Michigan State University*) *Head of the Department of Economics and International Business*. Professor. International trade theory, applied microeconomics.

Arunkumar Madapusi, PhD (*University of North Texas Denton*) *Department of Decision Sciences*. Assistant Clinical Professor. Manufacturing technology development; quality management; supply chain management; interface with information systems.

Hazem Diab Maragah, PhD (*Louisiana University*) *Department of Decision Sciences*. Associate Professor. Statistical quality control, total equity management, applied statistics.

Michele K. Masterfano, DBA (*Argosy University of Sarasolta*). Associate Clinical Professor. Entrepreneurship/small business administration, business planning, social capital, social networking.

Mary Mawritz, PhD (*University of Central Florida*). Assistant Professor. Abusive supervision; deviant behavior; leadership.

Roger A. McCain, PhD (*Louisiana State University*) *Department of Economics and International Business*. Professor. Computational economics, game theory.

Bruce D. McCullough, PhD (*University of Texas*) *Department of Decision Sciences*. Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Thomas P. McWilliams, PhD (*Stanford University*) *Department of Decision Sciences*. Professor. Statistical quality control; sequential analysis.

Irina Murtazashvili, PhD (*Michigan state University*). Assistant Professor. Applied econometrics.

Suchet Nadkarni, PhD (*University of Kansas*). Associate Professor. Strategic management, cognition and strategy.

V. K. Narayanan, PhD (*University of Pittsburgh*) *Deloitte Touche Jones Stubbs Professor; Associate Dean of Research, Department of Management*. Corporate and business strategy; management of technology and innovation; strategy implementation; macro environmental analysis; knowledge management; competitor analysis and intelligence.

Gordon Ndubizu, PhD (*Temple University*) *Department of Accounting and Tax*. Professor. Financial accounting.

Edward Nelling, PhD, CFA (*University of Pennsylvania-Wharton*) *Department of Finance*. Associate Professor. Investments; corporate finance; real estate finance.

Gregory Nini, PhD (*The Wharton School, University of Pennsylvania*). Assistant Professor. Creditor control rights, corporate governance, and firm value; insurance economics.

Maria Olivero, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA (*American University*) *Department of Economics and International Business*. Clinical Associate Professor. Macroeconomics, political economy.

Neal Orkin, JD (*Temple University*) *Department of Legal Studies*. Associate Professor. Intellectual property rights of employed inventors and authors; labor relations.

Duri Park, MS (PhD expected in 2013) (*Ohio State University*). Assistant Professor. Financial accounting, insider trading, investments, and cash holdings.

Haemin Park, PhD (*University of Washington*). Assistant Professor. Corporate entrepreneurship; IPO; knowledge-based view of the firm; new venture performance and survival; technology entrepreneurship; venture capital.

Fariborz Y. Partovi, Ph.D. (*The Wharton School, University of Pennsylvania*) *Department of Decision Sciences*. Professor. The use of analytical hierarchy process and quality function deployment for strategic decisions in manufacturing and service organizations.

Pedersen Pedersen, JD (*Harvard University*) *Department of Legal Studies*. Assistant Professor. American law, contract law, labor and employment law.

Bernhard Reichert, PhD, CPA (*University of Texas at Austin*) *Department of Accounting and Tax*. Assistant Professor. Behavioral research in accounting and experimental economics.

Christian Resick, PhD (*Wayne State University*). Associate Professor. Linkages between CEO personality with organizational culture, climate, and effectiveness; cross-cultural studies of ethical leadership beliefs and behaviors; roles of team leadership and member personality in building shared cognition and effective teamwo

Stanley Ridgley, PhD (*Duke University*). Assistant Clinical Professor. Business communication; cognition and strategy; competitive intelligence; determinants of firm performance; new markets in emerging countries; Russian business culture.

Patricia Robak, PhD (*Lehigh University*) *Department of Finance*. Clinical Associate Professor. Investments, money and banking, international finance.

Bert Rosenbloom, PhD (*Temple University*) *Rauth Chair of Electronic Commerce*. Professor. Marketing channels and distribution systems, electronic commerce, interorganizational marketing management, wholesale and retail distribution, marketing strategy and planning.

Raja Roy, PhD (*University of Pittsburgh*). Assistant Professor. Technology entrepreneurship, determinants of firm performance, technological change, technological innovation.

Diana Sandberg, MS (*Drexel University*) *Department of Finance*. Clinical Associate Professor. Portfolio management, derivatives, investment management.

Konstantinos Serfes, PhD (*University of Illinois at Champaign-Urbana*) *Department of Economics and International Business*. Associate Professor. Industrial organization; microeconomics.

Samir Shah, DPS (*Pace University*). Associate Clinical Professor.

Wenjing Shen, PhD (*University of Michigan*) *Department of Decision Sciences*. Assistant Professor. The interface of operations management and marketing; inventory management; supply chain management.

Steven R. Sher, JD (*Georgetown University Law Center*) *Department of Legal Studies*. Associate Professor. Business law, product liability, negligence, medical malpractice.

Milton Silver, PhD (*Columbia University*). Professor Emeritus. Strategic planning and control systems, analysis and design of information systems, and executive and management development and training.

Prashant Srivastava, PhD (*Oklahoma State University*). Associate Clinical Professor. New product development, supply chain management, B2B marketing, sales, strategic alliances, organizational learning, market orientation, healthcare marketing, and database marketing.

Mark Stehr, PhD (*University of California at Berkeley*) *Department of Economics and International Business*. Associate Professor. Health Economics, public finance, public policy.

Rajneesh Suri, PhD (*University of Illinois at Urbana-Champaign*). Professor. Pricing, promotions and branding.

Srinivasan Swaminathan, PhD (*University of Texas-Austin*). Professor. Marketing research and strategy, pricing and promotions, loyalty and satisfaction.

Constantinos Syropoulos, PhD (*Yale University*) *Trustee Professor of International Economics, Department of Economics and International Business*. Professor. International trade, political economy, applied microeconomics.

Samuel H. Szewczyk, PhD (*Pennsylvania State University*) *Department of Finance*. Associate Professor. Corporate governance, mergers and acquisitions, financial engineering, investment banking, financial institutions.

An Tran, PhD (*University of Colorado--Boulder*). Assistant Clinical Professor. Intertemporal choice, the psychology of time and money, consumer planning, financial decision making.

George Tsetsekos, PhD (*The University of Tennessee*) *Dean, LeBow College of Business*. Professor. Valuation and corporate restructuring, treasury and risk/hedging operations, investment banking, securitization, emerging capital markets, multinational finance, bank asset-liability management.

Daniel Tzabbar, PhD (*University of Toronto*). Assistant Professor. Business planning, social capital, technology entrepreneurship, alliances, human capital, innovation management, strategic management.

Mark Vargus, PhD (*Wharton School, University of Pennsylvania*) *Department of Accounting and Tax*. Assistant Professor. Capital market research and executive compensation.

Andrew G. Verzilli, PhD (*Boston College*). Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Ralph Walkling, PhD (*University of Maryland*) *Stratakis Professor of Corporate Governance, Department of Finance*. Professor. Corporate governance, mergers and acquisitions.

Min Wang, PhD (*Columbia University*) *Department of Decision Sciences*. Assistant Professor.

Matthew Weinberg, PhD (*Princeton University*). Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Joan Weiner, PhD (*The Wharton School, University of Pennsylvania*). Professor. Business ethics, leadership, communication and decision making; educational innovation; health system management design.

Jennifer Wright, MTA Master of Tax Accounting (*Villanova University*) *Department of Accounting and Tax*. Associate Clinical Professor.

Chiou-shuang Yan, PhD (*Purdue University*). Professor Emeritus. International economics, input-output analysis.

Yoto Yotov, PhD (*Boston College*). Associate Professor. International trade, applied microeconomics, political economy.

Jonathan C. Ziegert, PhD (*University of Maryland*). Associate Professor. Leadership; team dynamics; group performance; attraction and recruitment; discrimination.

Minor in Business Administration

The minor in business administration is designed to provide some flexibility while at the same time assuring exposure to a number of critical business functional areas.

Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance,

international economics, legal studies, management information systems, marketing, and operations & supply chain management.

- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Students select six of the following: 24.0

ACCT 115	Financial Accounting Foundations
or ACCT 110	Accounting for Professionals
BLAW 201	Business Law I
or BLAW 321	Law of Business Organizations
ECON 201	Principles of Microeconomics
ECON 202	Principles of Macroeconomics
FIN 301	Introduction to Finance
MIS 200	Management Information Systems
MKTG 301	Introduction to Marketing Management
OPM 200	Operations Management
ORGB 300 [WI	Organizational Behavior
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STAT 201	Introduction to Business Statistics
STAT 202	Business Statistics II

Total Credits 24.0

Legal Studies

Major: Legal Studies

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 22.9999

Standard Occupational Classification (SOC) code: 11-9199

About the Program

Law is pervasive in all aspects of business and life. The major in legal studies provides Drexel University students with the ability to recognize the influence of the law, understand its application and make informed and intelligent decisions regarding the course of action to take.

Although the major in legal studies will benefit those interested in pursuing a career in law, it is not intended solely for students aspiring to attend law school. This major enhances any business student's perspective on the impact of legal issues within their respective professions.

Students will learn the basics of various areas of the law and the legal environment of business and will learn to identify the factual situation in which to apply that law. They will be able to analyze the facts, determine which aspects of the law are pertinent, apply that to those facts, and draw a conclusion. Clarity of thought, reasoning and expression (both oral and written) are additional results of this process.

Emphasis is on critical thinking as a tool for problem solving, so that whatever the discipline, students will be able to identify and prevent possible problems or seek proper and timely assistance for critical decision making.

For more information about the program, contact the Department of Legal Studies (<http://www.lebow.drexel.edu/Faculty/Departments/Legal>).

Degree Requirements

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI	Business Communication	3.0
(p. 353)]		
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI	The Drexel Experience	1.0
(p. 353)]		
UNIV B201	Career Management	1.0
English literature elective	ENGL 200 through ENGL 399	3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	
General Education Electives		
Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.		
Society and Culture		
Communication, English, Fine Arts, International Area Studies, Language or Philosophy		3.0
Social Science		
Anthropology, History, Sociology, Political Science, Psychology		3.0
Science		
Computer Science, Information Systems, Science		3.0
Additional General Education Electives		
Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science		12.0
Business Requirements		
ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0
BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0

FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 353)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	
Major Requirements		
Eight required courses (See Major Requirements list below)		32.0
Free Electives		20.0
Total Credits		180.0

Legal Studies Major Degree Requirements

Select eight of the following:		32.0
BLAW 202	Business Law II	
BLAW 321	Law of Business Organizations	
BLAW 330	Real Estate	
BLAW 334	Labor Law	
BLAW 338	Government Regulation and Business	
BLAW 340	International Business Law	
BLAW 342	Criminal Law	
BLAW 346	Entrepreneurial Law	
BLAW 348	White Collar Crime	
BLAW 356	Legal Issues in Corporate Governance	
BLAW 358	Employment Law	
BLAW 360	Intellectual Property and Cyber Law	
Total Credits		32.0

Sample Plan of Study

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV B101 [WI (p. 353)]	The Drexel Experience	1.0
	Term Credits	16.0
Term 2		
BUSN 102	Foundations of Business II	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0

MATH 102	Introduction to Analysis II	4.0
	Term Credits	15.0
Term 3		
ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
General education elective		3.0
Society and culture elective		3.0
	Term Credits	16.0
Term 4		
ACCT 116	Managerial Accounting Foundations	4.0
STAT 201	Introduction to Business Statistics	4.0
History (HIST) elective		3.0
Select one of the following:		3.0
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	
	Term Credits	14.0

Term 5

BLAW 201	Business Law I	4.0
MIS 200	Management Information Systems	4.0
Select one of the following		3.0
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	
Social science elective		3.0
	Term Credits	14.0

Term 6

FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 353)]	Organizational Behavior	4.0
ENGL 200 Through ENGL 399		3.0
	Term Credits	15.0

Term 7

Business Legal Studies (BLAW) Course		4.0
INTB 200	International Business	4.0
OPM 200	Operations Management	4.0
COM 270 [WI (p. 353)]	Business Communication	3.0
	Term Credits	15.0

Term 8

PHIL 105	Critical Reasoning	3.0
Business Legal Studies (BLAW) Course		4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Free elective	4.0
Term Credits	15.0
Term 9	
Business Legal Studies (BLAW) Course	4.0
Business Legal Studies (BLAW) Course	4.0
Science elective	3.0
Free elective	4.0
Term Credits	15.0
Term 10	
Business Legal Studies (BLAW) Course	4.0
Business Legal Studies (BLAW) Course	4.0
General education elective	3.0
Free elective	4.0
Term Credits	15.0
Term 11	
Business Legal Studies (BLAW) Course	4.0
MGMT 450 Strategy and Competitive Advantage	4.0
Fine arts elective	3.0
Free electives	4.0
Term Credits	15.0
Term 12	
Business Legal Studies (BLAW) Course	4.0
UNIV B201 Career Management	1.0
General studies electives	3.0
General studies electives	3.0
Free electives	4.0
Term Credits	15.0
Total Credit:	180.0

* See degree requirements (p. 353).

Minor in Legal Studies

Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Requirements

BLAW 201 Business Law I	4.0
Select five of the following:	20.0

BLAW 202 Business Law II	
BLAW 321 Law of Business Organizations	
BLAW 330 Real Estate	
BLAW 334 Labor Law	
BLAW 338 Government Regulation and Business	
BLAW 340 International Business Law	
BLAW 342 Criminal Law	
BLAW 346 Entrepreneurial Law	
BLAW 348 White Collar Crime	
BLAW 356 Legal Issues in Corporate Governance	
BLAW 358 Employment Law	
BLAW 360 Intellectual Property and Cyber Law	
Total Credits	24.0

Legal Studies Faculty

Roger D. Collons, JD, PhD (*George Washington University; Georgia State University*) Department of Legal Studies. Professor. Patent law, preservation of wealth.

Richard P. Freedman, JD, LL.M. (*Temple University*) Head of the Department of Legal Studies. Associate Professor. Taxation, corporate and business matters, real estate, estate planning, estate administration and elder law.

Rosalie S. Kreider, JD (*Villanova University*) Department of Legal Studies. Clinical Professor. Business law, international business law.

Neal Orkin, JD (*Temple University*) Department of Legal Studies. Associate Professor. Intellectual property rights of employed inventors and authors; labor relations.

Pedersen Pedersen, JD (*Harvard University*) Department of Legal Studies. Assistant Professor. American law, contract law, labor and employment law.

Steven R. Sher, JD (*Georgetown University Law Center*) Department of Legal Studies. Associate Professor. Business law, product liability, negligence, medical malpractice.

Management Information Systems

Major: Management Information Systems

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.1201

Standard Occupational Classification (SOC) code: 11-3021

About the Major

Management Information Systems (MIS) is about managing how and why people, organizations, and markets apply, design, and deploy information technology to achieve tactical and strategic business goals. MIS is about the integration of both areas of expertise and applying the power of technology to solving business problems.

The major in management information systems prepares students for opportunities in the information technology field and business. Aimed at producing graduates who bridge the gap between technical knowledge and business functions, the program focuses on a mix of applied

computer systems content, interpersonal interaction, and a practical business orientation.

While administered by the Department of Decision Sciences and MIS (<http://www.lebow.drexel.edu/Faculty/Departments/Management>), the major in management information systems is interdisciplinary in nature. The courses may be taken by students in other colleges and departments who wish to complement other computer-related studies with business-oriented information systems subjects.

Degree Requirements

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 355)]	Business Communication	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 355)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
English literature elective ENGL 200 through ENGL 399		3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education Electives

Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.

Society and Culture		
Communication, English, Fine Arts, International Area Studies, Language or Philosophy		3.0
Social Science		
Anthropology, History, Sociology, Political Science, Psychology		3.0
Science		
Computer Science, Information Systems, Science		3.0

Additional General Education Electives

Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science

Business Requirements

ACCT 115	Financial Accounting Foundations	4.0
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ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0
BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 355)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Major Requirements

Eight required courses (See Major Requirements list below) 32.0

Free Electives 20.0

Total Credits 180.0

Management Information Systems Major Required Courses

MIS 342	Systems Analysis and Design	4.0
MIS 343	Database Design and Implementation	4.0
Select six of the following: *		24.0
MIS 250	Introduction to Enterprise Application Software Using SAP - Logistics	
MIS 344	Networking Technologies for Business	
MIS 345	Client/Server Computing for Business	
MIS 346	Management Information Systems Strategy	
MIS 347	Domestic and Global Outsourcing Management	
MIS 348	Visual Basic Database Programming for Business	
MIS 349	Predictive Business Analytics with Relational Database Data	
MIS 350	Intro to Enterprise Application Software Using SAP - Accounting & Analytics	
MIS 351	Introduction to Programming for Business in C#	
MIS 352	Advanced Business Programming with ASP.Net	
MIS 361	Information System Project Management	

Total Credits 32.0

* Students select from the following courses, or any other course at LeBow with the program manager's permission.

Sample Plan of Study

Term 1	Credits
BUSN 101	Foundations of Business I 4.0

titles include: Management Consultants, IS Business Analysts, IT Project Management, IT Consultants, IT Systems Managers, Systems Analysts. Some MIS students also choose to continue their studies with an MBA; recent Drexel MIS graduates are now attending Columbia, Princeton, and the University of Pennsylvania.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Management Information Systems

Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

MIS 200	Management Information Systems	4.0
MIS 342	Systems Analysis and Design	4.0
MIS 343	Database Design and Implementation	4.0
MIS 346	Management Information Systems Strategy	4.0
MIS 347	Domestic and Global Outsourcing Management	4.0
MIS 348	Visual Basic Database Programming for Business	4.0
Total Credits		24.0

Facilities

Management Faculty

Shanti Dewi Anak Agung Istri, PhD (*Georgia Institute of Technology*). Assistant Professor. Technology commercialization; technology entrepreneurship.

Murugan Anandarajan, PhD (*Drexel University*) *Head of Department, Management*. Professor. Individual Internet usage behavior (specifically abuse and addiction); Application of artificial intelligence techniques in forensic accounting and ophthalmology.

Orakwue B. Arinze, PhD (*London School of Economics*). Professor. Client/Server computing; Enterprise Application Software (EAS)/ Enterprise Resource Planning Software (ERP); knowledge-based and decision support applications in operations management.

Suresh Chandran, PhD. Associate Clinical Professor. Corporate entrepreneurship; corporate social responsibility; global management; intellectual property and employee rights.

Qizhi Dai, PhD (*University of Minnesota*). Associate Professor. Business to Business E-Commerce; information technology adoption; economic analysis of information systems.

Donna Marie De Carolis, PhD (*Temple University*) *Dean, Close School of Entrepreneurship*. Professor. Pharmaceutical/biotechnology industries; entrepreneurship; technology & strategy; technology commercialization, strategic alliances; social capital.

David Gefen, PhD (*Georgia State University*). Professor. Strategic IT management; IT development and implementation management; research methodology; managing the adoption of large IT systems, such as MRP II, ERP, and expert systems; research methodology.

Azi Gera, PhD (*University of Maryland*). Assistant Professor. Business planning, new venture performance and survival, social networking, cognition and strategy, determinants of firm performance, attention based view, business angles and VC firms, interfirm signaling, private equity investments.

Cuneyt Gozu, PhD (*University of Albany*). Associate Clinical Professor.

Jeffrey H. Greenhaus, PhD (*New York University*) *William A. Mackie Professor of Management*. Professor. Career management, career decision making, work-family linkages, managing diversity, career and adult life development, organizational behavior/human resources, job design, models of work motivation and job attitudes, human resource staffing.

Mazhar Islam, PhD (*University of Minnesota*). Assistant Professor. New markets in emerging countries, alliances, corporate entrepreneurship, emerging countries, pharmaceutical and biotechnology industry, technological innovation, transaction cost economics.

Robert W. Keidel, PhD (*Wharton School, University of Pennsylvania*). Clinical Professor. Organization design and change, management of technology, strategic cognition.

Keisha Liggett-Nichols, EDB (*Georgia State University*). Associate Clinical Professor. Corporate entrepreneurship, determinants of firm performance, evidence-based management.

Frank Linnehan, PhD (*Temple University*) *Interim Dean, LeBow College of Business*. Professor. Affirmative action; workforce diversity; equal employment; school-to-work transitions for younger workers. Research focuses on issues of race and diversity in the workplace.

Yu-Chieh Lo, PhD (*University of Southern California*). Assistant Professor. Organization theory, technology entrepreneurship.

Mark Loschiavo, MS (*University of Kentucky*). Clinical Professor. Business planning; new venture performance and survival; strategic management; strategic thinking; technology entrepreneurship.

Dali Ma, PhD (*University of Chicago*). Assistant Professor. Status dynamics, social networks, founding team formation; venture capital syndication; family business; Chinese private entrepreneurship.

Michele K. Masterfano, DBA (*Argosy University of Sarasota*). Associate Clinical Professor. Entrepreneurship/small business administration, business planning, social capital, social networking.

Mary Mawritz, PhD (*University of Central Florida*). Assistant Professor. Abusive supervision; deviant behavior; leadership.

Suchet Nadkarni, PhD (*University of Kansas*). Associate Professor. Strategic management, cognition and strategy.

V. K. Narayanan, PhD (*University of Pittsburgh*) *Deloitte Touche Jones Stubbs Professor; Associate Dean of Research, Department of Management*. Corporate and business strategy; management of technology and innovation; strategy implementation; macro environmental analysis; knowledge management; competitor analysis and intelligence.

Haemin Park, PhD (*University of Washington*). Assistant Professor. Corporate entrepreneurship; IPO; knowledge-based view of the firm; new venture performance and survival; technology entrepreneurship; venture capital.

Christian Resick, PhD (*Wayne State University*). Associate Professor. Linkages between CEO personality with organizational culture, climate, and effectiveness; cross-cultural studies of ethical leadership beliefs and behaviors; roles of team leadership and member personality in building shared cognition and effective teamwork.

Stanley Ridgley, PhD (*Duke University*). Assistant Clinical Professor. Business communication; cognition and strategy; competitive intelligence; determinants of firm performance; new markets in emerging countries; Russian business culture.

Raja Roy, PhD (*University of Pittsburgh*). Assistant Professor. Technology entrepreneurship, determinants of firm performance, technological change, technological innovation.

Samir Shah, DPS (*Pace University*). Associate Clinical Professor.

Sidney R. Siegel, PhD (*Drexel University*). Professor. Organizational change, development and behavior.

Daniel Tzabbar, PhD (*University of Toronto*). Assistant Professor. Business planning, social capital, technology entrepreneurship, alliances, human capital, innovation management, strategic management.

Joan Weiner, PhD (*The Wharton School, University of Pennsylvania*). Professor. Business ethics, leadership, communication and decision making; educational innovation; health system management design.

Jonathan C. Ziegert, PhD (*University of Maryland*). Associate Professor. Leadership; team dynamics; group performance; attraction and recruitment; discrimination.

Emeritus Faculty

Milton Silver, PhD (*Columbia University*). Professor Emeritus. Strategic planning and control systems, analysis and design of information systems, and executive and management development and training.

Marketing

Major: Marketing

Degree Awarded: Bachelor of Science in Business Administration (BSBA)
Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.1401

Standard Occupational Classification (SOC) code: 11-2021

About the Program

Marketing is one of the most dynamic areas of business because it focuses on satisfying the ever-changing wants and needs of people. Professional marketers research and identify target audiences, develop products and services, formulate pricing strategies, develop advertising and promotional campaigns, and implement methods of distribution so that customers receive products and services where and when they want them. Perhaps the most basic marketing skill is to be able to see an organization's activities from the customer's viewpoint.

A major in marketing prepares students for the many opportunities that exist in product and brand management, marketing research, advertising, digital marketing, customer analytics, retailing, channel management, logistics and physical distribution, professional personal selling and sales management, purchasing, wholesaling, marketing planning and analysis, public relations, marketing entrepreneurship, and new-product development. In combination with the commerce and engineering curriculum, this major prepares students to fill marketing positions that require a technical background.

The courses, MKTG 366 Customer Analytics and MKTG 367 Data-Driven Digital Marketing, count toward the Marketing Major, Minor or Business Analytics Co-Major. For more information about the major, contact the Department of Marketing (<http://www.lebow.drexel.edu/academics/disciplines/marketing>).

Degree Requirements

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 359)]	Business Communication	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 359)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
English literature elective ENGL 200 through ENGL 399		3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education Electives

Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.

Society and Culture	
Communication, English, Fine Arts, International Area Studies, Language or Philosophy	3.0
Social Science	
Anthropology, History, Sociology, Political Science, Psychology	3.0
Science	
Computer Science, Information Systems, Science	3.0

Additional General Education Electives

Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science	12.0
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Business Requirements

ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0
BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 359)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Major Requirements

Eight required courses (See Major Requirements list below)	32.0
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Free Electives	20.0
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Total Credits	180.0
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Marketing Major Required Course

MKTG 380	Seminar in Marketing Strategy	4.0
Select seven of the following:		28.0
MKTG 321	Selling and Sales Management	
MKTG 322	Advertising & Integrated Marketing Communications	
MKTG 324	Marketing Channels and Distribution Systems	
MKTG 326	Marketing Insights	
MKTG 344	Professional Personal Selling	
MKTG 347	New Product Development	
MKTG 348	Services Marketing	
MKTG 351	Marketing for Non-Profit Organizations	

MKTG 353	Business-to-Business Marketing	
MKTG 355	Interactive Marketing	
MKTG 356	Consumer Behavior	
MKTG 357	Global Marketing	
MKTG 358	Transportation and Logistics	
MKTG 362	Brand and Reputation Management	
MKTG 364	Marketing for New Ventures	

Total Credits	32.0
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Sample Plan of Study

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV B101 [WI (p. 359)]	The Drexel Experience	1.0
ECON 201	Principles of Microeconomics	4.0
Term Credits		16.0

Term 2		
BUSN 102	Foundations of Business II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
ECON 202	Principles of Macroeconomics	4.0
Term Credits		15.0

Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
	General education elective	3.0
	Society and culture course	3.0
ACCT 115	Financial Accounting Foundations	4.0
Term Credits		16.0

Term 4		
	History elective	3.0
STAT 201	Introduction to Business Statistics	4.0
ACCT 116	Managerial Accounting Foundations	4.0
	Select one of the following	3.0
BIO 100	Applied Cells, Genetics Physiology	
or 101	Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	
Term Credits		14.0

Term 5		
BLAW 201	Business Law I	4.0
COM 270 [WI (p. 359)]	Business Communication	3.0
INTB 200	International Business	4.0
	Select one of the following	3.0
	CHEM 151 Applied Chemistry	

BIO 100 or 101	Applied Cells, Genetics Physiology Applied Biological Diversity, Ecology Evolution	
PHYS 151	Applied Physics	

Term Credits 14.0

Term 6

FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 359)]	Organizational Behavior	4.0
ENGL 200 Through ENGL 399		3.0

Term Credits 15.0

Term 7

MIS 200	Management Information Systems	4.0
OPM 200	Operations Management	4.0
MKTG major course		4.0
Science or Computer Science elective		3.0

Term Credits 15.0

Term 8

PHIL 105	Critical Reasoning	3.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Free electives 4.0

MKTG major course 4.0

Term Credits 15.0

Term 9

MKTG major course		4.0
MKTG major course		4.0
General education elective		3.0
Free electives		4.0

Term Credits 15.0

Term 10

Fine arts elective		3.0
MGMT 450	Strategy and Competitive Advantage	4.0
MKTG major course		4.0
MKTG major course		4.0

Term Credits 15.0

Term 11

Free elective		4.0
UNIV B201	Career Management	1.0
MKTG 380	Seminar in Marketing Strategy	4.0
General education elective		3.0
Social science elective		3.0

Term Credits 15.0

Term 12

MKTG major course		4.0
General education elective		3.0

Free electives 8.0

Term Credits 15.0

Total Credit: 180.0

Co-op/Career Opportunities

Marketing opportunities abound in all types of organizations — including manufacturing firms, wholesalers, retail stores, Internet firms, service organizations, banking and financial institutions, law and accounting firms, hospitals, colleges and universities, museums, chambers of commerce, professional sports teams, government agencies, charitable foundations, churches, and countless other settings. Any organization that seeks to reach a particular audience or consumer group needs the skills of marketers.

There are many specialized jobs in marketing, including product and brand managers, marketing researchers, advertising executives, pricing analysts, direct (non-store) marketers, Internet marketers, professional buyers, manufacturing agents, transportation and distribution managers, industrial and consumer salespeople, stockbrokers, sales managers, college enrollment managers, wholesalers, retailers, marketing planners, sales forecasters, marketing cost analysts, public relations managers, media and event planners, sales promotion managers, trade show or exhibit marketers, new product development managers, management consultants, digital marketers, marketing data analytics and international marketers.

Co-op Experiences

When students complete their co-op jobs, they are asked to write an overview of their experiences. These brief quotes are taken from some recent student reports:

Marketing research assistant, manufacturing firm: "Assisted in the development of new products, which included gathering information concerning competitive products, markets, pricing. Conducted testing of new products. Assisted in special projects. . .gained good experience."

Retail analyst, producer of luxury home products: "Supported the sales and production divisions. Tracked weekly and monthly sales information. Developed product placement charts for forecasting. Assisted in maintaining productivity reports. Developed and presented a window treatment market analysis."

Activity-based management (ABM) analyst, pharmaceuticals manufacturer: "Supported the ABM team (5 people). Member of two sub-project teams. Maintained full participation on both sub-teams while still maintaining responsibilities on core team. Developed proficiencies in re-engineering methodologies, activity-based costing methodologies, and support of change management. . .included as a full team member. "

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Marketing Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.

- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Requirements

MKTG 301	Introduction to Marketing Management	4.0
MKTG 380	Seminar in Marketing Strategy	4.0
Select four of the following:		16.0
MKTG 321	Selling and Sales Management	
MKTG 322	Advertising & Integrated Marketing Communications	
MKTG 324	Marketing Channels and Distribution Systems	
MKTG 326	Marketing Insights	
MKTG 344	Professional Personal Selling	
MKTG 347	New Product Development	
MKTG 348	Services Marketing	
MKTG 351	Marketing for Non-Profit Organizations	
MKTG 353	Business-to-Business Marketing	
MKTG 355	Interactive Marketing	
MKTG 356	Consumer Behavior	
MKTG 357	Global Marketing	
MKTG 358	Transportation and Logistics	
MKTG 362	Brand and Reputation Management	
MKTG 364	Marketing for New Ventures	
MKTG 365	New Media Marketing	
MKTG 366	Customer Analytics	

Total Credits **24.0**

Marketing Faculty

Rolph E. Anderson, PhD (*University of Florida*) *Royal H. Gibson Sr. Professor of Marketing*. Professor. Personal selling and sales management; multivariate data analysis; customer relationship management (CRM); customer satisfaction and customer loyalty.

Trina Larsen Andras, PhD (*University of Texas at Austin*) *Head of the Department of Marketing; Academic Director, Center for Corporate Research Management*. Professor. International marketing, marketing channels management, cross-cultural communication.

Michaela Draganska, PhD (*Kellogg School of Management, Northwestern University*). Associate Professor. Advertising strategy, product assortment decisions, new product positioning, distribution channels.

Larry Duke, MBA (*Harvard Business School*). Associate Clinical Professor. International marketing and strategy, new product

development, business-to-business marketing, marketing of financial services.

Michael Howley, PhD (*Arizona State University*). Associate Clinical Professor. Investments in dissatisfied customers, service recovery, health care marketing, marketing of service organizations, financial consequences of marketing actions.

Yanliu Huang, PhD (*The Wharton School, University of Pennsylvania*). Assistant Professor. Consumer n-store decision making, consumer planning, health marketing, memory and learning.

Daniel Korshun, PhD (*Boston University*). Assistant Professor. Brand and corporate reputation management, corporate social responsibility, internal marketing, marketing strategy, relationship marketing.

Hyokjin Kwak, PhD (*University of Georgia*) *Department of Marketing*. Associate Professor. Advertising effects, consumer behaviors and e-commerce.

Bert Rosenbloom, PhD (*Temple University*) *Rauth Chair of Electronic Commerce*. Professor. Marketing channels and distribution systems, electronic commerce, interorganizational marketing management, wholesale and retail distribution, marketing strategy and planning.

Prashant Srivastava, PhD (*Oklahoma State University*). Associate Clinical Professor. New product development, supply chain management, B2B marketing, sales, strategic alliances, organizational learning, market orientation, healthcare marketing, and database marketing.

Rajneesh Suri, PhD (*University of Illinois at Urbana-Champaign*). Professor. Pricing, promotions and branding.

Srinivasan Swaminathan, PhD (*University of Texas-Austin*). Professor. Marketing research and strategy, pricing and promotions, loyalty and satisfaction.

An Tran, PhD (*University of Colorado--Boulder*). Assistant Clinical Professor. Intertemporal choice, the psychology of time and money, consumer planning, financial decision making.

Operations & Supply Chain Management

Major: Operations & Supply Chain Management

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.0205

Standard Occupational Classification (SOC) code: 11-3051; 11-3071

About the Program

The major in operations and supply chain management is designed to prepare students for eventual participation as managers or specialists in the operations activity of industrial and service systems.

Operations and supply chain management stresses a thorough knowledge of the rapidly accumulating analytical techniques in systems analysis, in addition to a full appreciation of all other phases of business.

With the proper choice of electives, this program also prepares students for graduate studies in industrial management, industrial engineering, management science, or operations research.

Additional Information

For additional information about the program, students should contact the Department of Decision Sciences and MiS (<http://www.lebow.drexel.edu/Faculty/Departments/Decision>).

Degree Requirements

Bachelor of Science in Business Administration (BSBA) Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 362)]	Business Communication	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 362)]	The Drexel Experience	1.0
UNIV B201	Career Management	1.0
English literature elective ENGL 200 through ENGL 399		3.0
Fine Arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education Electives

Students select seven (21.0 credits) general education electives, with a minimum of one course in each of the following three categories. Students take the remaining 12.0 credits from any of the topics listed under Additional General Education Electives.

Society and Culture	
Communication, English, Fine Arts, International Area Studies, Language or Philosophy	3.0
Social Science	
Anthropology, History, Sociology, Political Science, Psychology	3.0
Science	
Computer Science, Information Systems, Science	3.0

Additional General Education Electives

Twelve (12) credits must be earned by taking 4 courses from the following topics: Communication, English, Fine Arts, International Area Studies, Language, Philosophy, Anthropology, History, Sociology, Political Science, Psychology, Computer Science, Information Systems, Math, Science

Business Requirements

ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BUSN 101	Foundations of Business I (Online students take BUSN 111)	4.0

BUSN 102	Foundations of Business II (Online students take BUSN 112)	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 362)]	Organizational Behavior	4.0
STAT 201	Introduction to Business Statistics	4.0
Select one of the following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Major Requirements

Eight required courses (See Major Requirements list below) 32.0

Free Electives 20.0

Total Credits 180.0

Operations and Supply Chain Management Major Requirements

OPM 315	Service Operations Management	4.0
OPR 320	Linear Models for Decision Making	4.0
OPM 321	Planning and Control of Operations	4.0
OPM 325	Advanced Planning and Control of Operations	4.0
OPM 341	Supply Chain Management	4.0
Select three of the following:		12.0
MIS 250	Introduction to Enterprise Application Software Using SAP - Logistics	
OPM 342	Sustainable Supply Chain Management and Logistics	
OPM 343	Managing Queues for Service Operations	
OPM 344	Revenue Management	
OPR 330	Advanced Decision Making and Simulation	
OPR 340	Decision Models for the Public Sector	
STAT 325	Six-Sigma Quality Implementation	
STAT 331	Introduction to Data Mining for Business	
STAT 335	Introduction to Experimental Design	

Total Credits 32.0

Sample Plan of Study

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV B101 [WI (p. 362)]	The Drexel Experience	1.0

ECON 201	Principles of Microeconomics	4.0	OPM 321	Planning and Control of Operations	4.0
Term Credits		16.0	OPR 320	Linear Models for Decision Making	4.0
Term 2					
BUSN 102	Foundations of Business II	4.0	PHIL 105	Critical Reasoning	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	Free elective		4.0
MATH 102	Introduction to Analysis II	4.0	Term Credits		15.0
ECON 202	Principles of Macroeconomics	4.0	Term 9		
Term Credits		15.0	OPM 315	Service Operations Management	4.0
Term 3					
ACCT 115	Financial Accounting Foundations	4.0	OPM 325	Advanced Planning and Control of Operations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	General Education Elective*		3.0
PSY 101	General Psychology I	3.0	Free Elective		4.0
Social science course*		3.0	Term Credits		15.0
Society and culture course*		3.0	Term 10		
Term Credits		16.0	UNIV B201	Career Management	1.0
Term 4					
STAT 201	Introduction to Business Statistics	4.0	Operations & Supply Chain Mgmt major course		4.0
ACCT 116	Managerial Accounting Foundations	4.0	Select one of the following:		4.0
History elective		3.0	BUSN 451	Business Consulting	
Select one of the following:		3.0	MGMT 260	Introduction to Entrepreneurship	
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution		MGMT 451	Management Simulation	
CHEM 151	Applied Chemistry		STAT 202	Business Statistics II	
PHYS 151	Applied Physics		General education electives*		3.0
Term Credits		14.0	General education electives		3.0
Term 5					
COM 270 [WI (p. 362)]	Business Communication	3.0	Term Credits		15.0
BLAW 201	Business Law I	4.0	Term 11		
INTB 200	International Business	4.0	Operations & Supply Chain Mgmt major course		4.0
Select one of the following:		3.0	MGMT 450	Strategy and Competitive Advantage	4.0
BIO 100	Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution		General education elective*		3.0
CHEM 151	Applied Chemistry		Free elective		4.0
PHYS 151	Applied Physics		Term Credits		15.0
Term Credits		14.0	Term 12		
Term 6					
MIS 200	Management Information Systems	4.0	Operations & Supply Chain Mgmt major course		4.0
MKTG 301	Introduction to Marketing Management	4.0	OPM 341	Supply Chain Management	4.0
OPM 200	Operations Management	4.0	Fine arts elective		3.0
ENGL 200 Through ENGL 399		3.0	Free electives		4.0
Term Credits		15.0	Term Credits		15.0
Term 7					
FIN 301	Introduction to Finance	4.0	Total Credit: 180.0		
ORGB 300 [WI (p. 362)]	Organizational Behavior	4.0	* See degree requirements (p. 363).		
Science or Computer Science elective*		3.0	Co-op/Career Opportunities		
Free elective		4.0	Many production and operation management students go on to work in a variety of fields, including manufacturing, product planning and research and development.		
Term Credits		15.0	When students complete their co-op jobs, they are asked to write an overview of their experiences. These brief quotes are taken from some recent student reports:		
Term 8					

Manufacturing engineering co-op, corporate setting: "Developed manufacturing projects, procedures, and documentation in assisting (with International Standards Organization) certification. The best feature of the job was the chance to work within a manufacturing plant and witness the accomplishments and setbacks that can and will occur in all manufacturing jobs."

Meter operation co-op, major utility company: "Coordinated customer demand survey. Gathered and analyzed statistics pertaining to the water usage of residential, industrial, and commercial customers. . . .Management in department was excellent; very supportive."

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Operations Management Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

OPM 321	Planning and Control of Operations	4.0
OPR 320	Linear Models for Decision Making	4.0
Select four of the following:		16.0
MIS 250	Introduction to Enterprise Application Software Using SAP - Logistics	
OPM 200	Operations Management	
OPM 315	Service Operations Management	
OPM 325	Advanced Planning and Control of Operations	
OPM 341	Supply Chain Management	
OPM 342	Sustainable Supply Chain Management and Logistics	
OPM 343	Managing Queues for Service Operations	
OPM 344	Revenue Management	
OPR 330	Advanced Decision Making and Simulation	
OPR 340	Decision Models for the Public Sector	
STAT 325	Six-Sigma Quality Implementation	
Total Credits		24.0

Additional Information

For additional information about the program, students should contact the Department of Decision Sciences (<http://www.lebow.drexel.edu/Faculty/Departments/Decision>).

Facilities

Decision Sciences Faculty

Edward Arnheiter, PhD (*University of Massachusetts, Amherst*)

Department of Decision Sciences. Clinical Professor. Quality implementation and management, supply chain, statistical quality control, six sigma.

Avijit Banerjee, PhD (*The Ohio State University*) *Department of Decision Sciences.* Professor. Supply chain management; operations planning and scheduling; inventory control.

Hande Yurttan Benson, PhD (*Princeton University*) *Department of Decision Sciences.* Associate Professor. Nonlinear optimization, interior-point methods.

Oben Ceryan, PhD (*University of Michigan Ann Arbor*) *Department of Decision Sciences.* Assistant Professor. Pricing revenue management; inventory control; production planning and control supply chain management.

Neil Desnoyers, MS (*Drexel University*) *Department of Decision Sciences.* Assistant Clinical Professor. Decision sciences.

Seung-Lae Kim, PhD (*Penn State University*) *Department of Decision Sciences.* Professor. Production planning and control; inventory control; Just-In-Time (JIT) and Supply Chain Management (SCM).

Benjamin Lev, PhD (*Case Western Reserve University*) *Department Head, Department of Decision Sciences.* Professor. Operations research/management science, statistics, applications, engineering management.

Merrill W. Liechty, PhD (*Duke University*) *Department of Decision Sciences.* Associate Clinical Professor. Bayesian statistics, portfolio selection, higher moment estimation.

Arunkumar Madapusi, PhD (*University of North Texas Denton*) *Department of Decision Sciences.* Assistant Clinical Professor. Manufacturing technology development; quality management; supply chain management; interface with information systems.

Hazem Diab Maragah, PhD (*Louisiana University*) *Department of Decision Sciences.* Associate Professor. Statistical quality control, total equity management, applied statistics.

Bruce D. McCullough, PhD (*University of Texas*) *Department of Decision Sciences.* Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Thomas P. McWilliams, PhD (*Stanford University*) *Department of Decision Sciences.* Professor. Statistical quality control; sequential analysis.

Fariborz Y. Partovi, Ph.D. (*The Wharton School, University of Pennsylvania*) *Department of Decision Sciences.* Professor. The use of analytical hierarchy process and quality function deployment for strategic decisions in manufacturing and service organizations.

Wenjing Shen, PhD (*University of Michigan*) *Department of Decision Sciences.* Assistant Professor. The interface of operations management and marketing; inventory management; supply chain management.

Min Wang, PhD (*Columbia University*) *Department of Decision Sciences.* Assistant Professor.

Emeritus Faculty

Robert E. Laessig, PhD (Cornell University) Department of Decision Sciences. Professor Emeritus. Management systems integration.

Organizational Management

Major: Organizational Management

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 52.0206

Standard Occupational Classification (SOC) code: 11-9199

The Organizational Management program is a "co-major."

About the Program

The co-major in "Organizational Management" is designed for students with varied backgrounds who seek to develop knowledge and skills in leadership, teamwork, and communication. These organizational management skills are intended to supplement core technical skills such as Finance, Accounting, Marketing, Engineering, etc. The curriculum provides students with a foundation of skills for effectively working with others in a variety of contexts and situations. This co-major complements a variety of degrees and is suitable for both business majors as well as individuals from other Colleges and programs.

Degree Requirements

Required Courses

ORGB 300 [WI (p. 366)]	Organizational Behavior	4.0
ORGB 320	Leadership: Theory and Practice	4.0
ORGB 400	Team Development and Leadership	4.0
ORGB 420	Negotiations and Conflict Resolution	4.0
Select two of the following:		8.0
HRMT 323	Principles of Human Resource Administration	
ORGB 430	Career Management	
MGMT 370	Business Consulting	
MGMT 451	Management Simulation	
Total Credits		24.0

Primary Major Courses

Students completing the Organizational Management co-major (requirements listed above) must do so in conjunction with a primary business major. Students must select a primary major from the following list (Accounting, Entrepreneurship, Finance, Legal Studies, Management Information Systems, Marketing, or Operations & Supply Chain Management.)

Sample Plan of Study

First Year

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0

UNIV B101 [WI (p. 366)]	The Drexel Experience	1.0
Select one of the following:		3.0
BIO 100	Applied Cells, Genetics Physiology	
BIO 101	Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

Term Credits 15.0

Term 2

BUSN 102	Foundations of Business II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0

Select one of the following: 3.0

(same selections as term 1)

Term Credits 14.0

Term 3

ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ACCT 115	Financial Accounting Foundations	4.0
PSY 101	General Psychology I	3.0
	Society and culture elective	3.0
	General education elective	3.0

Term Credits 16.0

Second Year

Term 4

STAT 201	Introduction to Business Statistics	4.0
ACCT 116	Managerial Accounting Foundations	4.0
ECON 201	Principles of Microeconomics	4.0
	History elective	3.0

Term Credits 15.0

Term 5

BLAW 201	Business Law I	4.0
COM 270 [WI (p. 366)]	Business Communication	3.0
STAT 202	Business Statistics II	4.0
ECON 202	Principles of Macroeconomics	4.0

Term Credits 15.0

Third Year

Term 6

FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
MIS 200	Management Information Systems	4.0

Social science elective	3.0
Term Credits	15.0

Term 7

OPM 200 Operations Management	4.0
ORGB 300 [WI (p. 366)]	4.0
General education elective	3.0
General education elective	3.0
Term Credits	14.0

Fourth Year

Term 8

Major Course 1	4.0
Major Course 2	4.0
ORGB 320 Leadership: Theory and Practice	4.0
PHIL 105 Critical Reasoning	3.0
Term Credits	15.0

Term 9

Major Course 3	4.0
Major Course 4	4.0
ORGB 420 Negotiations and Conflict Resolution	4.0
INTB 200 International Business	4.0
Term Credits	16.0

Fifth Year

Term 10

Major Course 5	4.0
Major Course 6	4.0
ORGB 400 Team Development and Leadership	4.0
General education elective	3.0
Term Credits	15.0

Term 11

Major Course 7	4.0
Major Course 8	4.0
UNIV B201 Career Management	1.0
ORGB 430 Career Management	4.0
ENGL 200 - 399	3.0
Term Credits	16.0

Term 12

MGMT 450 Strategy and Competitive Advantage	4.0
HRMT 323 Principles of Human Resource Administration	4.0
Fine arts elective	3.0

General education elective	3.0
Term Credits	14.0

Total Credit: 180.0

Minor in Organizational Management

The minor in “Organizational Management” is designed for students with varied backgrounds who seek to develop knowledge and skills in leadership, teamwork, and communication. These organizational management skills are intended to supplement other majors such as from the College of Engineering or the College of Arts and Sciences. The curriculum provides students with a foundation of skills for effectively working with others in a variety of contexts and situations. This minor complements a variety of degrees and is suitable for individuals from other Colleges and programs.

Required Courses

ORGB 300 [WI (p. 366)]	Organizational Behavior	4.0
ORGB 320	Leadership: Theory and Practice	4.0
ORGB 400	Team Development and Leadership	4.0
ORGB 420	Negotiations and Conflict Resolution	4.0
Select two of the following courses:		8.0
HRMT 323	Principles of Human Resource Administration	
ORGB 430	Career Management	
MGMT 370	Business Consulting	
MGMT 451	Management Simulation	

Total Credits 24.0

Requirements

- No more than 2 courses or 8.0 credits required by a student’s major may be counted toward this minor.
- A grade of "c" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know the pre-requisite requirements.
- All prospective students should meet with an advisor from the College as soon as possible. Call 215-985-2110.

Learning Goals

Upon completing the minor, students will be able to:

- Discover important insights about oneself as a leader and develop a self-awareness of strengths and opportunities for personal growth
- Manage career and networks to achieve personal growth
- Develop the skills and competencies needed to lead effectively in today’s dynamic and diverse environment
- Increase conceptual understanding of leadership in different types of situations and facing different types of challenges
- Learn how to influence and manage conflict within organizations
- Identify various approaches and imperatives for leading teams
- Recognize ethical dilemmas in management practice and how to infuse ethical standards within a group or team

- Learn how to effectively function within a team and lead a team for success
- Recognize how human factors can both distort and enhance the process of managerial decision making
- Understand how the changing nature of work (e.g., global, technological, etc.) influences choices about design and practices within organizations

Technology Innovation Management

Major: Technology Innovation Management

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 52.0201

Standard Occupational Classification (SOC) code: 11-1021; 11-9199

The Technology Innovation Management program is a "co-major."

About the Program

Over the last two decades, Technology and Innovation Management has emerged as a unique and exciting area within the broad field of management. The field focuses broadly on understanding the process of innovation, and management approaches to innovation with special emphasis on technology change a source of innovations.

The Technology Innovation Management program offers a very significant way of differentiating the Drexel business student in the marketplace by embedding skill sets and knowledge base emphasizing technology innovation management which is built on a solid business background. Students most likely to benefit from a technology innovation management co-major will have majors in Operations, Marketing, and MIS; however, this is not a restricted co-major. Technology Innovation Management courses are oriented primarily toward innovation, with an emphasis on technology-based innovation.

Additional information about the LeBow College of Business (<http://www.lebow.drexel.edu/academics/undergraduate>) can be found on their website.

Degree Requirements

Required Courses: * 16.0

MGMT 201	Introduction to Technology Innovation Management
MGMT 301	Designing Innovative Organizations
MGMT 302	Competing in Technology Industries
MGMT 364	Technology Management

Select two courses from either track: 8.0

Product Innovation Track	
MGMT 370	Business Consulting
ORGB 400	Team Development and Leadership
ORGB 420	Negotiations and Conflict Resolution
MKTG 355	Interactive Marketing
MKTG 357	Global Marketing
MKTG 347	New Product Development
MKTG 365	New Media Marketing

BLAW 360 Intellectual Property and Cyber Law

Process Innovation Track	
MGMT 370	Business Consulting
MIS 361	Information System Project Management
MIS 481	Special Topics in Management Information Systems
MIS 250	Introduction to Enterprise Application Software Using SAP - Logistics
MIS 350	Intro to Enterprise Application Software Using SAP - Accounting & Analytics
OPM 315	Service Operations Management

Total Credits 24.0

Suggested Electives:

ENTP 250	Ideation	3.0
ENTP 329	Entrepreneurship & New Technologies	3.0
ENTP 340	Managing Entrepreneurial Growth	3.0
ENTP 385	Innovation in Established Companies	3.0
ENTP 450	Launch It!	3.0

* To graduate you must complete a minimum of 182 credits and complete the requirements for both majors.

Sample Plan of Study

First Year

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV	The Drexel Experience	2.0
B101 [WI (p. 368)]		
Select One of the Following:		3.0
BIO 100	Applied Cells, Genetics Physiology	
BIO 101	Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

Term Credits 16.0

Term 2

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
BUSN 102	Foundations of Business II	4.0
Select One of the Following:		3.0
(see term 1 for list)		

Term Credits 14.0

Term 3

MGMT 201	Introduction to Technology Innovation Management	4.0
ACCT 115	Financial Accounting Foundations	4.0
or		
ECON 201	Principles of Microeconomics	
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

PSY 101	General Psychology I	3.0
General Education Elective		3.0
Term Credits		17.0

Second Year

Term 4

ACCT 115 or ECON 201		4.0
ACCT 116	Managerial Accounting Foundations	4.0
or		
ECON 202	Principles of Macroeconomics	
STAT 201	Introduction to Business Statistics	4.0
History Elective		3.0
Term Credits		15.0

Term 5

BLAW 201	Business Law I	4.0
MGMT 364	Technology Management	4.0
MKTG 301	Introduction to Marketing Management	4.0
ACCT 116 or ECON 202		4.0
Term Credits		16.0

Third Year

Term 6

COM 270 [WI	Business Communication	3.0
(p. 368)]		
MGMT 301	Designing Innovative Organizations	4.0
INTB 200	International Business	4.0
OPM 200	Operations Management	4.0
Term Credits		15.0

Term 7

FIN 301	Introduction to Finance	4.0
ORGB	Organizational Behavior	4.0
300 [WI		
(p. 368)]		
Science Elective		3.0
Co-Major Elective Course 1		4.0
Term Credits		15.0

Fourth Year

Term 8

MGMT 302	Competing in Technology Industries	4.0
PHIL 105	Critical Reasoning	3.0
or 315	Engineering Ethics	
Social Sciences Elective		3.0

Free Elective	4.0
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Term Credits 14.0

Term 9

Business Elective	4.0	
Business Elective	4.0	
MGMT 450	Strategy and Competitive Advantage	4.0
Fine Arts Elective		3.0

Term Credits 15.0

Fifth Year

Term 10

Major Course	4.0	
Major Course	4.0	
General Education Elective		3.0
Select One of the Following:		4.0
BUSN 451	Business Consulting	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
STAT 202	Business Statistics II	

Term Credits 15.0

Term 11

ENGL 200 - 339 Course	3.0
Free Elective	4.0
Co-Major Elective Course	4.0
MGMT 499	4.0

Term Credits 15.0

Term 12

UNIV B201	Career Management	1.0
Business Elective		4.0
General Education Elective		3.0
General Education Elective		3.0
Senior Project		4.0

Term Credits 15.0

Total Credit: 182.0

Minor in Technology Innovation Management

Required Courses

MGMT 201	Introduction to Technology Innovation Management	4.0
MGMT 301	Designing Innovative Organizations	4.0
MGMT 302	Competing in Technology Industries	4.0
MGMT 364	Technology Management	4.0

Select 2 courses from either track: 8.0

Product Innovation Track

BLAW 360	Intellectual Property and Cyber Law	
FIN 335	Entrepreneurial Finance	
MGMT 370	Business Consulting	

MKTG 347	New Product Development	
MKTG 355	Interactive Marketing	
MKTG 357	Global Marketing	
MKTG 365	New Media Marketing	
ORGB 400	Team Development and Leadership	
ORGB 420	Negotiations and Conflict Resolution	
Process Innovation Track		
MGMT 370	Business Consulting	
MIS 250	Introduction to Enterprise Application Software Using SAP - Logistics	
MIS 350	Intro to Enterprise Application Software Using SAP - Accounting & Analytics	
MIS 361	Information System Project Management	
MIS 481	Special Topics in Management Information Systems	
OPM 315	Service Operations Management	
Total Credits		24.0

Certificate in Brand and Reputation Management

Certificate Level: Undergraduate

Admission Requirements: Current Drexel students only

Certificate Type: Certificate

Number of Credits to Completion: 16.0

Instructional Delivery: Campus

Calendar Type: Quarter

Expected Time to Completion: 3 years

Classification of Instructional Program (CIP) Code: 52.1499

Standard Occupational Classification (SOC) Code: 11-2021

In the increasingly competitive and volatile global marketplace, brand and reputation management have gained considerable interest and importance in organizations, including corporations, non-profits, and those in the public sector.

The Brand and Reputation Management Certificate program introduces the concept of the product and/or corporate brand, the components that make up a good brand, and how to develop brand strategies that are appropriate for various types of organizations. Students will also learn about the various stakeholders that impact or enhance an organization's ability to build its brand and reputation as well as learn to analyze the business environment in order to identify a desired image, to create brand positioning strategy, and to develop and nurture the positive perception of a product, organization, individual or place.

Following the completion of all other required courses, all students must also complete an "honors" project as part of MKTG 363 (p. 370) Brand & Reputation Management Project. The topic and scope of the project must be approved by the Academic Director of the Center for Corporate Reputation Management (<http://www.lebow.drexel.edu/Centers/CCRM>). Completed projects will be a written project submitted to the Academic Director of the Center for evaluation in a pass/fail manner.

COM 280	Public Relations Principles and Theory	3.0
MKTG 322	Advertising & Integrated Marketing Communications	4.0
MKTG 362	Brand and Reputation Management	4.0

MKTG 363	Brand & Reputation Management Project *	1.0
Students must complete one course from the following options, depending upon career interests:		4.0
MKTG 324	Marketing Channels and Distribution Systems	
MKTG 347	New Product Development	
MKTG 348	Services Marketing	
MKTG 356	Consumer Behavior	
Or a course from outside the LeBow College in a related field, with the approval of the Academic Director of the Center for Corporate Reputation Management		

Total Credits **16.0**

* Taken upon the completion of all other requirements.

Certificate in Social Responsibility in Business

Certificate Level: Undergraduate

Admission Requirements: Current Drexel students only

Certificate Type: Certificate

Number of Credits to Completion: 15.0

Instructional Delivery: Campus

Calendar Type: Quarter

Classification of Instructional Program (CIP) Code: 33.0104

Standard Occupational Classification (SOC) Code: 11-9199

Through course work, civic engagement and related co-op experience, the Certificate in Social Responsibility in Business provides a well-rounded look at corporate social responsibility, giving students a unique perspective on ethical leadership in the business community. The certificate program encourages students to seek co-op experience and positions after graduation with firms committed to acting with social responsibly.

Program Requirements

In conjunction with the Center for Civic Engagement (<http://www.drexel.edu/CCE>), students initiate and complete a socially focused winter break or spring break project during any one term/break. The scope of the project entails civic responsibility and focuses on business applications. An example would be to assist in the preparation of income tax forms for under privileged Philadelphia residents. This project is in addition to requirements of the University 101 course.

Student will use their My LIFE e-portfolios to retain reflections and relevant writings from each of the required courses.

Coordinated with the Center for Civic Engagement, students will complete a minimum of sixty hours (60) of civic engagement while a student at Drexel University.

Students are required to earn a minimum of "C" in the following required courses, and a "B" average over all the courses.

Required Courses *

ANTH 101	Introduction to Cultural Diversity	3.0
BUSN 103	Advanced First Year Business Seminar	2.0
SOC 115	Social Problems	3.0
SOC 210	Race, Ethnicity and Social Inequality	3.0
PHIL 301	Business Ethics	3.0

UNIV 101	The Drexel Experience	1.0
Total Credits		15.0

* In addition to these required courses, BUSN 451 Business Consulting is strongly recommended, but not required to complete the certificate.

LeBow College of Business: School of Economics

Economics is one of Drexel LeBow's strongest disciplines. The LeBow College of Business celebrated its strengths in economics teaching and research by elevating its economics department into a School of Economics in September 2013. The School of Economics will continue Drexel LeBow's commitment to offering a curriculum that is current and challenging, and to conducting research that aligns with business trends and informs policy makers.

A degree, major or minor in Economics provides students with a robust understanding of the workings of the market system and major economic institutions, economic policy, and development.

Majors

BA, BS, BS-JD Economics

- Economics (BA, BS, BS-JD) (p. 372)

BS Business Administration

- Business Economics co-major (p. 380)
- International Business (<http://catalog.drexel.edu/undergraduate/schoolofeconomics/internationalbusiness>)
- International Business co-major (p. 386)

Minors

- Economics (p. 377)
- International Economics (p. 389)

Economics

Major: Economics

Degree Awarded: Bachelor of Science (BS) or Bachelor of Arts (BA)

Calendar Type: Quarter

Total Credit Hours: 187.0

Classification of Instructional Programs (CIP) code: 45.0601

Standard Occupational Classification (SOC) code: 19-3011

About the Program

Economics is at the root of business decisions, government policy making, and global relations. As a course of study, it can lead to diverse career opportunities, and is often viewed favorably as excellent preparation for graduate programs such as business and law.

Bachelor of Arts in Economics

The BA in Economics introduces students to modern economics within the context of a broad-based liberal arts curriculum. The degree is oriented toward students with interest in the less quantitative features of economics and a broader liberal arts education, particularly in areas offered by the College of Arts and Sciences. The degree requires students develop a depth of knowledge in a coordinate field (minor or major) outside of economics.

Bachelor of Science in Economics

The BS in Economics program introduces students to modern economics within the context of a general scientific and humanities curriculum. This degree is oriented towards students interested in acquiring a broad-based education with a focus on quantitative and professional skills.

The program is designed to provide students with an understanding of the market system, as well as economic institutions, policies and development. In addition to this deep coverage of economics, the major includes liberal arts and sciences requirements. The degree stipulates that students either complete one of the specific economic concentrations (Business Economics or Mathematical Economics) or develop a depth of knowledge in a secondary minor or major field outside of economics. The BS in Economics program provides excellent training for graduate school in economics.

The BS in Economics offers concentration choices in both Business Economics and Mathematical Economics.

Business Economics Concentration

This concentration prepares students to apply the rigorous methods of modern quantitative economics as professionals in a business context. This program combines coursework in economics and the functional fields of business administration within the context of a general scientific and humanities curriculum.

Mathematical Economics Concentration

This concentration prepares students for graduate study in quantitative and rigorous programs in economics and related fields. This program will also prepare students for professional work in quantitative economics or closely related areas, by providing coursework in economics and mathematics, in the context of a general scientific and humanities curriculum.

Coordinate Field Option

As an alternative to choosing one of these concentrations, students may also personalize their degree by developing a depth of knowledge in a secondary minor or major field outside of economics such as finance, social sciences, international studies or natural sciences. Examples of possible coordinating minors could include a minor in History and Politics for students interested in political economy or policy studies; a minor in American or European Studies for students interested in the economics of those countries, or a minor in Communication for students interested in economic journalism. In addition, students can complete a specialization in business economics or mathematical economics as an area of concentration.

Minor in Economics

The minor in Economics provides a solid background in the application of economic theory to markets. Students complete standard courses in micro- and macroeconomics that emphasize core training in economic decision making. Students also choose a course that applies this training to areas such as international economics, firm and industry behavior, quantitative economic analysis, and public policy. This type of analytical training provides a strong complement to many majors, including business fields, but would be especially useful for students interested in careers in public policy or law.

Minor in International Economics

The minor in International Economics is designed for students with varied backgrounds who have a particular interest in learning more about the international economic environment. The curriculum provides the students a basic understanding of economics and exposes them to advanced topics dealing with international trade, multinational corporations, and other aspects of international economics. The minor complements a variety of degrees, particularly for students interested in applying their major discipline within an international context or within a multinational corporation.

Additional Information

For more information about this major, contact the School of Economics. (<http://www.lebow.drexel.edu/Faculty/Departments/Economics>)

Degree Requirements (BS)

While a variety of options are available for study in coordinating fields, two specific concentrations have been developed to address key areas in economics.

- The business economics concentration
- The mathematical economics concentration

The requirements for those concentrations are listed beneath the general requirements for the BS in Economics program.

General education requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 270 [WI (p. 372)]	Business Communication	3.0
CS 143	Computer Programming Fundamentals	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
UNIV B101 [WI (p. 372)]	The Drexel Experience	2.0

Select one of the following math sequences:

MATH 101 & MATH 102	Introduction to Analysis I and Introduction to Analysis II	8.0
MATH 121 & MATH 122	Calculus I and Calculus II	

Fine arts elective	3.0
Three laboratory science electives	9.0
Two English literature electives: (ENGL 200 through ENGL 399)	6.0
Two history electives	6.0
Two philosophy electives	6.0

Economics Requirements

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ECON 250	Game Theory and Applications	4.0
ECON 301	Microeconomics	4.0
ECON 321	Macroeconomics	4.0

ECON 322 [WI (p. 372)]	Economics Seminar	4.0
ECON 350 [WI (p. 372)]	Applied Econometrics	4.0
ECON 360	Time Series Econometrics	4.0
INTB 334	International Trade	4.0
INTB 336	International Money and Finance	4.0
Select one of the following sequences:		8.0

MATH 311 Probability and Statistics I
& MATH 312 and Probability and Statistics II

STAT 201 Introduction to Business Statistics
& STAT 202 and Business Statistics II

Economics Electives 20.0

Select 20.0 credits from any of the following:

ECON 260	Economics of Small Business
ECON 326 [WI (p. 372)]	Economic Ideas
ECON 330	Managerial Economics
ECON 331	International Macroeconomics
ECON 334	Public Finance
ECON 336	Labor Economics
ECON 338	Industrial Organization
ECON 342	Economic Development
ECON 344	Comparative Economic Systems
ECON 348	Mathematical Economics
ECON 351	Resource and Environmental Economics
ECON T480	Special Topics in ECON
INTB 332	Multinational Corporations
INTB 440	Seminar in International Business
INTB 338	Regional Studies in Economic Policies and International Business
ENVS 370	Practice of Environmental Economics
FIN 301	Introduction to Finance
FIN 325	Financial Institutions and Markets
SOC 240	Urban Sociology
SOC 260 [WI (p. 372)]	Classical Social Theory

Additional Requirements **

Coordinate Field 26.0

Additional courses as required to satisfy a coordinating field (a second major, minor, or one of the two available concentrations below)

Free electives 29.0

Total Credits 187.0

* Students pursuing the concentration in Mathematical Economics can select CS 171 instead of CS 143.

** Students who take the Mathematical Economics or Business Economics concentrations must complete the required concentration courses and free electives for a total of 55 credits.

Mathematical Economics Concentration

Students selecting this concentration must have satisfied the general educational mathematics requirements by taking and .

ECON 348	Mathematical Economics	4.0	SOC 101	Introduction to Sociology	3.0
MATH 123	Calculus III	4.0	MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0	or 102	Introduction to Analysis II	
MATH 201	Linear Algebra	4.0		Term Credits	17.0
MATH 210	Differential Equations	4.0		Term 3	
Select three of the following:		9.0-12.0	ANTH 101	Introduction to Cultural Diversity	3.0
MATH 220 [WI	Introduction to Mathematical Reasoning		ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
(p. 372)]			Laboratory science course		3.0
MATH 285	Differential Equations II		Philosophy elective		3.0
MATH 300	Numerical Analysis I		Economics elective*		4.0
MATH 301	Numerical Analysis II			Term Credits	16.0
MATH 305	Introduction to Optimization Theory			Term 4	
MATH 320	Actuarial Mathematics		COM 270 [WI	Business Communication	3.0
MATH 401	Elements of Modern Analysis I		(p. 372)]		
MATH 402	Elements of Modern Analysis II		ECON 301	Microeconomics	4.0
Free Electives		23.0-26.0	STAT 201	Introduction to Business Statistics	4.0
Total Credits		55.0	History elective		3.0
			Laboratory Science course		3.0

Business Economics Concentration

Required Courses

ACCT 115	Financial Accounting Foundations	4.0
ECON 330	Managerial Economics	4.0
FIN 301	Introduction to Finance	4.0
MIS 200	Management Information Systems	4.0
ORGB 300 [WI	Organizational Behavior	4.0
(p. 372)]		
or BLAW 201	Business Law I	
Select two of the following:		8.0
ACCT 116	Managerial Accounting Foundations	
FIN 302	Intermediate Corporate Finance	
FIN 321	Investment Securities & Markets	
MKTG 301	Introduction to Marketing Management	
OPM 200	Operations Management	
Free Electives		27.0
Total Credits		55.0

Sample Plan of Study (BS)

Term 1

		Credits
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PSY 101	General Psychology I	3.0
MATH 121	Calculus I	4.0
or 101	Introduction to Analysis I	
UNIV	The Drexel Experience	1.0
B101 [WI		
(p. 372)]		
Term Credits		15.0

Term 2

CS 143	Computer Programming Fundamentals	3.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0

	Term Credits	17.0
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Term 3

ANTH 101	Introduction to Cultural Diversity	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Laboratory science course		3.0
Philosophy elective		3.0
Economics elective*		4.0

Term Credits

16.0

Term 4

COM 270 [WI	Business Communication	3.0
(p. 372)]		
ECON 301	Microeconomics	4.0
STAT 201	Introduction to Business Statistics	4.0
History elective		3.0
Laboratory Science course		3.0

Term Credits

17.0

Term 5

ECON 250	Game Theory and Applications	4.0
ECON 321	Macroeconomics	4.0
STAT 202	Business Statistics II	4.0
Laboratory Science course		3.0

Term Credits

15.0

Term 6

ECON	Applied Econometrics	4.0
350 [WI		
(p. 372)]		
INTB 334	International Trade	4.0
ENGL 200 through ENGL 399		3.0
Coordinate Field course (concentration/minor) or a Free elective		3.0
Philosophy elective		3.0

Term Credits

17.0

Term 7

ECON 360	Time Series Econometrics	4.0
INTB 336	International Money and Finance	4.0
Coordinate Field course (concentration/minor) or Free elective		3.0
Free elective		3.0

Term Credits

14.0

Term 8

Economics electives*		8.0
ENGL 200 through ENGL 399 course		3.0
Coordinate field course (concentration/minor) or a Free elective		3.0
Fine Arts elective		3.0

Term Credits

17.0

Term 9

Economics elective*		4.0
Coordinate Field courses (concentration/minor) or Free electives		6.0
Free electives		6.0

Term Credits

16.0

Term 10

ECON 322 [WI (p. 372)]	Economics Seminar	4.0
UNIV B101 [WI (p. 372)]	The Drexel Experience	1.0
Coordinate Field course (concentration/minor) or a Free elective		3.0
Economics elective *		4.0
Free elective		3.0
Term Credits		15.0
Term 11		
Coordinate Field courses (concentration/minor) or Free electives		8.0
Economics elective *		4.0
Free elective		4.0
Term Credits		16.0
Term 12		
Free electives		12.0
Term Credits		12.0
Total Credit: 187.0		

* See degree requirements for a list of courses that satisfy the Economics elective requirements.

Degree Requirements (BA)

General Education Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 230	Techniques of Speaking	3.0
COM 270 [WI (p. 372)]	Business Communication	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
INTB 200	International Business	4.0
MATH 101 or MATH 121	Introduction to Analysis I Calculus I	4.0
MATH 102 or MATH 122	Introduction to Analysis II Calculus II	4.0
PHIL 101	Introduction to Western Philosophy	3.0
PHIL 105 or PHIL 371	Critical Reasoning Philosophy of Social Sciences	3.0
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
UNIV B101 [WI (p. 372)]	The Drexel Experience	2.0
College of Media Arts and Design elective		3.0
Two Laboratory Science courses *		6.0
Political Science elective		3.0
Social Science elective		3.0
Diversity elective		3.0
International Studies elective		3.0
Two Modern Language courses (at least through 201 level)		8.0

Required Economics Courses

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ECON 250	Game Theory and Applications	4.0
ECON 301	Microeconomics	4.0
ECON 321	Macroeconomics	4.0
ECON 322 [WI (p. 372)]	Economics Seminar	4.0
ECON 326 [WI (p. 372)]	Economic Ideas	4.0
INTB 334	International Trade	4.0
INTB 336	International Money and Finance	4.0
STAT 201	Introduction to Business Statistics	4.0

Economics Electives

Select five of the following:

ECON 260	Economics of Small Business	
ECON 330	Managerial Economics	
ECON 331	International Macroeconomics	
ECON 334	Public Finance	
ECON 336	Labor Economics	
ECON 338	Industrial Organization	
ECON 342	Economic Development	
ECON 344	Comparative Economic Systems	
ECON 348	Mathematical Economics	
ECON 350 [WI (p. 372)]	Applied Econometrics	
ECON 351	Resource and Environmental Economics	
ECON 360	Time Series Econometrics	
ENVS 370	Practice of Environmental Economics	
FIN 301	Introduction to Finance	
FIN 325	Financial Institutions and Markets	
INTB 332	Multinational Corporations	
INTB 338	Regional Studies in Economic Policies and International Business	
INTB 440	Seminar in International Business	
SOC 240	Urban Sociology	
SOC 260 [WI (p. 372)]	Classical Social Theory	

Coordinate Field (Minor or Major) 24.0

Two of the courses in the chosen coordinate field must be 200 level or above.

Free Electives 30.0

Total Credits 187.0

* Science courses are selected from Biology (BIO), Chemistry (CHEM), Environmental Science (ENVS), Physics (PHYS), or Physics-Environmental Science (PHEV).

Plan of Study (BA)

Term 1		Credits
UNIV 101	The Drexel Experience	1.0
ECON 201	Principles of Microeconomics	4.0

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	Coordinate Field Course	3.0
MATH 101 or 121	Introduction to Analysis I Calculus I	4.0	Modern Language 201 / Free Elective	4.0
PSY 101	General Psychology I	3.0	Diversity Elective	3.0
Term Credits		15.0	Economics (ECON) Elective	4.0
Term 2			Term Credits	17.0
ECON 202	Principles of Macroeconomics	4.0	Term 9	
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	Coordinate Field Course	3.0
MATH 101 or 122	Introduction to Analysis I Calculus II	4.0	Coordinate Field Course	3.0
SOC 101	Introduction to Sociology	3.0	Social Science Elective	3.0
Term Credits		14.0	International Elective	3.0
Term 3			Economics (ECON) Elective	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	Term Credits	16.0
INTB 200	International Business	4.0	Term 10	
ANTH 101	Introduction to Cultural Diversity	3.0	Economics (ECON) Elective	4.0
PHIL 105	Critical Reasoning	3.0	Coordinate Field Course	3.0
Lab Science (BIO, CHEM, ENVS, PHYS or PHEV)		3.0	Coordinate Field Course	3.0
Term Credits		16.0	UNIV 101 The Drexel Experience	1.0
Term 4			ECON 322 [WI (p. 372)]	4.0
STAT 201	Introduction to Business Statistics	4.0	Term Credits	15.0
Lab Science (BIO, CHEM, ENVS, PHYS, OR PHEV)		3.0	Term 11	
ECON 301	Microeconomics	4.0	Coordinate Field Course	3.0
COM 230	Techniques of Speaking	3.0	Free Elective	3.0
AWCOMAD Elective		3.0	Free Elective	3.0
Term Credits		17.0	Free Elective	3.0
Term 5			Economics (ECON) Elective	4.0
Political Science (PSCI) Elective		4.0	Term Credits	16.0
Modern Language 101		4.0	Term 12	
ECON 321	Macroeconomics	4.0	Free Elective	3.0
ECON 250	Game Theory and Applications	4.0	Free Elective	3.0
Term Credits		16.0	Free Elective	3.0
Term 6			Term Credits	12.0
Modern Language 102		4.0	Total Credit: 187.0	
ECON 326 [WI (p. 372)]	Economic Ideas	4.0	Co-op/Career Opportunities	
COM 270 [WI (p. 372)]	Business Communication	3.0	The study of economics prepares students for a variety of fields: research economists in banks, government and universities; law; economic development for local government, banks and firms; business management and consulting; government and international agencies, such as the CIA, World Bank, IMF and USAID; and business and economic journalism.	
INTB 334	International Trade	4.0		
Term Credits		15.0	Career Paths and Degree Combinations	
Term 7			Economics provides an excellent foundation for many career options and can also be combined with many other majors and minors in preparing students for great careers.	
PHIL 105 or 371	Critical Reasoning Philosophy of Social Sciences	3.0	For example:	
Economics (ECON) Elective		4.0	Banking and Finance	
Modern Language 103 or Free Elective		4.0	• Economics and Finance	
INTB 336	International Money and Finance	4.0	• Economics and Business	
Coordinate Field Course		3.0		
Term Credits		18.0		
Term 8				
Coordinate Field Course		3.0		

- Economics and Mathematics
- Business Economics Concentration
- Economics and Physics

Academia

- Economics and Anthropology
- Economics and Psychology
- Economics and Mathematics
- Economics and Philosophy

Economics Research in Industry

- Economics and Mathematics
- Mathematical Economics Concentration
- Economics and Marketing
- Economics and Finance

High Tech and IT Industries

- Economics and Information Systems
- Economics and Chemistry
- Economics and Biology

Economics Research in Governments and International Organizations

- Economics and Environmental Studies
- Economics and Political Science
- Economics and International Studies

Law School and Other Graduate School Options

- Economics and Legal Studies
- Economics and Philosophy
- Economics and Political Science
- Economics and International Studies

Opportunities

Recently, economics students have obtained positions at the following institutions:

- Federal Reserve Bank, Board of Governors
- Citibank
- Vanguard Corporation
- Deloitte Consulting
- Black Rock Inc.
- Tyco Electronics

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Economics

The minor in economics provides a solid background in the application of economic theory to markets. Students complete standard courses in micro- and macroeconomics that emphasize core training in economic decision making. Students also choose a course that applies this training to areas such as international economics, firm and industry behavior, quantitative economic analysis, and public policy. This type of analytical training provides a strong complement to many majors, including business

fields, but would be especially useful for students interested in careers in public policy or law.

Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ECON 301	Microeconomics	4.0
ECON 321	Macroeconomics	4.0
ECON 322 [WI (p. 372)]	Economics Seminar	4.0

Select one of the following:

ECON 250	Game Theory and Applications	4.0
ECON 260	Economics of Small Business	
ECON 326 [WI (p. 372)]	Economic Ideas	
ECON 331	International Macroeconomics	
ECON 334	Public Finance	
ECON 336	Labor Economics	
ECON 338	Industrial Organization	
ECON 342	Economic Development	
ECON 348	Mathematical Economics	
ECON 350 [WI (p. 372)]	Applied Econometrics	
ECON 351	Resource and Environmental Economics	
INTB 332	Multinational Corporations	
INTB 334	International Trade	
INTB 336	International Money and Finance	
INTB 338	Regional Studies in Economic Policies and International Business	

Total Credits

24.0

Minor in International Economics

This minor is designed for students with varied backgrounds who have a particular interest in learning more about the international economic environment. The curriculum provides the students a basic understanding of economics and exposes them to advanced topics dealing with international trade, multinational corporations, and other aspects of

international economics. The minor complements a variety of degrees, particularly for students interested in applying their major discipline within an international context or within a multinational corporation.

Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
INTB 200	International Business	4.0
INTB 334	International Trade	4.0
or INTB 336	International Money and Finance	
Select two of the following (at least one from the following list):		8.0
INTB 332	Multinational Corporations	
INTB 334	International Trade	
INTB 336	International Money and Finance	
INTB 338	Regional Studies in Economic Policies and International Business	
ECON 342	Economic Development	

Other Options

ECON 301	Microeconomics	
ECON 321	Macroeconomics	
ECON 322 [WI	Economics Seminar	
(p. 372)]		
ECON 336	Labor Economics	
ECON 338	Industrial Organization	
ECON 348	Mathematical Economics	
ECON 350 [WI	Applied Econometrics	
(p. 372)]		
ECON 351	Resource and Environmental Economics	
BLAW 340	International Business Law	
FIN 346	Global Financial Management	
MKTG 357	Global Marketing	

Total Credits **24.0**

Dual/Accelerated Degree

Dual Degree Bachelor's Programs

With careful planning, students can complete two full degrees in the time usually required to complete one. The double major option works best in closely related areas. For detailed information the student should contact his or her advisor.

Degree Requirements BS ECON Dual Degree

General Education Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
COM 270 [WI	Business Communication (WI)	3.0
(p. 372)]		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Select one of the following sequences:

MATH 101	Introduction to Analysis I	
& MATH 102	and Introduction to Analysis II	
MATH 121	Calculus I	
& MATH 122	and Calculus II (recommended)	
PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
UNIV 101	The Drexel Experience	2.0
Fine Arts Elective		3.0
Three Laboratory Science Electives		9.0-12.0
Two English Literature Electives: (ENGL 200 through ENGL 399)		6.0
Two History Electives		6.0
Two Philosophy Electives		6.0
Select one of the following:		3.0

CS 161	Introduction to Computing
CS 171	Computer Programming I

Professional Requirements

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ECON 250	Game Theory and Applications	4.0
ECON 301	Microeconomics	4.0
ECON 321	Macroeconomics	4.0
ECON 322 [WI	Economics Seminar	4.0
(p. 372)]		
ECON 330	Managerial Economics *	4.0
ECON 348	Mathematical Economics **	4.0
ECON 350 [WI	Applied Econometrics (WI)	4.0
(p. 372)]		
ECON 360	Time Series Econometrics	4.0
INTB 334	International Trade	4.0
INTB 336	International Money and Finance	4.0

Select one of the following sequences: 8.0

MATH 311	Probability and Statistics I	
& MATH 312	and Probability and Statistics II	
STAT 201	Introduction to Business Statistics	
& STAT 202	and Business Statistics II	

Professional Electives

Select six of the following: 20.0

Any other ECON courses numbered above 240

Any other INTB courses

ENVS 370 Practice of Environmental Economics

FIN 301 Introduction to Finance ***

FIN 325 Financial Institutions and Markets ***

SOC 240 Urban Sociology

SOC 260 [WI Classical Social Theory
(p. 372)]**Additional Requirements:****BS in Economics****Coordinate Field** 24.0

Additional courses as required to satisfy a coordinating field (a second major, minor, or one of the two available concentrations below).

Free Electives 28.0

Total Credits 184.0-1

* Only required for students pursuing the BS in Economics/Business Economics Concentration

** Only required for students pursuing the BS in Economics/Mathematical Economics Concentration

*** Required for the BS in Economics/Business Economics Concentration

Bachelor of Science / Juris Doctor

This program is a modified BS in Economics that allows students the ability to consider a BS/JD degree.

Conditional on successful admittance into Drexel's Kline School of Law (<http://drexel.edu/law>).

Due to the complex nature of this program students should work closely with their advisor when selecting courses.

General EducationUNIV B101 [WI The Drexel Experience (Part 1) 1.0
(p. 372)]

COOP 101 Career Management and Professional Development 0.0

ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research 3.0

ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0

ENGL 103 Composition and Rhetoric III: Themes and Genres 3.0

ENGL 200-399 3.0

ENGL 200-399 3.0

MATH 101 Introduction to Analysis I 4.0
or MATH 121 Calculus IMATH 102 Introduction to Analysis II 4.0
or MATH 122 Calculus II

CS 131 Computer Programming A 3.0

Science w/ Lab 4.0

Science w/ Lab 4.0

Science w/ Lab 4.0

COM 270 [WI Business Communication 3.0
(p. 372)]

PSY 101 General Psychology I 3.0

SOC 101 Introduction to Sociology 3.0

ANTH 101 Introduction to Cultural Diversity 3.0

CoMAD Elective 3.0

HIST Elective 3.0

HIST Elective 3.0

PHIL Elective 3.0

PHIL Elective 3.0

UNIV B101 [WI The Drexel Experience (Part 2) 1.0
(p. 372)]**Econ. Requirements**

ECON 201 Principles of Microeconomics 4.0

ECON 202 Principles of Macroeconomics 4.0

ECON 301 Microeconomics 4.0

ECON 321 Macroeconomics 4.0

ECON 322 [WI Economics Seminar 4.0
(p. 372)]

ECON 250 Game Theory and Applications 4.0

ECON 360 Time Series Econometrics 4.0

ECON 350 [WI Applied Econometrics 4.0
(p. 372)]

INTB 334 International Trade 4.0

INTB 336 International Money and Finance 4.0

STAT 201 Introduction to Business Statistics 4.0

STAT 202 Business Statistics II 4.0

Econ. Electives 20.0**Free Electives** 27.0**First Year Law School Classes** 28.0**Economics and International Business Faculty**Marco Airaud, PhD (*University of Pennsylvania Philadelphia*). Assistant Professor. Computational economics, international economics, macroeconomics and monetary economics.Richard Barnett, PhD (*University of Minnesota*). Associate Clinical Professor. Economic theory, macroeconomics.Sebastien Bradley, PhD (*University of Michigan*). Assistant Professor. Public finance, international economics.Mian Dai, PhD (*Northwestern University*). Assistant Professor. Managerial economics and strategy.Pia DiGirolamo, PhD (*Purdue University*). Assistant Clinical Professor. Macroeconomics, international finance.Anne Duchene, PhD (*Ecole Nationale des Ponts et Chaussees, France*) *Department of Economics and International Business*. Assistant Professor. Microeconomics, industrial organization, law and economics.Ramya Ghosh, PhD (*Claremont Graduate University*). Assistant Clinical Professor. International economics.Shawkat M. Hammoudeh, PhD (*University of Kansas*) *Department of Economics and International Business*. Professor. Applied econometrics,

financial economics, international economics, natural resource economics.

Teresa D. Harrison, PhD (*University of Texas at Austin*) *Department of Economics and International Business*. Associate Professor. Econometrics, public finance, industrial organization, empirical microeconomics including health and nonprofit organizations.

Paul E. Jensen, PhD (*Penn State University*) *Associate Dean, College of Business*. Associate Professor. International trade. Primary research interest is international trade, particularly in empirical studies of international trade patterns.

Bang Nam Jeon, PhD (*Indiana University*) *Department of Economics and International Business*. Professor. Financial economics, world financial market linkages, foreign direct investment flows in the Asia-Pacific economies, the Korean economy: currency crisis, FDI, and macroeconomic issues, regional economic integration and newly industrializing economies: the

Stephen Joyce, MA (*Temple University*) *Department of Economics and International Business*. Assistant Clinical Professor. Education and human capital.

Christopher A. Laincz, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Bijou Yang Lester, PhD (*University of Pennsylvania*) *Department of Economics and International Business*. Professor. Behavioral characteristics of shopping on-line, economic issues of electronic commerce, contingent employment and part-time work, the economy and suicide.

Vibhas Madan, PhD (*Michigan State University*) *Head of the Department of Economics and International Business*. Professor. International trade theory, applied microeconomics.

Roger A. McCain, PhD (*Louisiana State University*) *Department of Economics and International Business*. Professor. Computational economics, game theory.

Irina Murtazashvili, PhD (*Michigan State University*). Assistant Professor. Applied econometrics.

Maria Olivero, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA (*American University*) *Department of Economics and International Business*. Clinical Associate Professor. Macroeconomics, political economy.

Konstantinos Serfes, PhD (*University of Illinois at Champaign-Urbana*) *Department of Economics and International Business*. Associate Professor. Industrial organization; microeconomics.

Mark Stehr, PhD (*University of California at Berkeley*) *Department of Economics and International Business*. Associate Professor. Health Economics, public finance, public policy.

Constantinos Syropoulos, PhD (*Yale University*) *Trustee Professor of International Economics, Department of Economics and International*

Business. Professor. International trade, political economy, applied microeconomics.

Matthew Weinberg, PhD (*Princeton University*). Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Yoto Yotov, PhD (*Boston College*). Associate Professor. International trade, applied microeconomics, political economy.

Interdepartmental Faculty

Bruce D. McCullough, PhD (*University of Texas*) *Department of Decision Sciences*. Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Emeritus Faculty

Edward C. Koziara, PhD (*University of Wisconsin*) *Department of Economics and International Business*. Professor Emeritus. Applied micro and macro economics.

Andrew G. Verzilli, PhD (*Boston College*). Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Chiou-shuang Yan, PhD (*Purdue University*). Professor Emeritus. International economics, input-output analysis.

Business Economics

Major: Business Economics

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 184.0

Classification of Instructional Programs (CIP) code: 45.0601

Standard Occupational Classification (SOC) code: 11-9199; 19-3011

The Business Economics program is a "co-major."

About the Program

Economics is the study of allocating scarce resources among competing needs. The program places particular emphasis on the application of theory toward the solution of particular problems in such areas as international trade, money and finance, consumer activities, economic development, and other areas.

Drexel's Business Economics co-major is designed for students who wish to receive a sound education within a specific functional area of business (Primary major) while supplementing that knowledge with an overview of economics.

Prepares students to apply the rigorous methods of modern quantitative economics in a business context. This program combines coursework in economics and the functional fields of business administration within the context of a general scientific and humanities curriculum.

More information can be found on the School of Economics webpage (<http://www.lebow.drexel.edu/faculty-and-research/disciplines/economics>).

Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
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ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 380)]	Business Communication (WI)	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV 101	The Drexel Experience	2.0
English literature elective: (ENGL 200 through ENGL 399)		3.0
Fine arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education (Category) Electives * 21.0

Business Requirements

BUSN 101	Foundations of Business I	4.0
BUSN 102	Foundations of Business II	4.0
ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
STAT 201	Introduction to Business Statistics	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 380)]	Organizational Behavior (WI)	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
Select one of the following:		4.0
STAT 202	Business Statistics II	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
BUSN 451	Business Consulting	

Primary Major Courses 32.0

Students completing the business economics co-major must do so in conjunction with a primary business major. Students must select a primary major from the following list: accounting, entrepreneurship, finance, legal studies, management information systems, marketing, or operations & supply chain management.

Business Economics Requirements

ECON 301	Microeconomics	4.0
ECON 321	Macroeconomics	4.0
ECON 322 [WI (p. 380)]	Economics Seminar (WI)	4.0
Select three of the following:		12.0

ECON 250	Game Theory and Applications
ECON 326 [WI (p. 380)]	Economic Ideas (WI)
ECON 330	Managerial Economics
ECON 334	Public Finance
ECON 336	Labor Economics
ECON 338	Industrial Organization
ECON 342	Economic Development
ECON 348	Mathematical Economics
ECON 350 [WI (p. 380)]	Applied Econometrics (WI)
ECON 351	Resource and Environmental Economics
ECON 360	Time Series Econometrics
INTB 332	Multinational Corporations
INTB 334	International Trade
INTB 336	International Money and Finance
INTB 338	Regional Studies in Economic Policies and International Business

Total Credits 184.0

- * Students select seven (21.0 credits) of additional general education electives with a minimum of one course in each of the following categories:
- Society and Culture (Communication, English, Fine Arts, International Area Studies, Language, Philosophy)
 - Social Science (Anthropology, History, Sociology, Political Science, Psychology)
 - Math and Science (Computer Science, Information Systems, Math, Science).

Sample Plan of Study

		Credits
Term 1		
BUSN 101	Foundations of Business I	4.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV	The Drexel Experience	1.0
B101 [WI (p. 380)]		
Term Credits		16.0
Term 2		
BUSN 102	Foundations of Business II	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
Term Credits		15.0
Term 3		
ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
Select one of the following:		3.0
BIO 100	Applied Cells, Genetics Physiology	
or 101	Applied Biological Diversity, Ecology Evolution	

CHEM 151 Applied Chemistry		
PHYS 151 Applied Physics		
General education elective		3.0
Term Credits		16.0
Term 4		
ACCT 116 Managerial Accounting Foundations		4.0
BLAW 201 Business Law I		4.0
COM 270 [WI Business Communication (p. 380)]		3.0
STAT 201 Introduction to Business Statistics		4.0
Term Credits		15.0
Term 5		
MIS 200 Management Information Systems		4.0
INTB 200 International Business		4.0
Select one of the following:		3.0
BIO 100 Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution		
CHEM 151 Applied Chemistry		
PHYS 151 Applied Physics		
Social Science elective		3.0
Term Credits		14.0
Term 6		
FIN 301 Introduction to Finance		4.0
MKTG 301 Introduction to Marketing Management		4.0
OPM 200 Operations Management		4.0
English literature elective (ENGL 200 through 399)		3.0
Term Credits		15.0
Term 7		
ECON 301 Microeconomics		4.0
ORGB 300 [WI Organizational Behavior (WI) (p. 380)]		4.0
PHIL 105 Critical Reasoning		3.0
Primary Major course 1*		4.0
Term Credits		15.0
Term 8		
History (HIST) elective		3.0
ECON 321 Macroeconomics		4.0
Primary Major course 2*		4.0
Primary Major course 3*		4.0
Term Credits		15.0
Term 9		
ECON Co-Major course (See co-major requirements for list)		4.0
Primary Major course 4*		4.0
Primary Major course 5*		4.0
Society and culture elective		3.0
Term Credits		15.0
Term 10		
UNIV B201 Career Management		1.0
Primary Major course 6*		4.0
ECON Co-Major course (See co-major requirements for list)		4.0
General education elective		3.0

Fine arts elective		3.0
Term Credits		15.0
Term 11		
Science or computer science elective		3.0
MGMT 450 Strategy and Competitive Advantage		4.0
ECON Co-Major course (See co-major requirements for list)		4.0
Primary Major course 7*		4.0
Term Credits		15.0
Term 12		
Primary Major course 8*		4.0
Select one of the following:		4.0
BUSN 451 Business Consulting		
MGMT 451 Management Simulation		
STAT 202 Business Statistics II		
MGMT 260 Introduction to Entrepreneurship		
General education electives		6.0
ECON 322 [WI Economics Seminar (p. 380)]		4.0
Term Credits		18.0
Total Credit: 184.0		

* Students completing the Business Economics Co-major must do so in conjunction with a primary business major. Students must select a primary major from the following list: Accounting, Entrepreneurship, Finance, Legal Studies, Management Information Systems, Marketing, or Operations & Supply Chain Management.

Economics and International Business Faculty

Marco Airaud, PhD (*University of Pennsylvania Philadelphia*). Assistant Professor. Computational economics, international economics, macroeconomics and monetary economics.

Richard Barnett, PhD (*University of Minnesota*). Associate Clinical Professor. Economic theory, macroeconomics.

Sebastien Bradley, PhD (*University of Michigan*). Assistant Professor. Public finance, international economics.

Mian Dai, PhD (*Northwestern University*). Assistant Professor. Managerial economics and strategy.

Pia DiGirolamo, PhD (*Purdue University*). Assistant Clinical Professor. Macroeconomics, international finance.

Anne Duchene, PhD (*Ecole Nationale des Ponts et Chaussees, France*) *Department of Economics and International Business*. Assistant Professor. Microeconomics, industrial organization, law and economics.

Ramya Ghosh, PhD (*Claremont Graduate University*). Assistant Clinical Professor. International economics.

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Irina Murtazashvili, PhD (*Michigan state University*). Assistant Professor. Applied econometrics.

Maria Olivero, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA (*American University*) *Department of Economics and International Business*. Clinical Associate Professor. Macroeconomics, political economy.

Konstantinos Serfes, PhD (*University of Illinois at Champaign-Urbana*) *Department of Economics and International Business*. Associate Professor. Industrial organization; microeconomics.

Mark Stehr, PhD (*University of California at Berkeley*) *Department of Economics and International Business*. Associate Professor. Health Economics, public finance, public policy.

Constantinos Syropoulos, PhD (*Yale University*) *Trustee Professor of International Economics, Department of Economics and International Business*. Professor. International trade, political economy, applied microeconomics.

Matthew Weinberg, PhD (*Princeton University*). Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Yoto Yotov, PhD (*Boston College*). Associate Professor. International trade, applied microeconomics, political economy.

Interdepartmental Faculty

Bruce D. McCullough, PhD (*University of Texas*) *Department of Decision Sciences*. Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Emeritus Faculty

Edward C. Koziara, PhD (*University of Wisconsin*) *Department of Economics and International Business*. Professor Emeritus. Applied micro and macro economics.

Andrew G. Verzilli, PhD (*Boston College*). Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Chiou-shuang Yan, PhD (*Purdue University*). Professor Emeritus. International economics, input-output analysis.

Business Economics

Major: Business Economics

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 184.0

Classification of Instructional Programs (CIP) code: 45.0601

Standard Occupational Classification (SOC) code: 11-9199; 19-3011

The Business Economics program is a "co-major."

About the Program

Economics is the study of allocating scarce resources among competing needs. The program places particular emphasis on the application of theory toward the solution of particular problems in such areas as international trade, money and finance, consumer activities, economic development, and other areas.

Drexel's Business Economics co-major is designed for students who wish to receive a sound education within a specific functional area of business (Primary major) while supplementing that knowledge with an overview of economics.

Prepares students to apply the rigorous methods of modern quantitative economics in a business context. This program combines coursework in economics and the functional fields of business administration within the context of a general scientific and humanities curriculum.

More information can be found on the School of Economics webpage (<http://www.lebow.drexel.edu/faculty-and-research/disciplines/economics>).

Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

COM 270 [WI (p. 380)]	Business Communication (WI)	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0
PSY 101	General Psychology I	3.0
UNIV 101	The Drexel Experience	2.0
English literature elective: (ENGL 200 through ENGL 399)		3.0
Fine arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education (Category) Electives * 21.0**Business Requirements**

BUSN 101	Foundations of Business I	4.0
BUSN 102	Foundations of Business II	4.0
ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
STAT 201	Introduction to Business Statistics	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 380)]	Organizational Behavior (WI)	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
Select one of the following:		4.0
STAT 202	Business Statistics II	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
BUSN 451	Business Consulting	

Primary Major Courses 32.0

Students completing the business economics co-major must do so in conjunction with a primary business major. Students must select a primary major from the following list: accounting, entrepreneurship, finance, legal studies, management information systems, marketing, or operations & supply chain management.

Business Economics Requirements

ECON 301	Microeconomics	4.0
ECON 321	Macroeconomics	4.0
ECON 322 [WI (p. 380)]	Economics Seminar (WI)	4.0
Select three of the following:		12.0
ECON 250	Game Theory and Applications	
ECON 326 [WI (p. 380)]	Economic Ideas (WI)	

ECON 330	Managerial Economics
ECON 334	Public Finance
ECON 336	Labor Economics
ECON 338	Industrial Organization
ECON 342	Economic Development
ECON 348	Mathematical Economics
ECON 350 [WI (p. 380)]	Applied Econometrics (WI)
ECON 351	Resource and Environmental Economics
ECON 360	Time Series Econometrics
INTB 332	Multinational Corporations
INTB 334	International Trade
INTB 336	International Money and Finance
INTB 338	Regional Studies in Economic Policies and International Business

Total Credits 184.0

* Students select seven (21.0 credits) of additional general education electives with a minimum of one course in each of the following categories:

- Society and Culture (Communication, English, Fine Arts, International Area Studies, Language, Philosophy)
- Social Science (Anthropology, History, Sociology, Political Science, Psychology)
- Math and Science (Computer Science, Information Systems, Math, Science).

Sample Plan of Study

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV	The Drexel Experience	1.0
B101 [WI (p. 380)]		

Term Credits 16.0

Term 2		Credits
BUSN 102	Foundations of Business II	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0

Term Credits 15.0

Term 3		Credits
ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PSY 101	General Psychology I	3.0
Select one of the following:		3.0
BIO 100	Applied Cells, Genetics Physiology	
or 101	Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General education elective	3.0
Term Credits	16.0
Term 4	
ACCT 116 Managerial Accounting Foundations	4.0
BLAW 201 Business Law I	4.0
COM 270 [WI] Business Communication (p. 380)]	3.0
STAT 201 Introduction to Business Statistics	4.0
Term Credits	15.0
Term 5	
MIS 200 Management Information Systems	4.0
INTB 200 International Business	4.0
Select one of the following:	3.0
BIO 100 Applied Cells, Genetics Physiology or 101 Applied Biological Diversity, Ecology Evolution	
CHEM 151 Applied Chemistry	
PHYS 151 Applied Physics	
Social Science elective	3.0
Term Credits	14.0
Term 6	
FIN 301 Introduction to Finance	4.0
MKTG 301 Introduction to Marketing Management	4.0
OPM 200 Operations Management	4.0
English literature elective (ENGL 200 through 399)	3.0
Term Credits	15.0
Term 7	
ECON 301 Microeconomics	4.0
ORGB 300 [WI] Organizational Behavior (WI) (p. 380)]	4.0
PHIL 105 Critical Reasoning	3.0
Primary Major course 1*	4.0
Term Credits	15.0
Term 8	
History (HIST) elective	3.0
ECON 321 Macroeconomics	4.0
Primary Major course 2*	4.0
Primary Major course 3*	4.0
Term Credits	15.0
Term 9	
ECON Co-Major course (See co-major requirements for list)	4.0
Primary Major course 4*	4.0
Primary Major course 5*	4.0
Society and culture elective	3.0
Term Credits	15.0
Term 10	
UNIV B201 Career Management	1.0
Primary Major course 6*	4.0
ECON Co-Major course (See co-major requirements for list)	4.0
General education elective	3.0
Fine arts elective	3.0
Term Credits	15.0

Term 11	
Science or computer science elective	3.0
MGMT 450 Strategy and Competitive Advantage	4.0
ECON Co-Major course (See co-major requirements for list)	4.0
Primary Major course 7*	4.0
Term Credits	15.0
Term 12	
Primary Major course 8*	4.0
Select one of the following:	4.0
BUSN 451 Business Consulting	
MGMT 451 Management Simulation	
STAT 202 Business Statistics II	
MGMT 260 Introduction to Entrepreneurship	
General education electives	6.0
ECON 322 [WI] Economics Seminar (p. 380)]	4.0
Term Credits	18.0
Total Credit: 184.0	

* Students completing the Business Economics Co-major must do so in conjunction with a primary business major. Students must select a primary major from the following list: Accounting, Entrepreneurship, Finance, Legal Studies, Management Information Systems, Marketing, or Operations & Supply Chain Management.

Economics and International Business Faculty

Marco Airaud, PhD (*University of Pennsylvania Philadelphia*). Assistant Professor. Computational economics, international economics, macroeconomics and monetary economics.

Richard Barnett, PhD (*University of Minnesota*). Associate Clinical Professor. Economic theory, macroeconomics.

Sebastien Bradley, PhD (*University of Michigan*). Assistant Professor. Public finance, international economics.

Mian Dai, PhD (*Northwestern University*). Assistant Professor. Managerial economics and strategy.

Pia DiGirolamo, PhD (*Purdue University*). Assistant Clinical Professor. Macroeconomics, international finance.

Anne Duchene, PhD (*Ecole Nationale des Ponts et Chaussees, France*) *Department of Economics and International Business*. Assistant Professor. Microeconomics, industrial organization, law and economics.

Ramya Ghosh, PhD (*Claremont Graduate University*). Assistant Clinical Professor. International economics.

Shawkat M. Hammoudeh, PhD (*University of Kansas*) *Department of Economics and International Business*. Professor. Applied econometrics, financial economics, international economics, natural resource economics.

Teresa D. Harrison, PhD (*University of Texas at Austin*) *Department of Economics and International Business*. Associate Professor.

Econometrics, public finance, industrial organization, empirical microeconomics including health and nonprofit organizations.

Paul E. Jensen, PhD (*Penn State University*) *Associate Dean, College of Business*. Associate Professor. International trade. Primary research interest is international trade, particularly in empirical studies of international trade patterns.

Bang Nam Jeon, PhD (*Indiana University*) *Department of Economics and International Business*. Professor. Financial economics, world financial market linkages, foreign direct investment flows in the Asia-Pacific economies, the Korean economy: currency crisis, FDI, and macroeconomic issues, regional economic integration and newly industrializing economies: the

Stephen Joyce, MA (*Temple University*) *Department of Economics and International Business*. Assistant Clinical Professor. Education and human capital.

Christopher A. Laincz, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Economic development, technological change, and growth, industrial organization, macroeconomics and monetary economics.

Bijou Yang Lester, PhD (*University of Pennsylvania*) *Department of Economics and International Business*. Professor. Behavioral characteristics of shopping on-line, economic issues of electronic commerce, contingent employment and part-time work, the economy and suicide.

Vibhas Madan, PhD (*Michigan State University*) *Head of the Department of Economics and International Business*. Professor. International trade theory, applied microeconomics.

Roger A. McCain, PhD (*Louisiana State University*) *Department of Economics and International Business*. Professor. Computational economics, game theory.

Irina Murtazashvili, PhD (*Michigan state University*). Assistant Professor. Applied econometrics.

Maria Olivero, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA (*American University*) *Department of Economics and International Business*. Clinical Associate Professor. Macroeconomics, political economy.

Konstantinos Serfes, PhD (*University of Illinois at Champaign-Urbana*) *Department of Economics and International Business*. Associate Professor. Industrial organization; microeconomics.

Mark Stehr, PhD (*University of California at Berkeley*) *Department of Economics and International Business*. Associate Professor. Health Economics, public finance, public policy.

Constantinos Syropoulos, PhD (*Yale University*) *Trustee Professor of International Economics, Department of Economics and International Business*. Professor. International trade, political economy, applied microeconomics.

Matthew Weinberg, PhD (*Princeton University*). Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Yoto Yotov, PhD (*Boston College*). Associate Professor. International trade, applied microeconomics, political economy.

Interdepartmental Faculty

Bruce D. McCullough, PhD (*University of Texas*) *Department of Decision Sciences*. Professor. Applied econometrics; reliability of statistical and econometric software; business data mining.

Emeritus Faculty

Edward C. Koziara, PhD (*University of Wisconsin*) *Department of Economics and International Business*. Professor Emeritus. Applied micro and macro economics.

Andrew G. Verzilli, PhD (*Boston College*). Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Chiou-shuang Yan, PhD (*Purdue University*). Professor Emeritus. International economics, input-output analysis.

International Business Co-Major

Major: International Business

Degree Awarded: Bachelor of Science in Business Administration (BSBA)

Calendar Type: Quarter

Total Credit Hours: 184.0

Classification of Instructional Programs (CIP) code: 52.1101

Standard Occupational Classification (SOC) code: 11-1021

About the Program

The International Business Co-Major explores the international business environment as well as the internal workings of international corporations and the impact of international considerations on the various functional areas of business.

The International Business Co-Major allows students to choose from a menu of courses. The curriculum is interdisciplinary, with courses drawn from across business disciplines and anthropology. Specialized operational courses are offered, along with more general theoretical and comparative ones. The co-major option substitutes further training in a relevant business discipline or functional field in the form of a Primary Major instead of the language courses.

Degree Requirements

International Business Co-Major

Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 270 [WI (p. 386)]	Business Communication (WI)	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 105	Critical Reasoning	3.0

PSY 101	General Psychology I	3.0
UNIV B101 [WI (p. 386)]	The Drexel Experience	2.0
English literature elective: (ENGL 200 through ENGL 399)		3.0
Fine arts elective		3.0
History (HIST) elective		3.0
Select two of the following:		6.0
BIO 100	Applied Cells, Genetics & Physiology	
or BIO 101	Applied Biological Diversity, Ecology & Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

General Education (Category) Electives * 21.0

Business Requirements

BUSN 101	Foundations of Business I	4.0
BUSN 102	Foundations of Business II	4.0
ACCT 115	Financial Accounting Foundations	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
STAT 201	Introduction to Business Statistics	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MIS 200	Management Information Systems	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0
ORGB 300 [WI (p. 386)]	Organizational Behavior (WI)	4.0
INTB 200	International Business	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
Select one of the following:		4.0
STAT 202	Business Statistics II	
MGMT 260	Introduction to Entrepreneurship	
MGMT 451	Management Simulation	
BUSN 451	Business Consulting	

Primary Major Courses 32.0

Students completing the International Business co-major (requirements listed below) must do so in conjunction with a primary business major. Students must select a primary major from the following list (Accounting, Entrepreneurship, Finance, Legal Studies, Management Information Systems, Marketing, or Operations & Supply Chain Management.)

International Business Co-Major Requirements **

The International Business Major offers two options: Option (A), which includes study for competency in a language other than English (and other than the student's native language). For more information, please see the International Business (Stand-Alone Option) listed under Majors. Option (B) is the Co-Major option highlighted below. The co-major option substitutes further training in a relevant business discipline or functional field in the form of a Primary Major instead of the language courses.

Select six of the following:		24.0
ANTH 312	Approaches to Intercultural Behavior	
BLAW 340	International Business Law	
ECON 342	Economic Development	

ECON 344	Comparative Economic Systems
FIN 346	Global Financial Management
INTB 332	Multinational Corporations
INTB 334	International Trade
INTB 336	International Money and Finance
INTB 338	Regional Studies in Economic Policies and International Business
INTB 440	Seminar in International Business
MIS 347	Domestic and Global Outsourcing Management
MKTG 357	Global Marketing

Total Credits 184.0

* Students select seven (21.0 credits) of additional general education electives with a minimum of one course in each of the following categories:

- Society and Culture (Communication, English, Fine Arts, International Area Studies, Language, Philosophy)
- Social Science (Anthropology, History, Sociology, Political Science, Psychology)
- Math and Science (Computer Science, Information Systems, Math, Science).

** Students completing the International Business co-major must do so in conjunction with a primary business major. Students must select a primary major from the following list:

- Accounting
- Entrepreneurship
- Finance
- Legal Studies
- Management Information Systems
- Marketing
- Operations & Supply Chain Management

Sample Plan of Study International Business Co-Major

Sample Plan of Study

Term 1		Credits
BUSN 101	Foundations of Business I	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV B101 [WI (p. 386)]	The Drexel Experience	1.0
ECON 201	Principles of Microeconomics	4.0
Term Credits		16.0
Term 2		
BUSN 102	Foundations of Business II	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
ECON 202	Principles of Macroeconomics	4.0
Term Credits		15.0
Term 3		
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

ACCT 115	Financial Accounting Foundations	4.0
PSY 101	General Psychology I	3.0
	General education elective	3.0
	Select one of the following:	3.0
BIO 100	Applied Cells, Genetics Physiology	
or 101	Applied Biological Diversity, Ecology Evolution	
CHEM 151	Applied Chemistry	
PHYS 151	Applied Physics	

Term Credits 16.0

Term 4

STAT 201	Introduction to Business Statistics	4.0
ACCT 116	Managerial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
COM 270 [WI	Business Communication	3.0

(p. 386)]

Term Credits 15.0

Term 5

MIS 200	Management Information Systems	4.0
INTB 200	International Business	4.0
	Select one of the following:	4.0

- MGMT 260 Introduction to Entrepreneurship
- MGMT 451 Management Simulation
- STAT 202 Business Statistics II
- BUSN 451 Business Consulting

Select one of the following: 3.0

- BIO 100 Applied Cells, Genetics Physiology
- or 101 Applied Biological Diversity, Ecology Evolution
- CHEM 151 Applied Chemistry
- PHYS 151 Applied Physics

Term Credits 15.0

Term 6

	English literature elective - ENGL 200 through 399	3.0
FIN 301	Introduction to Finance	4.0
MKTG 301	Introduction to Marketing Management	4.0
OPM 200	Operations Management	4.0

Term Credits 15.0

Term 7

	Primary Major Course 1*	4.0
ORGB	Organizational Behavior (WI)	4.0
300 [WI	(p. 386)]	
PHIL 105	Critical Reasoning	3.0
	International Business Co-Major Course (See co-major requirements for list)	4.0

Term Credits 15.0

Term 8

	Primary Major Course 2*	4.0
	International Business Co-Major Course (See co-major requirements for list)	4.0
	History (HIST) elective	3.0
	Science or computer science elective	3.0

Term Credits 14.0

Term 9

	Society and culture elective	3.0
	Primary Major Course 3*	4.0
	Primary Major Course 4*	4.0
	International Business Co-Major Course (See co-major requirements for list)	4.0

Term Credits 15.0

Term 10

	Fine Arts elective	3.0
	General education elective	3.0
	Primary Major Course 5*	4.0
	International Business Co-Major Course (See co-major requirements for list)	4.0
UNIV B201	Career Management	1.0

Term Credits 15.0

Term 11

	Primary Major course 6*	4.0
	Primary Major course 7*	4.0
MGMT 450	Strategy and Competitive Advantage	4.0
	International Business Co-Major Course (See co-major requirements for list)	4.0

Term Credits 16.0

Term 12

	General education elective	3.0
	General education elective	3.0
	Social science elective	3.0
	Primary Major course 8*	4.0
	International Business Co-Major Course (See co-major requirements for list)	4.0

Term Credits 17.0

Total Credit: 184.0

* See catalog for a list of Business majors that may be completed in conjunction with the International Business Co-Major.

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Irina Murtazashvili, PhD (*Michigan state University*). Assistant Professor. Applied econometrics.

Maria Olivero, PhD (*Duke University*) *Department of Economics and International Business*. Associate Professor. Macroeconomics, international finance.

Eydis Olsen, MA (*American University*) *Department of Economics and International Business*. Clinical Associate Professor. Macroeconomics, political economy.

Konstantinos Serfes, PhD (*University of Illinois at Champaign-Urbana*) *Department of Economics and International Business*. Associate Professor. Industrial organization; microeconomics.

Mark Stehr, PhD (*University of California at Berkeley*) *Department of Economics and International Business*. Associate Professor. Health Economics, public finance, public policy.

Constantinos Syropoulos, PhD (*Yale University*) *Trustee Professor of International Economics, Department of Economics and International Business*. Professor. International trade, political economy, applied microeconomics.

Matthew Weinberg, PhD (*Princeton University*). Assistant Professor. Antitrust and regulation, applied econometrics, industrial organization.

Yoto Yotov, PhD (*Boston College*). Associate Professor. International trade, applied microeconomics, political economy.

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Andrew G. Verzilli, PhD (*Boston College*). Professor Emeritus. Teaching effectiveness in economics; economics and financial history.

Chiou-shuang Yan, PhD (*Purdue University*). Professor Emeritus. International economics, input-output analysis.

Minor in International Economics

This minor is designed for students with varied backgrounds who have a particular interest in learning more about the international economic environment. The curriculum provides the students a basic understanding of economics and exposes them to advanced topics dealing with international trade, multinational corporations, and other aspects of international economics. The minor complements a variety of degrees, particularly for students interested in applying their major discipline within an international context or within a multinational corporation.

Requirements

- No more than 2 courses or 8.0 credits required by a student's major may be counted towards this minor.
- A grade of "C" (2.0) or better must be earned for each course in this minor for it to be counted.
- No more than two transfer courses may be used to complete this minor. Transfer credits must be taken before matriculated at Drexel.
- Students should check the pre-requisites of all classes when selecting electives. It is the responsibility of the student to know pre-requisites.
- Business administration and business & engineering & economic students may complete any of the business minors, including: accounting, business, economics, entrepreneurship, finance, international economics, legal studies, management information systems, marketing, and operations & supply chain management.
- Cannot do a major and a minor in the same field of study.

All prospective students should meet with an advisor from the College as soon as possible. Call 215.895.2110 to set up an appointment.

Required Courses

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
INTB 200	International Business	4.0
INTB 334	International Trade	4.0
or INTB 336	International Money and Finance	
Select two of the following (at least one from the following list):		8.0
INTB 332	Multinational Corporations	
INTB 334	International Trade	
INTB 336	International Money and Finance	
INTB 338	Regional Studies in Economic Policies and International Business	
ECON 342	Economic Development	
Other Options		
ECON 301	Microeconomics	
ECON 321	Macroeconomics	
ECON 322 [WI Economics Seminar (p. 389)]		
ECON 336	Labor Economics	
ECON 338	Industrial Organization	
ECON 348	Mathematical Economics	
ECON 350 [WI Applied Econometrics (p. 389)]		
ECON 351	Resource and Environmental Economics	
BLAW 340	International Business Law	
FIN 346	Global Financial Management	
MKTG 357	Global Marketing	

Total Credits **24.0**

School of Biomedical Engineering Science & Health Systems

Mission Statement

The mission of the School of Biomedical Engineering, Science and Health Systems is to promote health and quality of life through education, research and innovation that integrates engineering and life sciences in a global context.

The School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu/new04/default.cfm>) is a nationally recognized center for research in biomedical engineering and science offering multi-disciplinary instruction on a full- and part-time basis at the graduate and undergraduate levels.

The School of Biomedical Engineering, Science, and Health Systems offers a bachelor of science program in biomedical engineering with a choice of five concentration areas: biomaterials and tissue engineering, biomechanics and human performance engineering, biomedical informatics, biomedical devices and imaging, and neuroengineering.

Major

- Biomedical Engineering (p. 395)

Concentrations

- Biomaterials and Tissue Engineering (p. 398)
- Biomechanics and Human Performance Engineering (p. 401)
- Biomedical Informatics (p. 405)
- Biomedical Devices and Imaging (p. 409)
- Neuroengineering (p. 412)

About the School

The School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu>) (formerly the Biomedical Engineering and Science Institute, founded in 1961) is a leader in biomedical engineering and biomedical science research and education. The undergraduate program was inaugurated in September 1998 and has steadily grown to attract the highest ability students at the University. The undergraduate biomedical engineering curriculum is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

The School's academic thrust areas, both in research and education, are at the forefront of biosensing, bioimaging, bioinformation engineering and integrated bioinformatics, drug delivery, biomedical ultrasound & optics, bionanotechnology, cellular tissue engineering, neuroengineering and human performance. Emerging initiatives include skin bioengineering, pediatric engineering and homeland security technologies. Various departments at Drexel University offer courses that are suited for students in biomedical engineering and biomedical science. The School's curriculum complements the strengths of the Colleges of Arts & Sciences, Business, Engineering, Computing & Informatics, Law and Medicine. As a whole, the curriculum offers the advanced knowledge needed for industrial careers, health professions, graduate research or careers in

highly specialized fields such as pre-professional health (medical, dental, and veterinary) and pre-law.

The marriage of technology with biology and medicine drives the 21st Century industrial enterprise. Consistent with this mission, the School strives for clinical and industrial relevance in our academic pursuits. The School maintains a strong entrepreneurship program in biomedical technologies. The School's alliance with regional economic development agencies and corporations together with advisors from business development, legal, and investment communities sustains the growth of this program. The students and faculty of the School are committed to move their discoveries from laboratories to clinical practice or home use. The success of the Translational Research in Biomedical Technologies program has been recognized and funded regionally as well as nationally.

The School has experienced remarkable growth in recent years thanks to our outstanding research portfolio, high quality and innovative undergraduate program, and our multidisciplinary approach to education and research. Another competitive advantage is the unique free-standing university-level administrative structure with its own tenure-track faculty lines, budget and space. This helps transcend the traditional organizational boundaries of engineering, sciences and medicine. The School's independence allows the pursuit of growth and collaborations in various disciplines. The School's small size provides agility to reconfigure and reorganize in response to emerging opportunities. The University Strategic Plan recognizes our School of Biomedical Engineering, Science and Health Systems as "Drexel's prototype of academic integration."

Metropolitan Philadelphia has one of the nation's highest concentrations of medical institutions and pharmaceutical, biotechnology, medical device and systems industry. The School has forged strategic partnerships with select universities, research institutes, health care institutions and industries in the region. The School enjoys a close working relationship with our Drexel College of Medicine as well as alliances with prominent medical institutions in the region to develop joint research and educational programs. These include University of Pennsylvania, Thomas Jefferson University, the Fox Chase Cancer Center and the Wistar Institute. These collaborative initiatives provide students with ample opportunities in basic and clinical research as well as innovative academic programs.

Applicants to the graduate program must meet the requirements for admission to graduate studies at Drexel University. Candidates for degrees in the School of Biomedical Engineering, Science and Health Systems are required to maintain academics standards applicable to all graduate students at Drexel University.

Co-operative Education

Co-op and career opportunities available to students include employment in the medical device, equipment, and systems industry; the biomaterial and implant industry; the pharmaceutical industry; the biotechnology and agricultural industry; the telemedicine and tele-health industry; health care; medical and clinical information and management systems; and biomedical technology transfer. Preprofessional options available in the academic programs of the School prepare students for admission to schools of medicine, dentistry, and veterinary medicine. Students may also choose to continue their education at the graduate level to prepare for careers in research and development in biomedical engineering and science.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Special Programs

Accelerated Bachelor's/Master's Dual Degree Program

The Accelerated BS/MS degree program provides opportunities for strongly motivated students with high ability to progress toward their educational goals at an accelerated pace. The program makes it possible for top engineering students to obtain both degrees in the same time period that it takes most students to obtain a bachelor's degree.

Preprofessional Programs

Students who want to prepare for admission to schools of medicine, dentistry, or veterinary medicine, including the BA/BS/MD and early assurance programs at the Drexel College of Medicine, may obtain professional counseling and assistance from the Office of Preprofessional Programs, 215-895-2437.

University Honors

Program Students in the Biomedical Engineering program may apply for admission to the University Honors Program. Admission depends on superior academic performance at Drexel and may be approved after a personal interview with the Honors Committee.

University Leadership Program

Drexel graduates in Biomedical Engineering will be the leaders of their profession--and their communities--in the twenty-first century. The University Leadership Program helps cultivate leadership skills and engages students in exploring the complex aspects of successful leadership by offering multi-dimensional courses featuring service learning.

Biomedical Engineering, Science and Health Systems Faculty

Fred D. Allen, PhD (*University of Pennsylvania*). Assistant Professor. Tissue engineering, cell engineering, orthopedics, bone remodeling, wound healing, mechanotransduction, signal transduction, adhesion, migration.

Sriram Balasubramanian, PhD (*Wayne State University*). Assistant Professor. Structural characteristics of the pediatric thoracic cage using CT scans and developing an age-equivalent animal model for pediatric long bones.

Kenneth A. Barbee, PhD (*University of Pennsylvania*). Professor. Cellular biomechanics of neural and vascular injury, mechanotransduction in the cardiovascular system, mechanical control of growth and development for wound healing and tissue engineering.

Lin Han, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Uri Hershberg, PhD (*Hebrew University of Jerusalem, Israel*). Assistant Professor. Bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, pathogens,

computational and mathematical modeling, complex systems, cognition and inflammation.

Joshua Jacobs, PhD (*University of Pennsylvania*). Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

Dov Jaron, PhD (*University of Pennsylvania*) *Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Andres Kriete, PhD (*University in Bremen Germany*) *Associate Director for Graduate Studies and Academic Operations*. Systems biology, bioimaging, control theory, biology of aging, skin cancer.

Ryszard Lec, PhD (*University of Warsaw Engineering College*). Professor. Biomedical applications of viscoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Peter Lewin, PhD (*University of Denmark, Copenhagen-Lyngby*) *Richard B. Beard Professor, School Of Biomedical Engineering, Science & Health Systems*. Professor. Biomedical ultrasonics, piezoelectric and polymer transducers and hydrophones; shock wave sensors.

Hualou Liang, PhD (*Chinese Academy of Sciences*). Associate Professor. Neuroengineering, neuroinformatics, cognitive and computational neuroscience, neural data analysis and computational modeling, biomedical signal processing.

Donald L. McEachron, PhD (*University of California at San Diego*) *Associate Director*. Research Professor. Animal behavior, autoradiography, biological rhythms, cerebral metabolism, evolutionary theory, image processing, neuroendocrinology.

Karen Moxon, PhD (*University of Colorado*). Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Banu Onaral, Ph.D. (*University of Pennsylvania*) *H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD (*Rensselaer Polytechnic University*). Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

Arye Rosen, PhD (*Drexel University*) *Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Ahmet Sacan, PhD (*Middle East Technical University*). Assistant Professor. Indexing and data mining in biological databases; protein sequence and structure; similarity search; protein structure modeling; protein-protein interaction; automated cell tracking.

Joseph J. Sarver, PhD (*Drexel University*). Teaching Professor. Neuromuscular adaptation to changes in the myo-mechanical environment.

Rahamim Seliktar, PhD (*University of Strathclyde, Glasgow*) *Vice Director, School of Biomedical Engineering, Science & Health Systems*. Professor. Limb prostheses, biomechanics of human motion, orthopedic biomechanics.

Adrian C. Shieh, PhD (*Rice University*). Assistant Professor. Contribution of mechanical forces to tumor invasion and metastasis, with a particular emphasis on how biomechanical signals may drive the invasive switch, and how the biomechanical microenvironment interacts with cytokine signaling and the extracellular matrix to influence tumor and stromal cell behavior.

Wan Young Shih, PhD (*Ohio State University*) *School of Biomedical Engineering, Science and Health Systems*. Associate Professor. Piezoelectric microcantilever biosensors development, piezoelectric finger development, quantum dots development, tissue elasticity imaging, piezoelectric microcantilever force probes.

Kara Spiller, PhD (*Drexel University*). Assistant Professor. Cell-biomaterial interactions, biomaterial design, and international engineering education.

Aydin Tozeren, PhD (*Columbia University*) *Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Margaret Wheatley, PhD (*University of Toronto*) *School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor*. Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

Yinghui Zhong, PhD (*Georgia Institute of Technology*). Assistant Professor. Spinal cord repair, and engineering neural prosthesis/brain interface using biomaterials, drug delivery, and stem cell therapy.

Interdepartmental Faculty

Douglas L. Chute, PhD (*University of Missouri*) *Louis and Bessie Stein Fellow; Faculty coordinator of ePsychology*. Professor. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Patricia A. Shewokis, PhD (*University of Georgia*). Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy (fNIR) and electroencephalography (EEG) and methodology and research design.

Emeritus Faculty

William Freedman, PhD (*Drexel University*). Professor Emeritus. Motor control; sensory and motor systems; reflexes; eye movements; neural networks.

John M. Reid, PhD (*University of Pennsylvania*) *Calhoun Professor Emeritus*. Professor Emeritus. Diagnostic ultrasound, wave propagation and scattering in inhomogeneous media, imaging, instrumentation.

Hun H. Sun, PhD (*Cornell University*). Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Biomedical Engineering

Major: Biomedical Engineering

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 196.5 - 203.5

Classification of Instructional Programs (CIP) code:
Standard Occupational Classification (SOC) code:

About the Program

Biomedical Engineering is an innovative Bachelor of Science degree program developed and delivered in collaboration with the College of Engineering, the College of Arts and Sciences and the College of Computing & Informatics. It prepares students to conceive, design, and develop devices and systems that improve human health and quality of life. Biomedical engineering is the convergence of life sciences with engineering. From child car seats and football helmets to drug-delivery systems, minimally invasive surgery, and noninvasive imaging technology, the work of the biomedical engineer makes a difference in everyone's life.

The undergraduate biomedical engineering curriculum is designed to strike a balance between academic breadth in biomedical engineering and specialization in one of five concentration areas: biomaterials and tissue engineering, biomechanics and human performance engineering, biomedical bioinformatics, biomedical devices and imaging, and neuroengineering.

This program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

Concentrations

The undergraduate biomedical engineering curriculum is designed to strike a balance between academic breadth in biomedical engineering and specialization in an area of concentration. Each concentration has its own degree requirements for graduation, and its own plan of study:

- Biomaterials and Tissue Engineering (p. 398)
- Biomechanics and Human Performance Engineering (p. 401)
- Biomedical Informatics (p. 405)
- Biomedical Devices and Imaging (p. 409)
- Neuroengineering (p. 412)

The degree program provides innovative experiences in hands-on experimentation and engineering design as well as opportunities for personal growth and development of leadership and communication skills.

Working with a faculty advisor, students can select their core and elective courses from the curricula offered by the School of Biomedical Engineering, Science, and Health Systems and the Departments of Biology, Chemistry, Physics, Mathematics, Chemical Engineering, Mechanical Engineering, Materials Science and Engineering, Electrical and Computer Engineering, and the College of Computing & Informatics.

Program Educational Objectives

Graduates from the School's undergraduate biomedical engineering program are expected to achieve success in their professional lives and contribute to the good of the global community. The School's specific objectives for its alumni include the following:

Objective 1: Professional Presence

As a result, within a few years, the graduate has established an Internet presence, either through professional organizations, social networking and/or other activities which demonstrate an appreciation and use of modern technological capabilities.

Objective 2: Workforce Skilled in Integrating Engineering, Design, and Life Sciences

As a result, graduates will identify opportunities to contribute to society from a variety of positions, ranging from biomedical engineering, biotechnology design and development to practicing physicians, lawyers, innovators, entrepreneurs and business managers. The graduate may also pursue further education in the form of graduate and professional degrees.

Objective 3: Leadership in Research, Innovation and Design

As a result, within a few years of graduation, the graduate will have made significant or meaningful contributions in his or her chosen field, either thorough research publications and/or presentations, the development of a product or process, obtaining patents for new products and/or processes, or other evidence of contributing to the advancement of knowledge, particularly in fields integrating engineering and the life sciences.

Objective 4: Ethical Reasoning, Behavior and Professionalism

As a result, within a few years of graduation, the graduate will demonstrate adherence to the professional codes of conduct appropriate to his or her field of study and/or practice, as well as exhibit behavior consistent with accepted standards of fiduciary responsibility, risk/benefit analysis and professional accountability.

Objective 5: Communication

As a result, graduates will have outstanding communication skills as evidenced by their professional presentations, and in their productive interactions with co-workers. The graduates may also use their communication skills to foster collaborative effort among co-workers and/or may represent his or her company, institution and/or laboratory to other interested parties.

Objective 6: Personal Engagement

As a result, within a few years, the graduate will be working independently and in diverse groups to effectively and efficiently achieve personal and organizational goals, engage in community or public service, create a product or process that fills a social need, and/or participate in educating individuals about an issue of societal concern.

Student Learning Outcomes

To support our graduates in achieving success in the program educational objectives, the biomedical engineering program is designed to facilitate student learning and achievement on the following Student Learning Outcomes, which indicate our students' skills sets at the time of graduation.

Outcome 1: Communication

The graduate employs an understanding of audience, purpose and context to communicate effectively in a range of situations using appropriate media while displaying a significant aptitude for presenting scientific and technical materials to diverse audiences.

Outcome 2: Engagement

The graduate uses his or her knowledge and skills, including those associated with engineering and life science, to make a positive difference on issues of public concern.

Outcome 3: Ethical Reasoning, Behavior, and Professionalism

The graduate recognizes ethical issues, considers multiple points of view, and uses critical ethical reasoning to determine the appropriate behavior to follow. The graduate thus demonstrates a high level of integrity and a positive work ethic combined with a thorough understanding of the ethical implications and obligations associated with the practice of biomedical engineering.

Outcome 4: Innovation and Design

The graduate often asks questions and makes observations that lead to new ideas or hypotheses. He or she formulates highly original solutions while moving beyond the conventional to new methods blending creative and practical approaches, methods and designs which may involve pioneering applications along the interface of engineering and biology. The graduate has the ability to create quality products and processes that are state-of-the-practice in his or her field.

Outcome 5: Leadership

The graduate is able to articulate a vision or goal in such a manner as to promote collaboration and successful implementation. The graduate displays a willingness to overcome adversity and work diligently in pursuit of goals, thus serving as a role model for others.

Outcome 6: Problem-Solving Abilities

The graduate is able to creatively solve problems from both analytic and synthetic perspectives using multiple approaches, integrating the life sciences, engineering, and the humanities. The graduate is able to recognize, incorporate and adapt to the limitations and consequences of applying various problem solutions.

Outcome 7: Research Abilities

The graduate is able to collect and process data, information and knowledge to answer specific questions or generate new conceptual models and hypotheses. The graduate evaluates these models and hypotheses using the appropriate experimental, mathematical and statistical approaches.

Outcome 8: Human Resources and Interactions

The graduate is able to work either independently or in diverse groups to effectively and efficiently respond to academic and work requirements.

Outcome 9: Technological Skills

The graduate makes appropriate use of technologies to communicate, collaborate, solve problems, make decisions, and conduct research, as well as foster creativity and life-long learning. The graduate is able to use state-of-the-art technological resources and tools and keeps up on advancements in her or her field of study and/or practice.

Additional Information

More information about the School's undergraduate program can be found at the School of Biomedical Engineering, Sciences and Health Systems' Academic Program (http://www.biomed.drexel.edu/new04/Content/ug_prog/academic_programs) web page.

Students are also encouraged to contact the School's Director for Student Services:

Caryn Glaser

Director of Student Services
School of Biomedical Engineering, Science and Health Systems
215.895.2237
glasercb@drexel.edu

Career and professional counseling is provided independently by the student's staff and faculty advisors. Information regarding undergraduate faculty advisors is available on the School's Undergraduate Advisors (http://www.biomed.drexel.edu/new04/Content/ug_prog/academic_programs/advisorslist.cfm) page.

Biomedical Engineering, Science and Health Systems Faculty

Fred D. Allen, PhD (*University of Pennsylvania*). Assistant Professor. Tissue engineering, cell engineering, orthopedics, bone remodeling, wound healing, mechanotransduction, signal transduction, adhesion, migration.

Sriram Balasubramanian, PhD (*Wayne State University*). Assistant Professor. Structural characteristics of the pediatric thoracic cage using CT scans and developing an age-equivalent animal model for pediatric long bones.

Kenneth A. Barbee, PhD (*University of Pennsylvania*). Professor. Cellular biomechanics of neural and vascular injury, mechanotransduction in the cardiovascular system, mechanical control of growth and development for wound healing and tissue engineering.

Lin Han, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Uri Hershberg, PhD (*Hebrew University of Jerusalem, Israel*). Assistant Professor. Bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, pathogens, computational and mathematical modeling, complex systems, cognition and inflammation.

Joshua Jacobs, PhD (*University of Pennsylvania*). Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

Dov Jaron, PhD (*University of Pennsylvania*) *Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Andres Kriete, PhD (*University in Bremen Germany*) *Associate Director for Graduate Studies and Academic Operations*. Systems biology, bioimaging, control theory, biology of aging, skin cancer.

Ryszard Lec, PhD (*University of Warsaw Engineering College*). Professor. Biomedical applications of viscoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

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Hun H. Sun, PhD (*Cornell University*). Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Biomaterials and Tissue Engineering Concentration

Major: Biomedical Engineering: Biomaterials and Tissue Engineering Concentration

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 197.5

Classification of Instructional Programs (CIP) code: 14.0501

Standard Occupational Classification (SOC) code: 17-2031

About the Program

The biomaterials and tissue engineering concentration focuses on the fundamental knowledge of natural and synthetic biomaterials and cellular biology and educates students in the emerging field of cellular and tissue engineering.

The concentration in biomaterials and tissue engineering includes courses from the Departments of Biology, Chemistry, and Mechanical Engineering & Mechanics. The program builds on the fundamental knowledge of natural and synthetic biomaterials and cellular biology and educates students in the emerging field of cellular and tissue engineering.

Biomaterials research has recently expanded to include fibrous materials and various prosthetic devices requiring the use of both synthetic and natural fibers. The emphasis is on improved materials and design of biological replacement tissues through cellular tissue engineering.

Upon graduation, students will be able to:

- select and evaluate biomaterials for use in biomedical applications *in vivo*;
- develop *in vitro* models for drug delivery, drug toxicity and drug discovery choosing the appropriate biomaterials;
- create high-fidelity tissue models *in vitro*;
- develop and evaluate tissue engineering approaches to initiate and promote regenerative processes *in vivo*.

The School maintains extensive facilities and laboratories devoted to areas of research. Visit the School's BIOMED Research Facilities and Laboratory Map (<http://www.biomed.drexel.edu/new04/Content/research/facilities>) web page for more details about the laboratories and equipment available.

For more information about this concentration, see Drexel's School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu/new04>) web site.

Degree Requirements

General Education Requirements

HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV R101	The Drexel Experience	1.0
General Studies Electives (5) *		15.0

Engineering Core Courses

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 122	Cells and Genetics	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0

Required Biomedical Engineering Courses

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0

BMES 124	Biomedical Engineering Freshman Seminar I	1.0
BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 130	Problem Solving in Biomedical Engineering	2.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
BMES 302	Laboratory II: Biomeasurements	2.0
BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 325	Principles of Biomedical Engineering I	3.0
BMES 326	Principles of Biomedical Engineering II	3.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 372	Biosimulation	3.0
BMES 381	Junior Design Seminar I	2.0
BMES 382	Junior Design Seminar II	2.0
BMES 491 [WI (p. 398)]	Senior Design Project I	3.0
BMES 492	Senior Design Project II	2.0
BMES 493	Senior Design Project III	3.0
ECE 201	Foundations of Electric Circuits	3.0
Biomaterials and Tissue Engineering Concentration Courses		
BIO 218	Principles of Molecular Biology	4.0
BIO 219 [WI (p. 398)]	Techniques in Molecular Biology	3.0
BMES 345	Mechanics of Biological Systems	3.0
BMES 375	Computational Bioengineering	4.0
BMES 451	Transport Phenomena in Living Systems	4.0
BMES 460	Biomaterials I	4.0
BMES 461	Biomaterials II	4.0
BMES 471	Cellular and Molecular Foundations of Tissue Engineering	4.0
BMES 472	Developmental and Evolutionary Foundations of Tissue Engineering	4.0
BMES 475	Biomaterials and Tissue Engineering III	4.0
CHEM 241	Organic Chemistry I	4.0
CHEM 242	Organic Chemistry II	4.0
Laboratory Requirement: Choose 2 of		4.0
BMES 301	Laboratory I: Experimental Biomechanics	
BMES 304	Laboratory IV: Ultrasound Images	
BIO 202	Human Physiology Laboratory	
CHEM 244	Organic Chemistry Laboratory I	
CHEM 245	Organic Chemistry Laboratory II	
Total Credits		197.5

* General studies electives include all liberal arts electives plus additional subjects, such as business, which do not fall under the subject areas of science, math or engineering. See the Biomedical Engineering General and Liberal Studies List (http://www.biomed.drexel.edu/new04/Content/ug_prog/gen_lib_studies_courses) for approved courses. A certain number of General Studies credits are required for graduation with this major.

Sample Plan of Study

Term 1		Credits
BMES 124	Biomedical Engineering Freshman Seminar I	1.0
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV R101	The Drexel Experience	1.0
Term Credits		18.5
Term 2		
BMES 126	Biomedical Engineering Freshman Seminar II	1.0
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
Term Credits		19.5
Term 3		
BIO 122	Cells and Genetics	4.5
BMES 130	Problem Solving in Biomedical Engineering	2.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
Term Credits		19.5
Term 4		
BIO 201	Human Physiology I	4.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		18.0
Term 5		
BIO 203	Human Physiology II	4.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0
Term Credits		19.0
Term 6		
BMES 301	Laboratory I: Experimental Biomechanics (Laboratory Requirement)	2.0
BMES 302	Laboratory II: Biomeasurements	2.0

BMES 325	Principles of Biomedical Engineering I	3.0
BMES 372	Biosimulation	3.0
ECE 201	Foundations of Electric Circuits	3.0
HIST 285	Technology in Historical Perspective	3.0
Term Credits		16.0
Term 7		
BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 326	Principles of Biomedical Engineering II	3.0
BMES 345	Mechanics of Biological Systems	3.0
General Studies Elective		3.0
Term Credits		15.0
Term 8		
BIO 218	Principles of Molecular Biology	4.0
BIO 219 [WI (p. 398)]	Techniques in Molecular Biology	3.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 381	Junior Design Seminar I	2.0
CHEM 241	Organic Chemistry I	4.0
Term Credits		16.0
Term 9		
BMES 375	Computational Bioengineering	4.0
BMES 382	Junior Design Seminar II	2.0
BMES 451	Transport Phenomena in Living Systems	4.0
CHEM 242	Organic Chemistry II	4.0
CHEM 244	Organic Chemistry Laboratory I (Laboratory Requirement)	3.0
Term Credits		17.0
Term 10		
BMES 460	Biomaterials I	4.0
BMES 471	Cellular and Molecular Foundations of Tissue Engineering	4.0
BMES 491 [WI (p. 398)]	Senior Design Project I	3.0
General Studies Elective		3.0
Term Credits		14.0
Term 11		
BMES 461	Biomaterials II	4.0
BMES 472	Developmental and Evolutionary Foundations of Tissue Engineering	4.0
BMES 492	Senior Design Project II	2.0
General Studies Elective		3.0
Term Credits		13.0
Term 12		
BMES 475	Biomaterials and Tissue Engineering III	4.0
BMES 493	Senior Design Project III	3.0
General Studies Electives (2)		6.0
Term Credits		13.0
Total Credit: 198.5		

Opportunities

Metropolitan Philadelphia has one of the highest concentrations of medical institutions and pharmaceutical and biotechnology industries in the nation. The bachelor of science degree in biomedical engineering gives students access to a broad spectrum of career opportunities in medical device and equipment industry; prosthetics and assist devices industry; biomaterials and implants industry; and the telemedicine, pharmaceutical, biotechnology, and agricultural sectors.

Biomedical engineering graduates are also ideally prepared for professional education in medicine, dentistry, veterinary medicine, and law. Those who choose to pursue graduate education can aim for careers in research and development, biomedical technology innovation and transfer, as well as health care technology management.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Biomedical Engineering, Science and Health Systems Faculty

Fred D. Allen, PhD (*University of Pennsylvania*). Assistant Professor. Tissue engineering, cell engineering, orthopedics, bone remodeling, wound healing, mechanotransduction, signal transduction, adhesion, migration.

Sriram Balasubramanian, PhD (*Wayne State University*). Assistant Professor. Structural characteristics of the pediatric thoracic cage using CT scans and developing an age-equivalent animal model for pediatric long bones.

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Joshua Jacobs, PhD (*University of Pennsylvania*). Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

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Rahamim Seliktar, PhD (*University of Strathclyde, Glasgow*) *Vice Director, School of Biomedical Engineering, Science & Health Systems*. Professor. Limb prostheses, biomechanics of human motion, orthopedic biomechanics.

Adrian C. Shieh, PhD (*Rice University*). Assistant Professor. Contribution of mechanical forces to tumor invasion and metastasis, with a particular emphasis on how biomechanical signals may drive the invasive switch, and how the biomechanical microenvironment interacts with cytokine signaling and the extracellular matrix to influence tumor and stromal cell behavior.

Wan Young Shih, PhD (*Ohio State University*) *School of Biomedical Engineering, Science and Health Systems*. Associate Professor. Piezoelectric microcantilever biosensors development, piezoelectric finger development, quantum dots development, tissue elasticity imaging, piezoelectric microcantilever force probes.

Kara Spiller, PhD (*Drexel University*). Assistant Professor. Cell-biomaterial interactions, biomaterial design, and international engineering education.

Aydin Tozeren, PhD (*Columbia University*) *Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Margaret Wheatley, PhD (*University of Toronto*) *School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor*. Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

Yinghui Zhong, PhD (*Georgia Institute of Technology*). Assistant Professor. Spinal cord repair, and engineering neural prosthesis/brain interface using biomaterials, drug delivery, and stem cell therapy.

Interdepartmental Faculty

Douglas L. Chute, PhD (*University of Missouri*) *Louis and Bessie Stein Fellow; Faculty coordinator of ePsychology*. Professor. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Patricia A. Shewokis, PhD (*University of Georgia*). Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy (fNIR) and electroencephalography (EEG) and methodology and research design.

Emeritus Faculty

William Freedman, PhD (*Drexel University*). Professor Emeritus. Motor control; sensory and motor systems; reflexes; eye movements; neural networks.

John M. Reid, PhD (*University of Pennsylvania*) *Calhoun Professor Emeritus*. Professor Emeritus. Diagnostic ultrasound, wave propagation and scattering in inhomogeneous media, imaging, instrumentation.

Hun H. Sun, PhD (*Cornell University*). Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Biomechanics and Human Performance Engineering Concentration

Major: Biomedical Engineering: Biomechanics and Human Performance Engineering Concentration

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 201.5

Classification of Instructional Programs (CIP) code: 14.0501

Standard Occupational Classification (SOC) code: 17-2031

About the Program

The concentration in biomechanics and human performance engineering provides students with the background and skills needed to create work and living environments which improve human health and enhance performance.

The biomechanics concentration applies engineering principles to study the interactions between humans and various machine systems in both working and living environments. Courses in this area of specialization cover such topics as the mechanics of materials, chronobiology, biomechanics, and human factors and cognitive engineering.

Upon graduation, students will be able to:

- model the effects of external forces on the human body and its tissues;
- design implanted prosthetic devices through an understanding of the interaction between biological tissues and engineering material;
- understand neural control of posture and locomotion;
- apply system approaches to the interaction of humans with their environment in order to optimize performance;
- design devices to aid people with disabilities by capitalizing on their engineering skills and human performance criteria.

The School maintains extensive facilities and laboratories devoted to areas of research. Visit the School's BIOMED Research Facilities and Laboratory Map (<http://www.biomed.drexel.edu/new04/Content/research/facilities>) web page for more details about the laboratories and equipment available.

For more information about this concentration, see Drexel's School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu/new04>) web site.

Degree Requirements

General Education Requirements

HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV 101	The Drexel Experience	1.0
PSY 101	General Psychology I (required General Studies course)	3.0
General Studies Electives (4)		12.0

Engineering Core Courses

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 122	Cells and Genetics	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0

ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0

Required Biomedical Engineering Courses

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0
BMES 124	Biomedical Engineering Freshman Seminar I	1.0
BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 130	Problem Solving in Biomedical Engineering	2.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
BMES 302	Laboratory II: Biomeasurements	2.0
BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 325	Principles of Biomedical Engineering I	3.0
BMES 326	Principles of Biomedical Engineering II	3.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 372	Biosimulation	3.0
BMES 381	Junior Design Seminar I	2.0
BMES 382	Junior Design Seminar II	2.0
BMES 491 [WI (p. 401)]	Senior Design Project I	3.0
BMES 492	Senior Design Project II	2.0
BMES 493	Senior Design Project III	3.0
ECE 201	Foundations of Electric Circuits	3.0

Biomechanics and Human Performance Engineering Concentration Courses

BMES 345	Mechanics of Biological Systems	3.0
BMES 375	Computational Bioengineering	4.0
or BMES 401	Biosensors I	
BMES 411	Chronoengineering I: Biological Rhythms in Health and Performance	3.0
BMES 412	Chronoengineering II: Sleep Functions in Health and Performance	3.0
BMES 430	Neural Aspects of Posture and Locomotion	3.0
BMES 440	Introduction to Biodynamics	3.0
BMES 441	Biomechanics I: Introduction to Biomechanics	4.0
BMES 442	Biomechanics II: Musculoskeletal Modeling and Human Performance	4.0
BMES 444	Biofluid Mechanics	3.0
BMES 451	Transport Phenomena in Living Systems	4.0
MEM 201	Foundations of Computer Aided Design	3.0
MEM 238	Dynamics	4.0
Laboratory Requirement: Choose 2 of		4.0
BMES 301	Laboratory I: Experimental Biomechanics	
BMES 304	Laboratory IV: Ultrasound Images	
BMES 305	Laboratory V: Musculoskeletal Anatomy for Biomedical Engineers	

BIO 219 [WI (p. 401)]	Techniques in Molecular Biology	
CHEM 244	Organic Chemistry Laboratory I	
CHEM 245	Organic Chemistry Laboratory II	
Biomechanics and Human Performance Electives (3)		9.0
Suggested Biomechanics and Human Performance concentration electives		
PSY 213	Sensation and Perception	
PSY 332	Human Factors and Cognitive Engineering	
PSY 410	Neuropsychology	

Total Credits 201.5

Sample Plan of Study

Term 1		Credits
BMES 124	Biomedical Engineering Freshman Seminar I	1.0
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV R101	The Drexel Experience	1.0

Term Credits 18.5

Term 2		Credits
BMES 126	Biomedical Engineering Freshman Seminar II	1.0
CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0

Term Credits 19.5

Term 3		Credits
BIO 122	Cells and Genetics	4.5
BMES 130	Problem Solving in Biomedical Engineering	2.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0

Term Credits 19.5

Term 4		Credits
BIO 201	Human Physiology I	4.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0

Term Credits 18.0

Term 5

BIO 203	Human Physiology II	4.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0

Term Credits 19.0

Term 6

BMES 301	Laboratory I: Experimental Biomechanics (Laboratory Requirement)	2.0
BMES 302	Laboratory II: Biomeasurements	2.0
BMES 325	Principles of Biomedical Engineering I	3.0
BMES 372	Biosimulation	3.0
ECE 201	Foundations of Electric Circuits	3.0
MEM 201	Foundations of Computer Aided Design	3.0

Term Credits 16.0

Term 7

BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 326	Principles of Biomedical Engineering II	3.0
BMES 345	Mechanics of Biological Systems	3.0
PSY 101	General Psychology I	3.0

Term Credits 15.0

Term 8

BMES 305	Laboratory V: Musculoskeletal Anatomy for Biomedical Engineers (Laboratory Requirement)	2.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 381	Junior Design Seminar I	2.0
BMES 411	Chronoengineering I: Biological Rhythms in Health and Performance	3.0
BMES 430	Neural Aspects of Posture and Locomotion	3.0
Biomechanics & Human Performance Concentration Elective *		3.0

Term Credits 16.0

Term 9

BMES 382	Junior Design Seminar II	2.0
BMES 412	Chronoengineering II: Sleep Functions in Health and Performance	3.0
MEM 238	Dynamics	4.0
BMES 401 or 375	Biosensors I Computational Bioengineering	4.0
General Studies Elective		3.0

Term Credits 16.0

Term 10

BMES 440	Introduction to Biodynamics	3.0
BMES 441	Biomechanics I: Introduction to Biomechanics	4.0
BMES 451	Transport Phenomena in Living Systems	4.0
BMES 491 [WI (p. 401)]	Senior Design Project I	3.0
General Studies Elective		3.0

Term Credits 17.0

Term 11

HIST 285	Technology in Historical Perspective	3.0
BMES 442	Biomechanics II: Musculoskeletal Modeling and Human Performance	4.0
BMES 492	Senior Design Project II	2.0
Biomechanics & Human Performance Concentration Elective*		3.0
General Studies Elective		3.0
Term Credits		15.0
Term 12		
BMES 444	Biofluid Mechanics	3.0
BMES 493	Senior Design Project III	3.0
General Studies Elective		3.0
Biomechanics & Human Performance Concentration Elective*		3.0
Term Credits		12.0
Total Credit: 201.5		

* See degree requirements (p. 402).

Opportunities

Metropolitan Philadelphia has one of the highest concentrations of medical institutions and pharmaceutical and biotechnology industries in the nation. The bachelor of science degree in biomedical engineering gives students access to a broad spectrum of career opportunities in medical device and equipment industry; prosthetics and assist devices industry; biomaterials and implants industry; and the telemedicine, pharmaceutical, biotechnology, and agricultural sectors.

Biomedical engineering graduates are also ideally prepared for professional education in medicine, dentistry, veterinary medicine, and law. Those who choose to pursue graduate education can aim for careers in research and development, biomedical technology innovation and transfer, as well as health care technology management.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Biomedical Engineering, Science and Health Systems Faculty

Fred D. Allen, PhD (*University of Pennsylvania*). Assistant Professor. Tissue engineering, cell engineering, orthopedics, bone remodeling, wound healing, mechanotransduction, signal transduction, adhesion, migration.

Sriram Balasubramanian, PhD (*Wayne State University*). Assistant Professor. Structural characteristics of the pediatric thoracic cage using CT scans and developing an age-equivalent animal model for pediatric long bones.

Kenneth A. Barbee, PhD (*University of Pennsylvania*). Professor. Cellular biomechanics of neural and vascular injury, mechanotransduction in the cardiovascular system, mechanical control of growth and development for wound healing and tissue engineering.

Lin Han, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Uri Hershberg, PhD (*Hebrew University of Jerusalem, Israel*). Assistant Professor. Bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, pathogens, computational and mathematical modeling, complex systems, cognition and inflammation.

Joshua Jacobs, PhD (*University of Pennsylvania*). Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

Dov Jaron, PhD (*University of Pennsylvania*) *Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Andres Kriete, PhD (*University in Bremen Germany*) *Associate Director for Graduate Studies and Academic Operations*. Systems biology, bioimaging, control theory, biology of aging, skin cancer.

Ryszard Lec, PhD (*University of Warsaw Engineering College*). Professor. Biomedical applications of viscoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Peter Lewin, PhD (*University of Denmark, Copenhagen-Lyngby*) *Richard B. Beard Professor, School Of Biomedical Engineering, Science & Health Systems*. Professor. Biomedical ultrasonics, piezoelectric and polymer transducers and hydrophones; shock wave sensors.

Hualou Liang, PhD (*Chinese Academy of Sciences*). Associate Professor. Neuroengineering, neuroinformatics, cognitive and computational neuroscience, neural data analysis and computational modeling, biomedical signal processing.

Donald L. McEachron, PhD (*University of California at San Diego*) *Associate Director*. Research Professor. Animal behavior, autoradiography, biological rhythms, cerebral metabolism, evolutionary theory, image processing, neuroendocrinology.

Karen Moxon, PhD (*University of Colorado*). Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Banu Onaral, Ph.D. (*University of Pennsylvania*) *H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD (*Rensselaer Polytechnic University*). Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

Arye Rosen, PhD (*Drexel University*) *Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Ahmet Sacan, PhD (*Middle East Technical University*). Assistant Professor. Indexing and data mining in biological databases; protein sequence and structure; similarity search; protein structure modeling; protein-protein interaction; automated cell tracking.

Joseph J. Sarver, PhD (*Drexel University*). Teaching Professor. Neuromuscular adaptation to changes in the myo-mechanical environment.

Rahamim Seliktar, PhD (*University of Strathclyde, Glasgow*) Vice Director, School of Biomedical Engineering, Science & Health Systems. Professor. Limb prostheses, biomechanics of human motion, orthopedic biomechanics.

Adrian C. Shieh, PhD (*Rice University*). Assistant Professor. Contribution of mechanical forces to tumor invasion and metastasis, with a particular emphasis on how biomechanical signals may drive the invasive switch, and how the biomechanical microenvironment interacts with cytokine signaling and the extracellular matrix to influence tumor and stromal cell behavior.

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Margaret Wheatley, PhD (*University of Toronto*) School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor. Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

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John M. Reid, PhD (*University of Pennsylvania*) Calhoun Professor Emeritus. Professor Emeritus. Diagnostic ultrasound, wave propagation and scattering in inhomogeneous media, imaging, instrumentation.

Hun H. Sun, PhD (*Cornell University*). Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Biomedical Informatics Concentration

Major: Biomedical Engineering: Biomechanics Informatics Concentration
Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 203.5

Classification of Instructional Programs (CIP) code: 14.0501

Standard Occupational Classification (SOC) code: 17-2031

About the Program

The biomedical informatics concentration focuses on the management, analysis and visualization of data that is generated in molecular and cellular biology, genomics and other areas of biology and biomedicine. Students are trained in the development of useful computational models of living systems and novel informatics technologies in life sciences.

Bioinformatics is an emerging field of science that is concerned with the management, analysis and visualization of the flood of data being generated in molecular and cellular biology, genomics and other areas of biology and biomedicine. The field of bioinformatics enables information at the gene, protein, cell, tissue, organ, and system level to be integrated and interpreted for early detection, accurate diagnosis, and effective treatment of complex diseases such as cancer.

The biomedical informatics concentration includes courses in biology, computer science, and information technology. The concentration introduces information handling systems for people in the allied health professions, with specific examples drawn from health care and covers locating, manipulating, and displaying information in the health system setting. Students are also introduced to the mathematical and computational analysis of biological systems. The systems analyzed include the genome, protein and gene networks, cell division cycles, and cellular level disease. Mathematical tools include matrix algebra, differential equations, cellular automata, and cluster analysis.

Upon graduation, students will be able to:

- select, access and integrate bioinformatics related databases for applications in genomics and proteomics;
- apply biostatistical techniques to analyze high-throughput data for genotyping, gene expression and proteomics data;
- develop and evaluate computational models to describe and simulate gene regulatory, protein and metabolic networks.

The School maintains extensive facilities and laboratories devoted to areas of research. Visit the School's BIOMED Research Facilities and Laboratory Map (<http://www.biomed.drexel.edu/new04/Content/research/facilities>) page for more details about the laboratories and equipment available.

For more information about this concentration, see Drexel's School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu/new04>) website.

Degree Requirements

General Education Requirements

HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	BMES 315	Experimental Design in Biomedical Research	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	BMES 375	Computational Bioengineering	4.0
CIVC 101	Introduction to Civic Engagement	1.0	BMES 401	Biosensors I	4.0
UNIV R101	The Drexel Experience	1.0	BMES 483	Quantitative Systems Biology	4.5
General Studies Electives (5)		15.0	BMES 484	Genome Information Engineering	4.5
Engineering Core Courses					
MATH 121	Calculus I	4.0	CS 171	Computer Programming I	3.0
MATH 122	Calculus II	4.0	CS 172	Computer Programming II	3.0
MATH 200	Multivariate Calculus	4.0	CS 260	Data Structures	3.0
PHYS 101	Fundamentals of Physics I	4.0	CS 265	Advanced Programming Tools and Techniques	3.0
PHYS 102	Fundamentals of Physics II	4.0	INFO 110	Human-Computer Interaction I	3.0
PHYS 201	Fundamentals of Physics III	4.0	INFO 200	Systems Analysis I	3.0
CHEM 101	General Chemistry I	3.5	INFO 210	Database Management Systems	3.0
CHEM 102	General Chemistry II	4.5	Laboratory Requirement: Choose 2 of		4.0
BIO 122	Cells and Genetics	4.5	BMES 301	Laboratory I: Experimental Biomechanics	
ENGR 100	Beginning Computer Aided Drafting for Design	1.0	BMES 304	Laboratory IV: Ultrasound Images	
ENGR 101	Engineering Design Laboratory I	2.0	BIO 202	Human Physiology Laboratory	
ENGR 102	Engineering Design Laboratory II	2.0	BIO 219 [WI	Techniques in Molecular Biology	
ENGR 103	Engineering Design Laboratory III	2.0	(p. 405)]		
ENGR 121	Computation Lab I	2.0	CHEM 244	Organic Chemistry Laboratory I	
ENGR 122	Computation Lab II	1.0	CHEM 245	Organic Chemistry Laboratory II	
ENGR 210	Introduction to Thermodynamics	3.0	Bioinformatics concentration electives (2)		6.0
ENGR 220	Fundamentals of Materials	4.0	Suggested Bioinformatics Electives		
ENGR 231	Linear Engineering Systems	3.0	BMES 335	Biomedical Informatics I	
ENGR 232	Dynamic Engineering Systems	3.0	BMES 336	Biomedical Informatics II: Hospital and Patient Information	
MEM 202	Statics	3.0	Total Credits 203.5		
Required Biomedical Engineering Courses					
BIO 201	Human Physiology I	4.0	Sample Plan of Study		
BIO 203	Human Physiology II	4.0	Term 1		Credits
BMES 124	Biomedical Engineering Freshman Seminar I	1.0	BMES 124	Biomedical Engineering Freshman Seminar I	1.0
BMES 126	Biomedical Engineering Freshman Seminar II	1.0	CHEM 101	General Chemistry I	3.5
BMES 130	Problem Solving in Biomedical Engineering	2.0	ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0	ENGR 100	Beginning Computer Aided Drafting for Design	1.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0	ENGR 101	Engineering Design Laboratory I	2.0
BMES 212	The Body Synthetic	3.0	ENGR 121	Computation Lab I	2.0
BMES 302	Laboratory II: Biomeasurements	2.0	MATH 121	Calculus I	4.0
BMES 303	Laboratory III: Biomedical Electronics	2.0	CIVC 101	Introduction to Civic Engagement	1.0
BMES 310	Biomedical Statistics	4.0	UNIV R101	The Drexel Experience	1.0
BMES 325	Principles of Biomedical Engineering I	3.0	Term Credits 18.5		
BMES 326	Principles of Biomedical Engineering II	3.0	Term 2		
BMES 338	Biomedical Ethics and Law	3.0	BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 372	Biosimulation	3.0	CHEM 102	General Chemistry II	4.5
BMES 381	Junior Design Seminar I	2.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
BMES 382	Junior Design Seminar II	2.0	ENGR 102	Engineering Design Laboratory II	2.0
BMES 491 [WI	Senior Design Project I	3.0	ENGR 122	Computation Lab II	1.0
(p. 405)]			MATH 122	Calculus II	4.0
BMES 492	Senior Design Project II	2.0	PHYS 101	Fundamentals of Physics I	4.0
BMES 493	Senior Design Project III	3.0	Term Credits 19.5		
ECE 201	Foundations of Electric Circuits	3.0	Term 3		
Biomedical Informatics Concentration Courses					
BIO 218	Principles of Molecular Biology	4.0	BIO 122	Cells and Genetics	4.5

BMES 130	Problem Solving in Biomedical Engineering	2.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0

Term Credits **19.5**

Term 4

BIO 201	Human Physiology I	4.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0

Term Credits **18.0**

Term 5

BIO 203	Human Physiology II	4.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0

Term Credits **19.0**

Term 6

BIO 218	Principles of Molecular Biology	4.0
BIO 219 [WI (p. 405)]	Techniques in Molecular Biology (Laboratory Requirement)	3.0
BMES 325	Principles of Biomedical Engineering I	3.0
BMES 372	Biosimulation	3.0
CS 171	Computer Programming I	3.0
ECE 201	Foundations of Electric Circuits	3.0

Term Credits **19.0**

Term 7

BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 326	Principles of Biomedical Engineering II	3.0
CS 172	Computer Programming II	3.0
INFO 110	Human-Computer Interaction I	3.0

Term Credits **15.0**

Term 8

BMES 302	Laboratory II: Biomeasurements	2.0
BMES 304	Laboratory IV: Ultrasound Images (Laboratory Requirement)	2.0
BMES 315	Experimental Design in Biomedical Research	4.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 381	Junior Design Seminar I	2.0
CS 265	Advanced Programming Tools and Techniques	3.0
INFO 200	Systems Analysis I	3.0

Term Credits **19.0**

Term 9

BMES 375	Computational Bioengineering	4.0
BMES 382	Junior Design Seminar II	2.0
CS 260	Data Structures	3.0

INFO 210	Database Management Systems	3.0
General Studies Elective		3.0

Term Credits **15.0**

Term 10

BMES 401	Biosensors I	4.0
BMES 491 [WI (p. 405)]	Senior Design Project I	3.0
HIST 285	Technology in Historical Perspective	3.0
Biomedical Informatics Concentration Elective (See degree requirements)		3.0
General Studies Elective		3.0

Term Credits **16.0**

Term 11

BMES 483	Quantitative Systems Biology	4.5
BMES 492	Senior Design Project II	2.0
Biomedical Informatics Concentration Elective (See degree requirements)		3.0
General Studies Elective		3.0

Term Credits **12.5**

Term 12

BMES 484	Genome Information Engineering	4.5
BMES 493	Senior Design Project III	3.0
General Studies Electives (2)		6.0

Term Credits **13.5**

Total Credit: 204.5

Opportunities

Metropolitan Philadelphia has one of the highest concentrations of medical institutions and pharmaceutical and biotechnology industries in the nation. The bachelor of science degree in biomedical engineering gives students access to a broad spectrum of career opportunities in medical device and equipment industry; prosthetics and assist devices industry; biomaterials and implants industry; and the telemedicine, pharmaceutical, biotechnology, and agricultural sectors.

Biomedical engineering graduates are also ideally prepared for professional education in medicine, dentistry, veterinary medicine, and law. Those who choose to pursue graduate education can aim for careers in research and development, biomedical technology innovation and transfer, as well as health care technology management.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Biomedical Engineering, Science and Health Systems Faculty

Fred D. Allen, PhD (*University of Pennsylvania*). Assistant Professor. Tissue engineering, cell engineering, orthopedics, bone remodeling, wound healing, mechanotransduction, signal transduction, adhesion, migration.

Sriram Balasubramanian, PhD (*Wayne State University*). Assistant Professor. Structural characteristics of the pediatric thoracic cage using

CT scans and developing an age-equivalent animal model for pediatric long bones.

Kenneth A. Barbee, PhD (*University of Pennsylvania*). Professor. Cellular biomechanics of neural and vascular injury, mechanotransduction in the cardiovascular system, mechanical control of growth and development for wound healing and tissue engineering.

Lin Han, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Uri Hershberg, PhD (*Hebrew University of Jerusalem, Israel*). Assistant Professor. Bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, pathogens, computational and mathematical modeling, complex systems, cognition and inflammation.

Joshua Jacobs, PhD (*University of Pennsylvania*). Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

Dov Jaron, PhD (*University of Pennsylvania*) *Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

Andres Kriete, PhD (*University in Bremen Germany*) *Associate Director for Graduate Studies and Academic Operations*. Systems biology, bioimaging, control theory, biology of aging, skin cancer.

Ryszard Lec, PhD (*University of Warsaw Engineering College*). Professor. Biomedical applications of viscoelastic, acoustoptic and ultrasonic properties of liquid and solid media.

Peter Lewin, PhD (*University of Denmark, Copenhagen-Lyngby*) *Richard B. Beard Professor, School Of Biomedical Engineering, Science & Health Systems*. Professor. Biomedical ultrasonics, piezoelectric and polymer transducers and hydrophones; shock wave sensors.

Hualou Liang, PhD (*Chinese Academy of Sciences*). Associate Professor. Neuroengineering, neuroinformatics, cognitive and computational neuroscience, neural data analysis and computational modeling, biomedical signal processing.

Donald L. McEachron, PhD (*University of California at San Diego*) *Associate Director*. Research Professor. Animal behavior, autoradiography, biological rhythms, cerebral metabolism, evolutionary theory, image processing, neuroendocrinology.

Karen Moxon, PhD (*University of Colorado*). Associate Professor. Cortico-thalamic interactions; neurobiological perspectives on design of humanoid robots.

Banu Onaral, Ph.D. (*University of Pennsylvania*) *H.H. Sun Professor / Director, School of Biomedical Engineering Science and Health Systems*. Professor. Biomedical signal processing; complexity and scaling in biomedical signals and systems.

Kambiz Pourrezaei, PhD (*Rensselaer Polytechnic University*). Professor. Thin film technology; nanotechnology; near infrared imaging; power electronics.

Arye Rosen, PhD (*Drexel University*) *Biomedical Engineering and Electrical Engineering*. Microwave components and subsystems; utilization of RF/microwaves and lasers in therapeutic medicine.

Ahmet Sacan, PhD (*Middle East Technical University*). Assistant Professor. Indexing and data mining in biological databases; protein sequence and structure; similarity search; protein structure modeling; protein-protein interaction; automated cell tracking.

Joseph J. Sarver, PhD (*Drexel University*). Teaching Professor. Neuromuscular adaptation to changes in the myo-mechanical environment.

Rahamim Seliktar, PhD (*University of Strathclyde, Glasgow*) *Vice Director, School of Biomedical Engineering, Science & Health Systems*. Professor. Limb prostheses, biomechanics of human motion, orthopedic biomechanics.

Adrian C. Shieh, PhD (*Rice University*). Assistant Professor. Contribution of mechanical forces to tumor invasion and metastasis, with a particular emphasis on how biomechanical signals may drive the invasive switch, and how the biomechanical microenvironment interacts with cytokine signaling and the extracellular matrix to influence tumor and stromal cell behavior.

Wan Young Shih, PhD (*Ohio State University*) *School of Biomedical Engineering, Science and Health Systems*. Associate Professor. Piezoelectric microcantilever biosensors development, piezoelectric finger development, quantum dots development, tissue elasticity imaging, piezoelectric microcantilever force probes.

Kara Spiller, PhD (*Drexel University*). Assistant Professor. Cell-biomaterial interactions, biomaterial design, and international engineering education.

Aydin Tozeren, PhD (*Columbia University*) *Distinguished Professor and Director, Center for Integrated Bioinformatics, School of Biomedical Engineering, Science & Health Systems*. Professor. Breast cell adhesion and communication, signal transduction networks in cancer and epithelial cells; integrated bioinformatics, molecular profiling, 3D-tumors, bioimaging.

Margaret Wheatley, PhD (*University of Toronto*) *School of Biomedical Engineering, Science and Health Systems, John M. Reid Professor*. Ultrasound contrast agent development (tumor targeting and triggered drug delivery), controlled release technology (bioactive compounds), microencapsulated allografts (*ex vivo* gene therapy) for spinal cord repair.

Yinghui Zhong, PhD (*Georgia Institute of Technology*). Assistant Professor. Spinal cord repair, and engineering neural prosthesis/brain interface using biomaterials, drug delivery, and stem cell therapy.

Interdepartmental Faculty

Douglas L. Chute, PhD (*University of Missouri*) *Louis and Bessie Stein Fellow; Faculty coordinator of ePsychology*. Professor. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Patricia A. Shewokis, PhD (*University of Georgia*). Professor. Roles of cognition and motor function during motor skill learning; role of information feedback frequency on the memory of motor skills, noninvasive neural imaging techniques of functional near infrared spectroscopy (fNIR) and electroencephalography (EEG) and methodology and research design.

Emeritus Faculty

William Freedman, PhD (*Drexel University*). Professor Emeritus. Motor control; sensory and motor systems; reflexes; eye movements; neural networks.

John M. Reid, PhD (*University of Pennsylvania*) *Calhoun Professor Emeritus*. Professor Emeritus. Diagnostic ultrasound, wave propagation and scattering in inhomogeneous media, imaging, instrumentation.

Hun H. Sun, PhD (*Cornell University*). Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Biomedical Devices and Imaging Concentration

Major: Biomedical Engineering: Biomedical Devices and Imaging Concentration

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 202.5

Classification of Instructional Programs (CIP) code: 14.0501

Standard Occupational Classification (SOC) code: 17-2031

About the Program

Biomedical imaging focuses on the theoretical and practical issues related to machine vision, image processing and analysis, and signal processing associated with such medical applications as ultrasound, optics, magnetic resonance, and autoradiographic imaging.

The concentration in biomedical devices and imaging is for those individuals interested in careers in medical imaging, medical device development, and clinical engineering. The concentration covers the fundamentals of modern imaging methodologies, covering aspects of light imaging, ultrasound imaging, and volumetric and functional imaging systems, and the principles of magnetic resonance imaging (MRI).

Upon graduation, students will be able to:

- understand the multi-disciplinary background and limitations of current and emerging instrumentation, imaging and internet technologies used in clinical, pharmaceutical and research environments;
- select and evaluate sensors and imaging modalities for specific biomedical research, diagnostic and theragnostic applications;
- analyze the performance of different systems including microscopical and medical imaging methodologies in terms of safety, resolution and the trade-offs important for a given application;
- optimize digital acquisition, enhancement, visualization and analysis of signals from biomedical instruments in multidimensions;
- understand the impact of compliance with the standards and guidelines of regulatory agencies such as FDA on the design and application of devices in clinical practice and knowledge of basic quality assurance tools.

The School maintains extensive facilities and laboratories devoted to areas of research. Visit the School's BIOMED Research Facilities and Laboratory Map (<http://www.biomed.drexel.edu/new04/Content/research/facilities>) page for more details about the laboratories and equipment available.

For more information about this concentration, see Drexel's School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu/new04>) website.

Degree Requirements

General Education Requirements

HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV R101	The Drexel Experience	1.0
General Studies Electives (5)		15.0

Engineering Core Courses

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 122	Cells and Genetics	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0

Required Biomedical Engineering Courses

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0
BMES 124	Biomedical Engineering Freshman Seminar I	1.0
BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 130	Problem Solving in Biomedical Engineering	2.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
BMES 302	Laboratory II: Biomeasurements	2.0
BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 325	Principles of Biomedical Engineering I	3.0
BMES 326	Principles of Biomedical Engineering II	3.0
BMES 338	Biomedical Ethics and Law	3.0

BMES 372	Biosimulation	3.0	BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 381	Junior Design Seminar I	2.0	CHEM 102	General Chemistry II	4.5
BMES 382	Junior Design Seminar II	2.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
BMES 491 [WI (p. 409)]	Senior Design Project I	3.0	ENGR 102	Engineering Design Laboratory II	2.0
BMES 492	Senior Design Project II	2.0	ENGR 122	Computation Lab II	1.0
BMES 493	Senior Design Project III	3.0	MATH 122	Calculus II	4.0
ECE 201	Foundations of Electric Circuits	3.0	PHYS 101	Fundamentals of Physics I	4.0
Biomedical Devices and Imaging Concentration Courses			Term Credits		
BMES 315	Experimental Design in Biomedical Research	4.0	19.5		
BMES 391	Biomedical Instrumentation I	3.0	Term 3		
BMES 392	Biomedical Instrumentation II	3.0	BIO 122	Cells and Genetics	4.5
BMES 375	Computational Bioengineering	4.0	BMES 130	Problem Solving in Biomedical Engineering	2.0
BMES 401	Biosensors I	4.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
BMES 421	Biomedical Imaging Systems I: Images	4.0	ENGR 103	Engineering Design Laboratory III	2.0
BMES 422	Biomedical Imaging Systems II: Ultrasound	4.0	MATH 200	Multivariate Calculus	4.0
BMES 423	Biomedical Imaging Systems III	4.0	PHYS 102	Fundamentals of Physics II	4.0
BMES 432	Biomedical Systems and Signals	3.0	Term Credits		
ECES 301	Transform Methods and Filtering	4.0	19.5		
ECES 303	Transform Methods II	3.0	Term 4		
ECES 304	Dynamic Systems and Stability	4.0	BIO 201	Human Physiology I	4.0
ECES 352	Introduction to Digital Signal Process	4.0	BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
Laboratory Requirement: Choose 2 of		4.0	ENGR 220	Fundamentals of Materials	4.0
BMES 301	Laboratory I: Experimental Biomechanics		ENGR 231	Linear Engineering Systems	3.0
BMES 304	Laboratory IV: Ultrasound Images		PHYS 201	Fundamentals of Physics III	4.0
BIO 202	Human Physiology Laboratory		Term Credits		
BIO 219 [WI (p. 409)]	Techniques in Molecular Biology		18.0		
CHEM 244	Organic Chemistry Laboratory I		Term 5		
CHEM 245	Organic Chemistry Laboratory II		BIO 203	Human Physiology II	4.0
Biomedical Systems and Imaging Elective			BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
Select one of the following:			BMES 212	The Body Synthetic	3.0
BMES 488	Medical Device Development		ENGR 210	Introduction to Thermodynamics	3.0
BMES 494	Clinical Practicum I		ENGR 232	Dynamic Engineering Systems	3.0
BMES 495	Clinical Practicum II		MEM 202	Statics	3.0
BMES 496	Clinical Practicum III		Term Credits		
Total Credits			19.0		
202.5			Term 6		

Sample Plan of Study

Term		Credits			
Term 1					
BMES 124	Biomedical Engineering Freshman Seminar I	1.0	BMES 301	Laboratory I: Experimental Biomechanics (Laboratory Requirement)	2.0
CHEM 101	General Chemistry I	3.5	BMES 302	Laboratory II: Biomeasurements	2.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	BMES 325	Principles of Biomedical Engineering I	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0	BMES 372	Biosimulation	3.0
ENGR 101	Engineering Design Laboratory I	2.0	ECE 201	Foundations of Electric Circuits	3.0
ENGR 121	Computation Lab I	2.0	HIST 285	Technology in Historical Perspective	3.0
MATH 121	Calculus I	4.0	Term Credits		
CIVC 101	Introduction to Civic Engagement	1.0	16.0		
UNIV R101	The Drexel Experience	1.0	Term 7		
Term Credits			BMES 303	Laboratory III: Biomedical Electronics	2.0
18.5			BMES 310	Biomedical Statistics	4.0
Term 2					
			BMES 326	Principles of Biomedical Engineering II	3.0
			ECES 301	Transform Methods and Filtering	4.0
			General Studies Elective		3.0
			Term Credits		
			16.0		
			Term 8		
			BMES 304	Laboratory IV: Ultrasound Images (Laboratory Requirement)	2.0

BMES 315	Experimental Design in Biomedical Research	4.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 381	Junior Design Seminar I	2.0
ECES 303	Transform Methods II	3.0

Term Credits **14.0**

Term 9

BMES 375	Computational Bioengineering	4.0
BMES 382	Junior Design Seminar II	2.0
ECES 304	Dynamic Systems and Stability	4.0
ECES 352	Introduction to Digital Signal Process	4.0

General Studies Elective 3.0

Term Credits **17.0**

Term 10

BMES 391	Biomedical Instrumentation I	3.0
BMES 401	Biosensors I	4.0
BMES 421	Biomedical Imaging Systems I: Images	4.0
BMES 432	Biomedical Systems and Signals	3.0
BMES 491 [WI (p. 409)]	Senior Design Project I	3.0

Term Credits **17.0**

Term 11

BMES 392	Biomedical Instrumentation II	3.0
BMES 422	Biomedical Imaging Systems II: Ultrasound	4.0
BMES 492	Senior Design Project II	2.0
General Studies Electives (2)		6.0

Term Credits **15.0**

Term 12

BMES 423	Biomedical Imaging Systems III	4.0
BMES 493	Senior Design Project III	3.0
Biomedical Devices and Imaging Concentration Elective*		3.0
General Studies Elective		3.0

Term Credits **13.0**

Total Credit: 202.5

* See degree requirements (p. 409).

Opportunities

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Emeritus Faculty

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John M. Reid, PhD (*University of Pennsylvania*) *Calhoun Professor Emeritus*. Professor Emeritus. Diagnostic ultrasound, wave propagation and scattering in inhomogeneous media, imaging, instrumentation.

Hun H. Sun, PhD (*Cornell University*). Professor Emeritus. Biological control systems, physiological modeling, systems analysis.

Neuroengineering Concentration

*Major: Biomedical Engineering: Neuroengineering Concentration
Degree Awarded: Bachelor of Science*

Calendar Type: Quarter

Total Credit Hours: 196.5 - 198.5

Classification of Instructional Programs (CIP) code: 14.0501

Standard Occupational Classification (SOC) code: 17-2031

About the Program

Bachelor of Science in Biomedical Engineering (BMES) 197.0 credits

Neuroengineering is broadly defined to include the modeling of neural and endocrine systems, neural networks, complexity in physiological systems, evolutionary influences in biological control systems, neurocontrol, neurorobotics, and neuroprosthetics.

This concentration focuses on the theory of neural signaling, as well as addressing issues that have a neuroscientific basis, such as locomotion and pattern generation, central control of movement, and the processing of sensory information. Students pursuing this concentration will learn the fundamental theory of cellular potentials and chemical signaling, the Hodgkin Huxley description of action potential generation, circuit representations of neurons and be able to derive and integrate equations describing the circuit as well as design computer models.

Upon graduation, students will be able to:

- model specific aspects of neural systems;
- understand control system theory as applied to neural systems;
- understand how neuroengineering can be applied in clinical situations.

The School maintains extensive facilities and laboratories devoted to areas of research. Visit the School's BIOMED Research Facilities and Laboratory Map (<http://www.biomed.drexel.edu/new04/Content/research/facilities>) page for more details about the laboratories and equipment available.

For more information about this concentration, see Drexel's School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu/new04>) web page.

Degree Requirements

General education requirements

HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV R101	The Drexel Experience	1.0
PSY 101	General Psychology I (required General Studies course)	3.0
General Studies Electives (4)		12.0

Engineering core courses

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 122	Cells and Genetics	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0

Required Biomedical Engineering courses

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0
BMES 124	Biomedical Engineering Freshman Seminar I	1.0
BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 130	Problem Solving in Biomedical Engineering	2.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
BMES 302	Laboratory II: Biomeasurements	2.0
BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 325	Principles of Biomedical Engineering I	3.0

BMES 326	Principles of Biomedical Engineering II	3.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 372	Biosimulation	3.0
BMES 381	Junior Design Seminar I	2.0
BMES 382	Junior Design Seminar II	2.0
BMES 491 [WI (p. 412)]	Senior Design Project I	3.0
BMES 492	Senior Design Project II	2.0
BMES 493	Senior Design Project III	3.0
ECE 201	Foundations of Electric Circuits	3.0

Neuroengineering concentration courses

BIO 462	Biology of Neuron Function	3.0
BMES 375	Computational Bioengineering	4.0
BMES 401	Biosensors I	4.0
BMES 405	Physiological Control Systems	3.0
BMES 411	Chronoengineering I: Biological Rhythms in Health and Performance	3.0
BMES 430	Neural Aspects of Posture and Locomotion	3.0
BMES 451	Transport Phenomena in Living Systems	4.0
BMES 477	Neuroengineering I: Neural Signals	3.0
BMES 478	Neuroengineering II: Principles of Neuroengineering	3.0
ECES 301	Transform Methods and Filtering	4.0
ECES 304	Dynamic Systems and Stability	4.0
ECES 356	Theory of Control	4.0
PSY 213	Sensation and Perception	3.0
Laboratory Requirement: Choose 2 of		4.0-6.0
BMES 301	Laboratory I: Experimental Biomechanics	
BMES 304	Laboratory IV: Ultrasound Images	
BMES 305	Laboratory V: Musculoskeletal Anatomy for Biomedical Engineers	
BIO 202	Human Physiology Laboratory	
BIO 219 [WI (p. 412)]	Techniques in Molecular Biology	
CHEM 244	Organic Chemistry Laboratory I	
CHEM 245	Organic Chemistry Laboratory II	

Total Credits 196.5-198.5

Sample Plan of Study

Term 1		Credits
BMES 124	Biomedical Engineering Freshman Seminar I	1.0
CHEM 101	General Chemistry I	3.5
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 121	Computation Lab I	2.0
MATH 121	Calculus I	4.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV R101	The Drexel Experience	1.0
Term Credits		18.5
Term 2		Credits
BMES 126	Biomedical Engineering Freshman Seminar II	1.0

CHEM 102	General Chemistry II	4.5
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 122	Computation Lab II	1.0
MATH 122	Calculus II	4.0
PHYS 101	Fundamentals of Physics I	4.0
Term Credits		19.5
Term 3		
BIO 122	Cells and Genetics	4.5
BMES 130	Problem Solving in Biomedical Engineering	2.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGR 103	Engineering Design Laboratory III	2.0
MATH 200	Multivariate Calculus	4.0
PHYS 102	Fundamentals of Physics II	4.0
Term Credits		19.5
Term 4		
BIO 201	Human Physiology I	4.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
PHYS 201	Fundamentals of Physics III	4.0
Term Credits		18.0
Term 5		
BIO 203	Human Physiology II	4.0
BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
BMES 212	The Body Synthetic	3.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0
Term Credits		19.0
Term 6		
BMES 301	Laboratory I: Experimental Biomechanics (Laboratory Requirement)	2.0
BMES 302	Laboratory II: Biomeasurements	2.0
BMES 325	Principles of Biomedical Engineering I	3.0
BMES 372	Biosimulation	3.0
ECE 201	Foundations of Electric Circuits	3.0
Term Credits		13.0
Term 7		
BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 326	Principles of Biomedical Engineering II	3.0
ECES 301	Transform Methods and Filtering	4.0
General Studies Elective		3.0
Term Credits		16.0
Term 8		
BMES 338	Biomedical Ethics and Law	3.0
BMES 381	Junior Design Seminar I	2.0
BMES 411	Chronoengineering I: Biological Rhythms in Health and Performance	3.0

PSY 101	General Psychology I	3.0
HIST 285	Technology in Historical Perspective	3.0
Term Credits		14.0
Term 9		
BMES 375	Computational Bioengineering	4.0
BMES 382	Junior Design Seminar II	2.0
BMES 451	Transport Phenomena in Living Systems	4.0
ECES 304	Dynamic Systems and Stability	4.0
PSY 213	Sensation and Perception	3.0
Term Credits		17.0
Term 10		
BIO 462	Biology of Neuron Function	3.0
BMES 401	Biosensors I	4.0
BMES 430	Neural Aspects of Posture and Locomotion	3.0
BMES 491 [WI (p. 412)]	Senior Design Project I	3.0
ECES 356	Theory of Control	4.0
Term Credits		17.0
Term 11		
BMES 305	Laboratory V: Musculoskeletal Anatomy for Biomedical Engineers (Laboratory Requirement)	2.0
BMES 405	Physiological Control Systems	3.0
BMES 477	Neuroengineering I: Neural Signals	3.0
BMES 492	Senior Design Project II	2.0
General Studies Elective		3.0
Term Credits		13.0
Term 12		
BMES 478	Neuroengineering II: Principles of Neuroengineering	3.0
BMES 493	Senior Design Project III	3.0
General Studies Electives (2)		6.0
Term Credits		12.0

Total Credit: 196.5

Opportunities

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Biomedical engineering graduates are also ideally prepared for professional education in medicine, dentistry, veterinary medicine, and law. Those who choose to pursue graduate education can aim for careers in research and development, biomedical technology innovation and transfer, as well as health care technology management.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

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Lin Han, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Nanoscale structure-property relationships of biological materials, genetic and molecular origins soft joint tissue diseases, biomaterials under extreme conditions, coupling between stimulus-responsiveness and geometry.

Uri Hershberg, PhD (*Hebrew University of Jerusalem, Israel*). Assistant Professor. Bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, pathogens, computational and mathematical modeling, complex systems, cognition and inflammation.

Joshua Jacobs, PhD (*University of Pennsylvania*). Assistant Professor. Neuroengineering, electrocorticography (ECoG), electroencephalography (EEG), single-neuron spiking, brain oscillations, episodic memory, working memory, spatial navigation, conceptual representations.

Dov Jaron, PhD (*University of Pennsylvania*) *Calhoun Distinguished Professor of Engineering in Medicine*. Professor. Mathematical, computer and electromechanical simulations of the cardiovascular system.

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Biomedical Devices and Imaging Concentration

Major: Biomedical Engineering: Biomedical Devices and Imaging Concentration

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 202.5

Classification of Instructional Programs (CIP) code: 14.0501

Standard Occupational Classification (SOC) code: 17-2031

About the Program

Biomedical imaging focuses on the theoretical and practical issues related to machine vision, image processing and analysis, and signal processing associated with such medical applications as ultrasound, optics, magnetic resonance, and autoradiographic imaging.

The concentration in biomedical devices and imaging is for those individuals interested in careers in medical imaging, medical device development, and clinical engineering. The concentration covers the fundamentals of modern imaging methodologies, covering aspects of light imaging, ultrasound imaging, and volumetric and functional imaging systems, and the principles of magnetic resonance imaging (MRI).

Upon graduation, students will be able to:

- understand the multi-disciplinary background and limitations of current and emerging instrumentation, imaging and internet technologies used in clinical, pharmaceutical and research environments;
- select and evaluate sensors and imaging modalities for specific biomedical research, diagnostic and therapeutic applications;
- analyze the performance of different systems including microscopical and medical imaging methodologies in terms of safety, resolution and the trade-offs important for a given application;
- optimize digital acquisition, enhancement, visualization and analysis of signals from biomedical instruments in multidimensions;

- understand the impact of compliance with the standards and guidelines of regulatory agencies such as FDA on the design and application of devices in clinical practice and knowledge of basic quality assurance tools.

The School maintains extensive facilities and laboratories devoted to areas of research. Visit the School's BIOMED Research Facilities and Laboratory Map (<http://www.biomed.drexel.edu/new04/Content/research/facilities>) page for more details about the laboratories and equipment available.

For more information about this concentration, see Drexel's School of Biomedical Engineering, Science, and Health Systems (<http://www.biomed.drexel.edu/new04>) website.

Degree Requirements

General Education Requirements

HIST 285	Technology in Historical Perspective	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV R101	The Drexel Experience	1.0
General Studies Electives (5)		15.0

Engineering Core Courses

MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 200	Multivariate Calculus	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
BIO 122	Cells and Genetics	4.5
ENGR 100	Beginning Computer Aided Drafting for Design	1.0
ENGR 101	Engineering Design Laboratory I	2.0
ENGR 102	Engineering Design Laboratory II	2.0
ENGR 103	Engineering Design Laboratory III	2.0
ENGR 121	Computation Lab I	2.0
ENGR 122	Computation Lab II	1.0
ENGR 210	Introduction to Thermodynamics	3.0
ENGR 220	Fundamentals of Materials	4.0
ENGR 231	Linear Engineering Systems	3.0
ENGR 232	Dynamic Engineering Systems	3.0
MEM 202	Statics	3.0

Required Biomedical Engineering Courses

BIO 201	Human Physiology I	4.0
BIO 203	Human Physiology II	4.0
BMES 124	Biomedical Engineering Freshman Seminar I	1.0
BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 130	Problem Solving in Biomedical Engineering	2.0
BMES 201	Programming and Modeling for Biomedical Engineers I	3.0

BMES 202	Programming and Modeling for Biomedical Engineers II	3.0	ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
BMES 212	The Body Synthetic	3.0	ENGR 100	Beginning Computer Aided Drafting for Design	1.0
BMES 302	Laboratory II: Biomeasurements	2.0	ENGR 101	Engineering Design Laboratory I	2.0
BMES 303	Laboratory III: Biomedical Electronics	2.0	ENGR 121	Computation Lab I	2.0
BMES 310	Biomedical Statistics	4.0	MATH 121	Calculus I	4.0
BMES 325	Principles of Biomedical Engineering I	3.0	CIVC 101	Introduction to Civic Engagement	1.0
BMES 326	Principles of Biomedical Engineering II	3.0	UNIV R101	The Drexel Experience	1.0
BMES 338	Biomedical Ethics and Law	3.0	Term Credits		18.5
BMES 372	Biosimulation	3.0	Term 2		
BMES 381	Junior Design Seminar I	2.0	BMES 126	Biomedical Engineering Freshman Seminar II	1.0
BMES 382	Junior Design Seminar II	2.0	CHEM 102	General Chemistry II	4.5
BMES 491 [WI (p. 409)]	Senior Design Project I	3.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
BMES 492	Senior Design Project II	2.0	ENGR 102	Engineering Design Laboratory II	2.0
BMES 493	Senior Design Project III	3.0	ENGR 122	Computation Lab II	1.0
ECE 201	Foundations of Electric Circuits	3.0	MATH 122	Calculus II	4.0
Biomedical Devices and Imaging Concentration Courses			PHYS 101	Fundamentals of Physics I	4.0
BMES 315	Experimental Design in Biomedical Research	4.0	Term Credits		19.5
BMES 391	Biomedical Instrumentation I	3.0	Term 3		
BMES 392	Biomedical Instrumentation II	3.0	BIO 122	Cells and Genetics	4.5
BMES 375	Computational Bioengineering	4.0	BMES 130	Problem Solving in Biomedical Engineering	2.0
BMES 401	Biosensors I	4.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
BMES 421	Biomedical Imaging Systems I: Images	4.0	ENGR 103	Engineering Design Laboratory III	2.0
BMES 422	Biomedical Imaging Systems II: Ultrasound	4.0	MATH 200	Multivariate Calculus	4.0
BMES 423	Biomedical Imaging Systems III	4.0	PHYS 102	Fundamentals of Physics II	4.0
BMES 432	Biomedical Systems and Signals	3.0	Term Credits		19.5
ECES 301	Transform Methods and Filtering	4.0	Term 4		
ECES 303	Transform Methods II	3.0	BIO 201	Human Physiology I	4.0
ECES 304	Dynamic Systems and Stability	4.0	BMES 201	Programming and Modeling for Biomedical Engineers I	3.0
ECES 352	Introduction to Digital Signal Process	4.0	ENGR 220	Fundamentals of Materials	4.0
Laboratory Requirement: Choose 2 of		4.0	ENGR 231	Linear Engineering Systems	3.0
BMES 301	Laboratory I: Experimental Biomechanics		PHYS 201	Fundamentals of Physics III	4.0
BMES 304	Laboratory IV: Ultrasound Images		Term Credits		18.0
BIO 202	Human Physiology Laboratory		Term 5		
BIO 219 [WI (p. 409)]	Techniques in Molecular Biology		BIO 203	Human Physiology II	4.0
CHEM 244	Organic Chemistry Laboratory I		BMES 202	Programming and Modeling for Biomedical Engineers II	3.0
CHEM 245	Organic Chemistry Laboratory II		BMES 212	The Body Synthetic	3.0
Biomedical Systems and Imaging Elective			ENGR 210	Introduction to Thermodynamics	3.0
Select one of the following:			ENGR 232	Dynamic Engineering Systems	3.0
BMES 488	Medical Device Development		MEM 202	Statics	3.0
BMES 494	Clinical Practicum I		Term Credits		19.0
BMES 495	Clinical Practicum II		Term 6		
BMES 496	Clinical Practicum III		BMES 301	Laboratory I: Experimental Biomechanics (Laboratory Requirement)	2.0
Total Credits		202.5	BMES 302	Laboratory II: Biomeasurements	2.0
Sample Plan of Study			BMES 325	Principles of Biomedical Engineering I	3.0
Term 1			BMES 372	Biosimulation	3.0
BMES 124	Biomedical Engineering Freshman Seminar I	1.0	ECE 201	Foundations of Electric Circuits	3.0
CHEM 101	General Chemistry I	3.5	HIST 285	Technology in Historical Perspective	3.0
			Term Credits		16.0

Term 7		
BMES 303	Laboratory III: Biomedical Electronics	2.0
BMES 310	Biomedical Statistics	4.0
BMES 326	Principles of Biomedical Engineering II	3.0
ECES 301	Transform Methods and Filtering	4.0
General Studies Elective		3.0
Term Credits		16.0
Term 8		
BMES 304	Laboratory IV: Ultrasound Images (Laboratory Requirement)	2.0
BMES 315	Experimental Design in Biomedical Research	4.0
BMES 338	Biomedical Ethics and Law	3.0
BMES 381	Junior Design Seminar I	2.0
ECES 303	Transform Methods II	3.0
Term Credits		14.0
Term 9		
BMES 375	Computational Bioengineering	4.0
BMES 382	Junior Design Seminar II	2.0
ECES 304	Dynamic Systems and Stability	4.0
ECES 352	Introduction to Digital Signal Process	4.0
General Studies Elective		3.0
Term Credits		17.0
Term 10		
BMES 391	Biomedical Instrumentation I	3.0
BMES 401	Biosensors I	4.0
BMES 421	Biomedical Imaging Systems I: Images	4.0
BMES 432	Biomedical Systems and Signals	3.0
BMES 491 [WI (p. 409)]	Senior Design Project I	3.0
Term Credits		17.0
Term 11		
BMES 392	Biomedical Instrumentation II	3.0
BMES 422	Biomedical Imaging Systems II: Ultrasound	4.0
BMES 492	Senior Design Project II	2.0
General Studies Electives (2)		6.0
Term Credits		15.0
Term 12		
BMES 423	Biomedical Imaging Systems III	4.0
BMES 493	Senior Design Project III	3.0
Biomedical Devices and Imaging Concentration Elective *		3.0
General Studies Elective		3.0
Term Credits		13.0
Total Credit: 202.5		

* See degree requirements (p. 409).

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School of Education

The School of Education offers Pennsylvania Department of Education-approved programs to certify students who want to become teachers. Undergraduate students have the option to choose from a variety of traditional full-time and non-traditional part-time on-campus and online programs. These programs are designed to meet the needs of a variety of diverse learners who wish to pursue a bachelor's degree and Pennsylvania State Certification in elementary (grades PreK-4), middle level (grades 4-8) and/or secondary (grades 7-9).

School of Education undergraduate students have the option to choose from the following program options: BS on-campus (full or part-time) taking day or evening courses, or the part-time Online BS Degree completion program. In addition, any Drexel non-education undergraduate student who is interested in becoming a teacher has the option to enroll in either the BS/MS or BA/MS Dual Degree programs (4 or 5 year options) regardless of their major.

The School of Education (<http://www.drexel.edu/soe>) seeks to enrich knowledge and practice related to lifespan learning, based on the most current and appropriate research and practice. Our goal is to improve human understanding through programs and activities that emphasize creative uses of human effort, technology, leadership, and problem solving.

Majors

- Elementary Education (p. 423)
 - PK-4 (p. 425)
 - PK-4 Special Education (p. 427)
 - Middle Level Math and English (p. 429)
 - Middle Level Science and Math (p. 431)
 - Middle Level Science and English (p. 433)
- Learning, Culture and Technology (p. 435)
- Teacher Education (p. 438)
 - Biology (p. 439)
 - Chemistry (p. 442)
 - Earth and Space Science (p. 445)
 - English (p. 448)
 - Environmental Education (p. 451)
 - General Science (p. 454)
 - Mathematics (p. 457)
 - Physics (p. 460)
 - Social Studies (p. 463)

Minor

- Education (p. 466)
- STEM Education (p. 466)

Certificates

- Creativity and Innovation (p. 467)

About the Curriculum

The School of Education's programs apply the most updated trends in theory, instruction, and leadership, with an emphasis on effective teaching integrating the sciences, enhancing teaching by using technology, two

central components of every Drexel Education. In addition, this is the only such program in the country to incorporate a six-month paid internship in industry related to the student's area of certification or individual interest.

Certification for classroom instruction is organized according to the two majors, the BS in Elementary Education and the BS in Secondary Education. Below is a list of all certification areas currently offered by the School of Education.

- Elementary education
 - Elementary: PK-4
 - Elementary: PK-4 and Special Education
 - Middle Level Math and English
 - Middle Level Science and English
 - Middle Level Science and Math
- Secondary education (grades 7-12)
 - Biology
 - Chemistry
 - Earth and Space Science
 - English
 - General Science
 - Mathematics
 - Physics
 - Social Studies
 - Environmental Education (grades K-12)

Students may acquire certification in more than one subject area.

The School of Education uses university-wide resources to prepare fully qualified teachers at both the elementary and secondary levels. The Teacher Education Program at Drexel University is closely aligned with National INTASC Teaching Standards as well as the Pennsylvania Department of Education's Four Domains for Professional Teaching. In addition, the Teacher Ed Program has identified seven **Program Outcomes**, which identify the specific qualities that set the Drexel Teacher Candidate apart from other candidates in the field. These program outcomes are directly aligned with the Drexel University Student Learning Priorities (DSLPP). It is expected that students exiting the Teacher Education Program at Drexel University will exhibit these seven standards in his/her professional teaching practice.

Program Outcomes:

1. The teacher candidate demonstrates independent and creative academic leadership skills that can be applied in the classroom, school community and the profession.
2. The teacher candidate understands the changing role of the educator in an increasingly diverse society, and applies this understanding in the classroom, school community and profession.
3. The teacher candidate holds a global perspective on current issues in education, understands best pedagogical practices, and utilizes this knowledge in the classroom, school community and profession.
4. The teacher candidate recognizes the importance of the application of educational research as a tool to explore critical aspects of teaching and learning in PK-12 setting.

5. The teacher candidate demonstrates a strong academic background in all subject areas that meet PDE content requirements, with strong emphasis on mathematics and science.

6. The teacher candidate can effectively integrate tools of technology in curriculum, assessment and instruction to enhance PK-12 student learning.

7. The teacher candidate demonstrates the ability to reflect upon one's professional practice through the successful completion of course work and engagement in experiential learning to promote positive, transformative change within the profession.

Pennsylvania Instructional I Teaching Certifications

There are multiple ways for Drexel University students to obtain their initial and add-on teaching certifications in Pennsylvania while pursuing their current major at Drexel. Education majors have the opportunity to achieve these certifications through the Bachelors of Science Education program, the BS/MS dual degree, the graduate level Post-baccalaureate (PBC) and Masters (MS) in Teaching Learning and Curriculum programs.

Non-teaching education majors may have the opportunity to build teacher certification into their program of study as electives, depending on their major. Those students who cannot manage the whole certification program may opt to participate in the (non-certification) education minor. Undergraduate students also have the option to enroll in as many content courses as can be managed in their undergraduate degree and then finish their teaching certification requirements through the Post-baccalaureate Teaching Certification or Masters in Teaching Learning and Curriculum programs. Additionally, undergraduate non-education majors can pursue a Master's degree in Teaching, Learning, and Curriculum with Teaching Certification through the BA/MS or BS/MS dual degree route while in their current major provided they meet and maintain the program's minimum criteria of a 3.0 cumulative GPA requirement and have completed no more than 90-120 credits at Drexel at the time of applying for the dual degree program.

*Please note that during a Drexel student's senior year, undergraduate students have the option to take up to and including 9 graduate credits in core pedagogy education courses that can be applied to a future graduate level Post-baccalaureate Teacher Certification or MS degree program at Drexel provided that these graduate credits are not required for UG degree completion and the student received a minimum grade of a "B" in those graduate courses.

Please be advised that the Pennsylvania Department of Education requires that all teacher certification candidates must maintain a 3.0 GPA in their degree or certification program in order to be recommended for state certification.

Combination certifications are available from the School of Education. Sample combinations include:

- Grades PreK-4 certification, with certification in Special Education.
- Biology certification, with courses for additional certification in chemistry.
- Chemistry certification, with courses for additional certification in biology.
- Earth and space science certification, with courses for additional certification in chemistry.
- Earth and space science certification, with courses for additional certification in physics.

- Mathematics certification, with courses for additional certification in physics.
- Physics certification, with courses for additional certification in mathematics.

Students pursuing the appropriate majors in the College of Arts and Sciences may also complete the requirements for certification within their area of study.

For more information, please contact the Program Manager or the School of Education at 215.895.6770.

Post-Graduate Opportunities

Students obtain employment in the School District of Philadelphia and neighboring school districts in Pennsylvania and such surrounding states as New Jersey, Delaware, Ohio, and New York. Often, students begin a graduate degree program in combination with their employment.

Writing-Intensive Course Requirements

In order to graduate, all students must pass three writing-intensive courses after their freshman year. Two writing-intensive courses must be in a student's major. The third can be in any discipline. Students are advised to take one writing-intensive class each year, beginning with the sophomore year, and to avoid "clustering" these courses near the end of their matriculation. Transfer students need to meet with an academic advisor to review the number of writing-intensive courses required to graduate.

A "WI" next to a course in this catalog may indicate that this course can fulfill a writing-intensive requirement. For the most up-to-date list of writing-intensive courses being offered, students should check the Writing Intensive Course List on the Drexel University Writing Center page. Students scheduling their courses in Banner/DrexelOne can also conduct a search for courses with the attribute "WI" to bring up a list of all writing-intensive courses available that term.

Cooperative Education

Drexel University has long been known for its co-operative education program, through which students combine periods of full-time, career-related employment with their studies. Internship employment is a requirement for all teacher education majors.

The BS degree is completed in four years. In addition to the Pennsylvania Department of Education's (PDE) state mandated field experiences and 12 week student teaching, this program includes one six-month internship period of full-time employment related to the student's initial area of teacher certification. The goal of the co-op program in teacher education is to provide real-world experiences for future teachers to use in their classrooms.

Students typically participate in co-ops during their fall and winter terms of their sophomore year and pursue varied positions geared directly to their area(s) of certification. Candidates are asked to pursue a position that would allow them to see other areas of education that reach beyond K-12 teaching. This caveat to the requirement allows candidates to understand the broadness and extensive nature of the field of education both nationally and internationally.

Students have interned in a variety of institutions or museums such as the Philadelphia School District, the Philadelphia's Please Touch Museum, Drexel's Academy of Natural Science (<http://www.ansp.org>) Museum (<http://www.ansp.org>), the Philadelphia Dream Academy, Children's

Hospital of Philadelphia, and the Franklin Institute Science Museum just to name a few.

While the BS/MS 5 year dual degree program offers both a co-op, PA state mandated field experiences and student teaching, the BS/MS 4 year dual degree program only requires the PA state mandated field experiences and student teaching, not a co-op experience.

Facilities

The Drexel Center for the Prevention of School-aged Violence (http://goodwin.drexel.edu/centers_posav.php) is located within the School of Education at Drexel University, 3141 Chestnut Street, Philadelphia, PA 19104. The mission of the center is to create public awareness around the need for youth-focused, evidence-based efforts aimed at preventing youth violence from occurring in environments where youth grow, learn, and recreate.

Our vision is to help ensure that all youth possess the requisite social and cognitive skills to prevent violence on their own, which includes developing conflict resolution and mediation skills. We also strive to inform policy leaders and stakeholders of the various types of evidence-based activities that prevent school-aged violence.

The Math Forum is a leading center for mathematics and mathematics education on the Internet. Operating under Drexel's School of Education, our mission is to provide resources, materials, activities, person-to-person interactions, and educational products and services that enrich and support teaching and learning in an increasingly technological world.

For more information about these and other School of Education centers, visit the Centers of Goodwin College (<http://goodwin.drexel.edu/centers.php>) website.

Education Faculty

W. Edward Bureau, PhD (*University of Pennsylvania*) *Director of the Sacramento EdD*. Clinical Associate Professor. Leadership, supervision, and capacity development.

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Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Elementary Education

Major: Elementary Education

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 180.0 - 188.5

Classification of Instructional Programs (CIP) code: 13.1202; 13.1311; 13.1316

Standard Occupational Classification (SOC) code: 25-2022

About the Program

Elementary school teachers instruct classes of children in several subjects. Often they work as part of a team with other teachers who are jointly responsible for a group of students in at least one subject.

The BS in Elementary Education uses university-wide resources to prepare fully qualified teachers at the primary education levels. Students in the School of Education participate in one six-month cooperative education (co-op) experience in a professional position related to their area of certification.

Primary teacher certification options include:

- Pre-Kindergarten - Grade 4 (p. 425)
- Pre-Kindergarten - Grade 4 & Special Education (p. 427)
- Middle Level (grades 4-8) Mathematics and English (p. 429)
- Middle Level (grades 4-8) Science and English (p. 433)

- Middle Level (grades 4-8) Science and Mathematics (p. 431)

Students may acquire certification in more than one subject area. The program requires that students have a B average (3.0 GPA) in content courses needed for teacher certification in addition to the grade of B or better in each EDUC course throughout their time in the program. These requirements must be satisfied in order for Drexel to recommend the student for teacher certification upon graduation and/or be considered to have completed the program.

A benchmark to assist students in meeting the GPA and B grade requirements is the formal review of each student's content and pedagogy coursework at the end of the sophomore year. Students who meet these requirements, as well as pass the *Pre-Professional Skills Test* (PPST Reading, PPST Writing, PPST Mathematics) of the *ETS Praxis Exams* according to Pennsylvania standards at that time, are officially accepted into Drexel's Teacher Preparation Program. Students who do not meet the requirements work with their academic advisor to develop a plan of action to work toward meeting the requirements, continue in the program to work toward the BS degree without being recommended for a teaching certificate, or explore another major.

Students participate in classroom observations and limited direct teaching experiences as a component of many of their pedagogy courses beginning in their freshman year. Students have the option of the following teacher certification/concentration tracks within their major which determines their individual program of study:

Elementary Education, Pre-Kindergarten through Grade 4: Focused study to work with children in pre-kindergarten, kindergarten, and grades 1-4 across subject areas (ages 3-9). The competencies for this concentration include child development (birth through age 5), language development, early literacy and math foundations for preschool years, early intervention, integrating the arts for the developing child and family and community partnerships.

Elementary Education, Pre-Kindergarten through Grade 4 and Special Education: Focused study to work with children in pre-kindergarten, kindergarten, and grades 1-4 across subject areas (ages 3-9) within the competencies listed previously as well as working with students with disabilities in pre-kindergarten, kindergarten and grades 1-8 (ages 3-14). The special education competencies emphasize the Response to Intervention process, working with students at risk for and with/without disabilities, progress monitoring techniques, research-based instructional practices and interventions.

Elementary Education, Middle Level: Focused study to work with students in grades 4-6 across subjects and with students in grades 7-8 in two core academic subject(s) the teacher education candidate chooses to pursue:

- Middle School Mathematics & English
- Middle School Science & English
- Middle School Science & Math

In the senior year, students who are officially accepted into the Teacher Preparation Program and maintain the GPA and grade requirements, enroll and complete the 12-week, full-time, student-teaching experience in their primary area of certification. Students must receive a grade of at least B in (and if applicable) and in all pedagogy (EDUC) coursework, as well as maintain an overall 3.0 GPA to be recommended for teacher certification.

Students who were not officially accepted into the Teacher Preparation Program and/or do not maintain the GPA and grade requirements but who are working towards the BS degree without being recommended for teacher certification take other courses as assigned by the Teacher Education Program Director and/or academic advisor to fulfill needed credits for the degree in lieu of student teaching.

Students pursuing the appropriate majors in the College of Arts and Sciences may also complete the requirements for certification within their area of study. For more information, contact the Program Coordinator for the School of Education at 215-895-6770.

Additional information is available at the School of Education's (<http://www.drexel.edu/soe>) web site.

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Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Elementary Education: PK-4

Major: Elementary Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional (CIP) code: 13.1202

Standard Occupational Classification (SOC) code: 25-2021

About the Concentration

This certification option within the BS in Elementary Education (p. 423) enables teachers to work with children in pre-kindergarten, kindergarten, and grades 1 through 4 (ages 3-9) across subject areas. Required competencies are covered in areas such as child development, language development, early literacy and math foundations for preschool years, early intervention, integrating the arts for the developing child, and family and community partnerships.

Additional Information

For more information about the program, visit the School of Education (<http://drexel.edu/soe>) website.

Degree Requirements

General Education/Content Requirements

BIO 100	Applied Cells, Genetics & Physiology	3.0
BIO 101	Applied Biological Diversity, Ecology & Evolution	3.0
CHEM 111	General Chemistry I	4.0
COM 111	Principles of Communication	3.0
COOP 101	Career Management and Professional Development	0.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENVS 260	Environmental Science and Society	3.0
HIST 276	The History of Philadelphia	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0

MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
NFS 100	Nutrition, Foods, and Health	2.0
PHYS 151	Applied Physics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 425)]	Educational Psychology	3.0
PSY 330	Cognitive Psychology	3.0
SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	2.0
English (Literature) elective course between 200-329		3.0
Free electives		15.0

Pedagogy Requirements

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 246 [WI (p. 425)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar (enroll 3 times)	3.0
EDUC 120	Child Development I: Typical Development	3.0
EDUC 121	Child Development II: Atypical Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 210	Early Language Development	3.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 236	Early Literacy I	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 425)]	Junior Pedagogy Seminar	1.0
EDUC 306	Assessment of Young Children I	3.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 314	Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 326 [WI (p. 425)]	Language Arts Processes	3.0
EDUC 335	Engaging the Learner	3.0
EDUC 336	Early Literacy II	3.0
EDUC 338	Expressive Arts for PK-4	3.0
EDUC 355	Social Studies Teaching Methods	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
EDUC 411	Family and Community Partnerships	3.0
MTED 417	Mathematics Methods and Content: Early Childhood	3.0
MTED 418	Mathematics Methods and Content	3.0

Student Teaching Experience

EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 425)]	Student Teaching	9.0

Total Credits

180.0

Elementary PK-4 Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 120	Child Development I: Typical Development	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 181	Mathematical Analysis I	3.0
PSY 101	General Psychology I	3.0
UNIV T101	The Drexel Experience	1.0
Term Credits		17.0
Term 2		
BIO 100	Applied Cells, Genetics Physiology	3.0
COM 111	Principles of Communication	3.0
COOP 001	Co-op Essentials	0.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 121	Child Development II: Atypical Development	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 182	Mathematical Analysis II	3.0
UNIV T101	The Drexel Experience	1.0
Term Credits		17.0
Term 3		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 314	Science Teaching Methods	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
Term Credits		16.0
Term 4		
BIO 101	Applied Biological Diversity, Ecology Evolution	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 236	Early Literacy I	3.0
NFS 100	Nutrition, Foods, and Health	2.0
ENGL 200 Through ENGL 329		3.0
Term Credits		15.0
Term 5		
EDUC 265	Instructing English Language Learners	3.0
EDUC 326 [WI (p. 425)]	Language Arts Processes	3.0
HIST 276	The History of Philadelphia	3.0
PHYS 151	Applied Physics	3.0
Free Elective		3.0
Term Credits		15.0

Term 6		
ECON 201	Principles of Microeconomics	4.0
EDEX 246 [WI (p. 425)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 210	Early Language Development	3.0
EDUC 216	Diversity and Today's Teacher	3.0
Term Credits		13.0
Term 7		
CHEM 111	General Chemistry I	4.0
EDUC 305 [WI (p. 425)]	Junior Pedagogy Seminar	1.0
EDUC 324	Current Research in Curriculum Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
PSY 320 [WI (p. 425)]	Educational Psychology	3.0
SOC 335	Sociology of Education	3.0
Term Credits		17.0
Term 8		
EDUC 306	Assessment of Young Children I	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 335	Engaging the Learner	3.0
EDUC 355	Social Studies Teaching Methods	3.0
ENVS 260	Environmental Science and Society	3.0
MTED 418	Mathematics Methods and Content	3.0
Term Credits		18.0
Term 9		
EDUC 336	Early Literacy II	3.0
EDUC 338	Expressive Arts for PK-4	3.0
MTED 417	Mathematics Methods and Content: Early Childhood	3.0
PSY 330	Cognitive Psychology	3.0
Free Elective		3.0
Term Credits		15.0
Term 10		
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 409	Student Teaching Seminar I	9.0
Term Credits		12.0
Term 11		
EDUC 410 [WI (p. 425)]	Student Teaching	9.0
EDUC 411	Family and Community Partnerships	3.0
Term Credits		12.0
Term 12		
EDUC 312	Educational Policy, Law Advocacy	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
Free Electives		9.0
Term Credits		13.0
Total Credit: 180.0		

Elementary Education: PK-4 and Special Education

Major: Elementary Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 183.0

Classification of Instructional Programs (CIP) code: 13.1202

Standard Occupational Classification (SOC) code: 25-2052

About the Concentration

This certification option within the BS in Elementary Education (p. 423) enables teachers to work with children in pre-kindergarten, kindergarten, and grades 1 through 4 (ages 3-9) across subject areas, with the addition of being specialized to work with students at risk for disabilities or with disabilities. As with the Elementary PK-4 certification, the program covers required competencies such as child development, language development, early literacy and math foundations for preschool years, early intervention, integration of the arts for the developing child, and family and community partnerships.

Improvements in the diagnosis of learning disabilities at earlier ages have resulted in an increase in the number of students requiring special education. This program is designed to provide the information necessary to: understand the complexities of the disabled learner's needs; modify a curriculum appropriately; provide remedial instruction; use technology to address the learner's needs/progress; manage instruction for students with special needs in the inclusive classroom; as well as additional approaches to assessment and special education teaching techniques.

Additional Information

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Degree Requirements

General Education/Content Requirements

BIO 100	Applied Cells, Genetics & Physiology	3.0
BIO 101	Applied Biological Diversity, Ecology & Evolution	3.0
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COM 111	Principles of Communication	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENVS 260	Environmental Science and Society	3.0
HIST 276	The History of Philadelphia	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
NFS 100	Nutrition, Foods, and Health	2.0
PHYS 151	Applied Physics	3.0
PSY 101	General Psychology I	3.0

PSY 320 [WI (p. 427)]	Educational Psychology	3.0
PSY 330	Cognitive Psychology	3.0
SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	2.0
English (Literature) Elective: select course between ENGL 200-329		3.0
Free Electives		3.0
Pedagogy Requirements		
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 120	Child Development I: Typical Development	3.0
EDUC 121	Child Development II: Atypical Development	3.0
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 236	Early Literacy I	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 246 [WI (p. 427)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 427)]	Junior Pedagogy Seminar	1.0
EDUC 306	Assessment of Young Children I	3.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 314	Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 326 [WI (p. 427)]	Language Arts Processes	3.0
EDUC 335	Engaging the Learner	3.0
EDUC 336	Early Literacy II	3.0
EDUC 338	Expressive Arts for PK-4	3.0
EDUC 355	Social Studies Teaching Methods	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
EDUC 411	Family and Community Partnerships	3.0
MTED 417	Mathematics Methods and Content: Early Childhood	3.0
MTED 418	Mathematics Methods and Content	3.0
Special Education Core Courses		
EDEX 347	Special Education Processes PreK-8	3.0
EDEX 348	Emotional and Behavioral Support of Individuals with Disabilities	3.0
EDEX 349	High Incident Disabilities	3.0
EDEX 350	Teaching Individuals with Low Incident Disabilities	3.0
EDEX 351	Pervasive Developmental Disorders	3.0
EDEX 352	Integrating Technology for Learning & Achievement	3.0
EDEX 353	Special Education: Methods & Practices PreK-8	3.0
Student Teaching Experience		
EDUC 409	Student Teaching Seminar I	9.0

EDEX 414 [WI Special Education Field Placement Seminar (p. 427)] 9.0

Total Credits 183.0

Elementary PK-4 and Special Education Concentration: Plan of Study

4 YR UG Co-op

Term 1

	Credits
EDUC 101 Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105 Freshman Pedagogy Seminar	1.0
EDUC 120 Child Development I: Typical Development	3.0
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 181 Mathematical Analysis I	3.0
PSY 101 General Psychology I	3.0
UNIV T101 The Drexel Experience	1.0

Term Credits 17.0

Term 2

BIO 100 Applied Cells, Genetics Physiology	3.0
COM 111 Principles of Communication	3.0
EDUC 105 Freshman Pedagogy Seminar	1.0
EDUC 121 Child Development II: Atypical Development	3.0
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 182 Mathematical Analysis II	3.0
UNIV T101 The Drexel Experience	1.0

Term Credits 17.0

Term 3

EDEX 142 Special Education Foundations: Referral and Assessment	3.0
EDUC 105 Freshman Pedagogy Seminar	1.0
EDUC 314 Science Teaching Methods	3.0
ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
MATH 183 Mathematical Analysis III	3.0
MUSC 130 Introduction to Music	3.0

Term Credits 16.0

Term 4

NFS 100 Nutrition, Foods, and Health	2.0
BIO 101 Applied Biological Diversity, Ecology Evolution	3.0
EDEX 244 Inclusionary Practices for Exceptional Students	3.0
EDUC 205 Sophomore Pedagogy Seminar	1.0
EDUC 236 Early Literacy I	3.0
ENGL 200 through ENGL 329	3.0

Term Credits 15.0

Term 5

EDUC 265 Instructing English Language Learners	3.0
EDUC 326 [WI (p. 427)] Language Arts Processes	3.0
HIST 276 The History of Philadelphia	3.0

PHYS 151 Applied Physics 3.0

Term Credits 12.0

Term 6

ECON 201 Principles of Microeconomics	4.0
EDEX 246 [WI (p. 427)] Literacy and Content Skill Development PreK-8	3.0
EDEX 347 Special Education Processes PreK-8	3.0
EDEX 349 High Incident Disabilities	3.0
EDUC 216 Diversity and Today's Teacher	3.0

Term Credits 16.0

Term 7

CHEM 111 General Chemistry I	4.0
EDEX 352 Integrating Technology for Learning Achievement	3.0
EDUC 305 [WI (p. 427)] Junior Pedagogy Seminar	1.0
EDUC 324 Current Research in Curriculum Instruction	3.0
PSY 320 [WI (p. 427)] Educational Psychology	3.0
SOC 335 Sociology of Education	3.0

Term Credits 17.0

Term 8

EDEX 348 Emotional and Behavioral Support of Individuals with Disabilities	3.0
EDUC 306 Assessment of Young Children I	3.0
EDUC 316 Teaching in Urban Contexts	3.0
EDUC 335 Engaging the Learner	3.0
EDUC 355 Social Studies Teaching Methods	3.0
MTED 418 Mathematics Methods and Content	3.0

Term Credits 18.0

Term 9

EDEX 351 Pervasive Developmental Disorders	3.0
EDUC 336 Early Literacy II	3.0
EDUC 338 Expressive Arts for PK-4	3.0
MTED 417 Mathematics Methods and Content: Early Childhood	3.0
Free Elective	3.0

Term Credits 15.0

Term 10

EDUC 308 Creating a Positive Classroom Climate	3.0
EDUC 409 Student Teaching Seminar I	9.0

Term Credits 12.0

Term 11

EDEX 350 Teaching Individuals with Low Incident Disabilities	3.0
EDEX 414 [WI (p. 427)] Special Education Field Placement Seminar	9.0

Term Credits 12.0

Term Credits 15.0

Term 12

EDEX 353 Special Education: Methods Practices PreK-8	3.0
EDUC 312 Educational Policy, Law Advocacy	3.0

EDUC 405	Senior Pedagogy Seminar	1.0
ENVS 260	Environmental Science and Society	3.0
PSY 330	Cognitive Psychology	3.0
Term Credits		13.0

Total Credit: 183.0

Elementary Education: Middle Level Math and English

Major: Elementary Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.5

Classification of Instructional (CIP) code: 13.1202

Standard Occupational Classification (SOC) code: 25-2022

About the Concentration

This certification option within the BS in Elementary Education (p. 423) enables to teachers to work with students in grades 4-6 across subjects, and with students in grades 7-8 in the core academic subjects of mathematics and English.

This program addresses the complexities of adolescent development, through discussion of theories. It explores the middle school environment, developmentally appropriate middle school programs, strategies for supporting students through the transition to middle school, and the impact of peer pressure on the middle school child.

In addition, this certification area provides: (1) training in how to effectively deliver standards-based academic math content, based on age-appropriate understanding, individual and groups needs; (2) courses devoted to teaching; age-appropriate; reading skills, how to teach and assess writing effectively, as well as a specialized course in the genre of young adult fiction.

Additional Information

For more information about the program, visit the School of Education (<http://drexel.edu/soe>) website.

Degree Requirements

General Education/Content Requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
BIO 161	General Biology I	3.0
BIO 162	General Biology II	3.0
CHEM 111	General Chemistry I	4.0
COM 111	Principles of Communication	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGL 304	Young Adult Fiction	3.0
ENVS 260	Environmental Science and Society	3.0
HIST 276	The History of Philadelphia	3.0
LING 101	Introduction to Linguistics	3.0

MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
PHYS 151	Applied Physics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 429)]	Educational Psychology	3.0
PSY 330	Cognitive Psychology	3.0
SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	2.0
Select one of the following:		3.0
HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	

Free electives 7.0

Pedagogy Requirements

EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 115	Reasoning about Numbers and Quantity (4-8)	3.0
EDUC 123	Adolescent Development	3.0
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 240	Proportional Reasoning in Middle School	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 246 [WI (p. 429)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 256	Teaching Writing Grades 4-8	3.0
EDUC 257	Content Area Reading (Grades 4-8)	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 285	Teaching Physical Science in the Middle School	3.0
EDUC 305 [WI (p. 429)]	Junior Pedagogy Seminar	1.0
EDUC 306	Assessment of Young Children I	3.0
EDUC 307	Assessment of Young Children II	4.0
EDUC 310	Computer Applications in Teaching	3.0
EDUC 314	Science Teaching Methods	3.0
EDUC 318	Math Methods & Content: Elementary	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 326 [WI (p. 429)]	Language Arts Processes	3.0
EDUC 328	Language Arts Processes 4-8	3.0
EDUC 355	Social Studies Teaching Methods	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
EDUC 416	Introduction to Math Teaching Methods (4-8)	3.0
EDUC 417	Advanced Math Teaching Methods (4-8)	3.0

EDUC 432	Algebraic Reasoning	3.0	HIST 276	The History of Philadelphia	3.0
EDUC 433	Functions in Middle School Math	3.0	PHYS 151	Applied Physics	3.0
Student Teaching Experience			Term Credits		
EDUC 410 [WI (p. 429)]	Student Teaching	9.0	Term 6		
Total Credits			ECON 201	Principles of Microeconomics	4.0
180.0			EDEX 246 [WI (p. 429)]	Literacy and Content Skill Development PreK-8	3.0

Middle Level Math and English: Plan of Study

4 YR UG Co-op Concentration /Middle Level Math & English

Term 1		Credits	Term 7		Credits
BIO 161	General Biology I	3.0	CHEM 111	General Chemistry I	4.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0	EDUC 305 [WI (p. 429)]	Junior Pedagogy Seminar	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0	EDUC 324	Current Research in Curriculum Instruction	3.0
EDUC 123	Adolescent Development	3.0	EDUC 325	Multimedia in Instructional Design	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	PSY 320 [WI (p. 429)]	Educational Psychology	3.0
MATH 181	Mathematical Analysis I	3.0	SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	1.0	Term Credits		
Term Credits			17.0		
Term 2			Term 8		
COM 111	Principles of Communication	3.0	EDUC 256	Teaching Writing Grades 4-8	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0	EDUC 306	Assessment of Young Children I	3.0
EDUC 115	Reasoning about Numbers and Quantity (4-8)	3.0	EDUC 355	Social Studies Teaching Methods	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	ENVS 260	Environmental Science and Society	3.0
MATH 182	Mathematical Analysis II	3.0	EDUC 318	Math Methods Content: Elementary	3.0
UNIV T101	The Drexel Experience	1.0	Term Credits		
Term Credits			17.0		
Term 3			Term 9		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0	EDUC 307	Assessment of Young Children II	4.0
EDUC 105	Freshman Pedagogy Seminar	1.0	EDUC 310	Computer Applications in Teaching	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	EDUC 326 [WI (p. 429)]	Language Arts Processes	3.0
LING 101	Introduction to Linguistics	3.0	EDUC 416	Introduction to Math Teaching Methods (4-8)	3.0
MATH 183	Mathematical Analysis III	3.0	EDUC 432	Algebraic Reasoning	3.0
EDUC 314	Science Teaching Methods	3.0	Term Credits		
Term Credits			16.0		
Term 4			Term 10		
BIO 162	General Biology II	3.0	EDUC 417	Advanced Math Teaching Methods (4-8)	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0	EDUC 433	Functions in Middle School Math	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0	MUSC 130	Introduction to Music	3.0
EDUC 223	Teaching the Middle School Child	3.0	NFS 100	Nutrition, Foods, and Health	2.0
EDUC 285	Teaching Physical Science in the Middle School	3.0	NFS 101	Introduction to Nutrition Food	1.0
PSY 101	General Psychology I	3.0	PSY 330	Cognitive Psychology	3.0
Term Credits			Term Credits		
16.0			15.0		
Term 5			Term 11		
EDUC 240	Proportional Reasoning in Middle School	3.0	EDUC 405	Senior Pedagogy Seminar	1.0
EDUC 265	Instructing English Language Learners	3.0	EDUC 410 [WI (p. 429)]	Student Teaching	9.0
EDUC 328	Language Arts Processes 4-8	3.0	Free Elective		3.0
Term Credits			Term Credits		
16.0			13.0		

Term 12

ARTH 101	History of Art I: Ancient to Medieval	3.0
ENGL 304	Young Adult Fiction	3.0
Select one of the following:		3.0
HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	
Free Elective		4.0
Term Credits		13.0

Total Credit: 180.0

Elementary Education: Middle Level Science and Math

*Major: Elementary Education**Degree Awarded: Bachelor of Science (BS)**Calendar Type: Quarter**Total Credit Hours: 180.0**Classification of Instructional (CIP) code: 13.1202**Standard Occupational Classification (SOC) code: 25-2022*

About the Concentration

This certification option within the BS in Elementary Education (p. 423) enables to teachers to work with students in grades 4-6 across subjects, and with students in grades 7-8 in the core academic subjects of science and mathematics.

This program addresses the complexities of adolescent development, through discussion of theories. It explores the middle school environment, developmentally appropriate middle school programs, strategies for supporting students through the transition to middle school, and the impact of peer pressure on the middle school child.

In addition, this certification area provides: (1) training in how to effectively deliver standards-based academic math content, based on age-appropriate understanding, individual and groups needs; (2) training and methodology for teaching physical and life sciences (including using an inquiry-based model of learning, developing authentic assessments, drawing upon a variety of tools, creating and maintaining a safe laboratory) as well as other skills necessary to meet the needs of diverse learners in science education.

Additional Information

For more information about the program, visit the School of Education (<http://drexel.edu/soe>) website.

Degree Requirements

General Education/Content Requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
BIO 161	General Biology I	3.0
BIO 162	General Biology II	3.0
CHEM 111	General Chemistry I	4.0
COM 111	Principles of Communication	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENVS 260	Environmental Science and Society	3.0
HIST 276	The History of Philadelphia	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
PHYS 151	Applied Physics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 431)]	Educational Psychology	3.0
PSY 330	Cognitive Psychology	3.0
SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	2.0
Select one of the following:		3.0

HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	

Free electives 13.0

Pedagogy Requirements

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 246 [WI (p. 431)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 115	Reasoning about Numbers and Quantity (4-8)	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 240	Proportional Reasoning in Middle School	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 284	Teaching Life Science in the Middle School	3.0
EDUC 285	Teaching Physical Science in the Middle School	3.0
EDUC 286	Teaching Earth & Space Science for Middle School	3.0
EDUC 292	Science Methods for Middle School	3.0
EDUC 305 [WI (p. 431)]	Junior Pedagogy Seminar	1.0
EDUC 306	Assessment of Young Children I	3.0
EDUC 307	Assessment of Young Children II	4.0
EDUC 310	Computer Applications in Teaching	3.0
EDUC 314	Science Teaching Methods	3.0
EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 318	Math Methods & Content: Elementary	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0

EDUC 355	Social Studies Teaching Methods	3.0	EDUC 240	Proportional Reasoning in Middle School	3.0
EDUC 405	Senior Pedagogy Seminar	1.0	EDUC 265	Instructing English Language Learners	3.0
EDUC 416	Introduction to Math Teaching Methods (4-8)	3.0	EDUC 284	Teaching Life Science in the Middle School	3.0
EDUC 417	Advanced Math Teaching Methods (4-8)	3.0	EDUC 285	Teaching Physical Science in the Middle School	3.0
EDUC 432	Algebraic Reasoning	3.0	PHYS 151	Applied Physics	3.0
EDUC 433	Functions in Middle School Math	3.0		Term Credits	15.0
Student Teaching Experience			Term 6		
EDUC 410 [WI (p. 431)]	Student Teaching	9.0	ECON 201	Principles of Microeconomics	4.0
			EDEX	Literacy and Content Skill Development PreK-8	3.0
			246 [WI (p. 431)]		
Total Credits		180.0	EDUC 216	Diversity and Today's Teacher	3.0
			PSY 101	General Psychology I	3.0
			Free Elective		3.0

Middle Level Science and Math Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits	Term 7		Credits
BIO 161	General Biology I	3.0	CHEM 111	General Chemistry I	4.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0	EDUC 305 [WI (p. 431)]	Junior Pedagogy Seminar	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0	EDUC 324	Current Research in Curriculum Instruction	3.0
EDUC 123	Adolescent Development	3.0	EDUC 325	Multimedia in Instructional Design	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	PSY 320 [WI (p. 431)]	Educational Psychology	3.0
MATH 181	Mathematical Analysis I	3.0	SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	1.0		Term Credits	17.0
	Term Credits	17.0		Term 8	
			EDUC 306	Assessment of Young Children I	3.0
Term 2			EDUC 318	Math Methods Content: Elementary	3.0
COM 111	Principles of Communication	3.0	EDUC 355	Social Studies Teaching Methods	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0	EDUC 315	Secondary Science Teaching Methods	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	ENVS 260	Environmental Science and Society	3.0
MATH 182	Mathematical Analysis II	3.0		Term Credits	15.0
MUSC 130	Introduction to Music	3.0		Term 9	
UNIV T101	The Drexel Experience	1.0	EDUC 286	Teaching Earth Space Science for Middle School	3.0
	Term Credits	14.0	EDUC 307	Assessment of Young Children II	4.0
			EDUC 310	Computer Applications in Teaching	3.0
Term 3			EDUC 416	Introduction to Math Teaching Methods (4-8)	3.0
EDEX 142	Special Education Foundations: Referral and Assessment	3.0	EDUC 432	Algebraic Reasoning	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0		Term Credits	16.0
EDUC 115	Reasoning about Numbers and Quantity (4-8)	3.0		Term 10	
EDUC 314	Science Teaching Methods	3.0	EDUC 292	Science Methods for Middle School	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	EDUC 417	Advanced Math Teaching Methods (4-8)	3.0
MATH 183	Mathematical Analysis III	3.0	EDUC 433	Functions in Middle School Math	3.0
	Term Credits	16.0	PSY 330	Cognitive Psychology	3.0
				Term Credits	12.0
Term 4				Term 11	
BIO 162	General Biology II	3.0	EDUC 405	Senior Pedagogy Seminar	1.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0	EDUC 410 [WI (p. 431)]	Student Teaching	9.0
EDUC 205	Sophomore Pedagogy Seminar	1.0	Free Elective		3.0
EDUC 223	Teaching the Middle School Child	3.0		Term Credits	13.0
HIST 276	The History of Philadelphia	3.0			
Free Elective		3.0			
	Term Credits	16.0			
Term 5					

Term 12

ARTH 101	History of Art I: Ancient to Medieval	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition Food	1.0
Select one of the following:		3.0
HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	
Free Electives		4.0
Term Credits		13.0

Total Credit: 180.0

Elementary Education: Middle Level Science and English

*Major: Elementary Education**Degree Awarded: Bachelor of Science (BS)**Calendar Type: Quarter**Total Credit Hours: 180.5**Classification of Instructional (CIP) code: 13.1202**Standard Occupational Classification (SOC) code: 25-2022*

About the Concentration

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Additional Information

For more information about the program, visit the School of Education (<http://drexel.edu/soe>) website.

Degree Requirements

General Education/Content Requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
BIO 161	General Biology I	3.0
BIO 162	General Biology II	3.0
CHEM 111	General Chemistry I	4.0
COM 111	Principles of Communication	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGL 304	Young Adult Fiction	3.0
ENVS 260	Environmental Science and Society	3.0
HIST 276	The History of Philadelphia	3.0
LING 101	Introduction to Linguistics	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
PHYS 151	Applied Physics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 433)]	Educational Psychology	3.0
PSY 330	Cognitive Psychology	3.0
SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	2.0
Select one of the following:		3.0

HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	
Free electives		22.0

Pedagogy Requirements

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 246 [WI (p. 433)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 256	Teaching Writing Grades 4-8	3.0
EDUC 257	Content Area Reading (Grades 4-8)	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 284	Teaching Life Science in the Middle School	3.0
EDUC 285	Teaching Physical Science in the Middle School	3.0
EDUC 286	Teaching Earth & Space Science for Middle School	3.0
EDUC 292	Science Methods for Middle School	3.0
EDUC 305 [WI (p. 433)]	Junior Pedagogy Seminar	1.0
EDUC 306	Assessment of Young Children I	3.0
EDUC 307	Assessment of Young Children II	4.0
EDUC 310	Computer Applications in Teaching	3.0
EDUC 318	Math Methods & Content: Elementary	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0

EDUC 328	Language Arts Processes 4-8	3.0
EDUC 355	Social Studies Teaching Methods	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
Student Teaching Experience		
EDUC 410 [WI (p. 433)]	Student Teaching	9.0
Total Credits		180.0

Middle Level Science and English: Plan of Study

4 YR UG Co-op Concentration

Term		Credits
Term 1		
BIO 161	General Biology I	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 123	Adolescent Development	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 181	Mathematical Analysis I	3.0
UNIV T101	The Drexel Experience	1.0
	Term Credits	17.0
Term 2		
COM 111	Principles of Communication	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 182	Mathematical Analysis II	3.0
MUSC 130	Introduction to Music	3.0
UNIV T101	The Drexel Experience	1.0
	Term Credits	14.0
Term 3		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
LING 101	Introduction to Linguistics	3.0
MATH 183	Mathematical Analysis III	3.0
	Term Credits	13.0
Term 4		
BIO 162	General Biology II	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 223	Teaching the Middle School Child	3.0
HIST 276	The History of Philadelphia	3.0
PSY 101	General Psychology I	3.0
	Term Credits	16.0
Term 5		
EDUC 265	Instructing English Language Learners	3.0
EDUC 284	Teaching Life Science in the Middle School	3.0
EDUC 285	Teaching Physical Science in the Middle School	3.0
EDUC 328	Language Arts Processes 4-8	3.0

PHYS 151	Applied Physics	3.0
	Term Credits	15.0
Term 6		
EDEX 246 [WI (p. 433)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 257	Content Area Reading (Grades 4-8)	3.0
ENGL 304	Young Adult Fiction	3.0
Free Elective		4.0
	Term Credits	16.0
Term 7		
CHEM 111	General Chemistry I	4.0
EDUC 305 [WI (p. 433)]	Junior Pedagogy Seminar	1.0
EDUC 324	Current Research in Curriculum Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
PSY 320 [WI (p. 433)]	Educational Psychology	3.0
SOC 335	Sociology of Education	3.0
	Term Credits	17.0
Term 8		
EDUC 256	Teaching Writing Grades 4-8	3.0
EDUC 306	Assessment of Young Children I	3.0
EDUC 318	Math Methods Content: Elementary	3.0
EDUC 355	Social Studies Teaching Methods	3.0
ENVS 260	Environmental Science and Society	3.0
	Term Credits	15.0
Term 9		
EDUC 286	Teaching Earth Space Science for Middle School	3.0
EDUC 307	Assessment of Young Children II	4.0
EDUC 310	Computer Applications in Teaching	3.0
Free Elective		3.0
	Term Credits	13.0
Term 10		
ECON 201	Principles of Microeconomics	4.0
EDUC 292	Science Methods for Middle School	3.0
PSY 330	Cognitive Psychology	3.0
Free Elective		6.0
	Term Credits	16.0
Term 11		
EDUC 405	Senior Pedagogy Seminar	1.0
EDUC 410 [WI (p. 433)]	Student Teaching	9.0
Free Elective		3.0
	Term Credits	13.0
Term 12		
ARTH 101	History of Art I: Ancient to Medieval	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition Food	1.0
Select one of the following:		3.0

HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	
Free Elective		6.0
Term Credits		15.0
Total Credit: 180.0		

Learning, Culture and Technology

Major: Learning, Culture, and Technology

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 183.0

Classification of Instructional Programs (CIP) code: 13.0401; 13.0501; 13.0607

Standard Occupational Classification (SOC) code: 11-3131; 15-1132; 15-1134; 25-9031

About the Program

The Bachelor of Science major in Learning, Culture, and Technology (LCT) prepares students needed to build the next generation of information and computing technology for learning. Students learn interdisciplinary skills and knowledge necessary to design, develop, and implement technology-enhanced learning environments for a variety of settings.

Students in the major will be exposed to three major themes in their coursework:

1. *Cognition and Learning*: Cognitive/mental processes and representations underlying knowledge and skill acquisition
2. *Culture and Society*: Social, cultural, and organizational aspects of teaching and learning, in and outside of schools
3. *Design and Technology*: Design and evaluation techniques to enable the development of new and emerging technologies to support learning and teaching

Work across these themes is coordinated to facilitate the development of expertise on the design of learning technologies grounded in strong theories of learning for a wide range of educational contexts (e.g., classrooms, museum exhibits, after-school, summer camps, etc.), audiences (e.g., teachers, students, corporations, children, adults, etc.), and learning environments.

The curriculum combines knowledge of how people learn, learning technology design, and child/adolescent development from the School of Education with design courses in the Westphal College of Media Arts & Design and computational thinking courses in the College of Computing and Informatics. Co-op experiences may include work within Drexel University's Innovation Neighborhood, Philadelphia schools, and software and design firms with a need for individuals with training in both learning theories and computational design.

Graduates of the program will have strong skills in applying theory to the creation of educational and learning environments. With hands-on courses focused on human learning and technology design, the Learning, Culture, and Technology major combines expertise in the foundations of education with design and technical expertise that is central for best practices of the application, development, and use of technologies throughout our lifetimes.

Degree Requirements

General Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
BIO 100	Applied Cells, Genetics & Physiology	3.0
BIO 101	Applied Biological Diversity, Ecology & Evolution	3.0
CHEM 111	General Chemistry I	4.0
COM 111	Principles of Communication	3.0
CRTV 301	Foundations in Creativity	3.0
CRTV 303	Creativity in the Workplace	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Literature Requirement (Select one from between ENGL 200 - ENGL 335)		3.0
American History Requirement (Select one from HIST 201 - HIST 203)		3.0
INFO 105	Introduction to Informatics	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
PHYS 151	Applied Physics	3.0
PSY 101	General Psychology I	3.0
PSY 330	Cognitive Psychology	3.0
SOC 335	Sociology of Education	3.0

Education Requirements

EDLT 103	Foundation in Education III: Learning Sciences	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 102	Foundations in Education II: Contemporary Issues	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0

(Students enroll in EDUC 105 three times; Fall, Winter and Spring of Freshman Year)

EDUC 120	Child Development I: Typical Development	3.0
EDUC 123	Adolescent Development	3.0
EDUC 201	Instructional Issues	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 335	Engaging the Learner	3.0

Learning, Culture & Technology Program Requirements

ANTH 370	Ethnographic Methods	3.0
CS 140	Introduction to Multimedia Programming	3.0
DIGM 223	Creative Concept Design	3.0
EDLT 101	Learning, Culture & Technology Workshop I	3.0
EDLT 201	Learning, Culture and Technology Workshop II	3.0
EDLT 238	New Media Literacies	3.0
EDLT 250	Sociocultural Perspectives on Learning	3.0
EDLT 301	Learning, Culture & Technology Workshop III	3.0

EDLT 339	Future Pedagogies	3.0
EDLT 353	Play and Learning in Participatory Cultures	3.0
EDLT 354	Learning In and Out of Schools	3.0
EDLT 491	Senior Project I	3.0
EDLT 492	Senior Project II	3.0
EDLT 493	Senior Project III	3.0
EHRD 205	Organizational Learning & Strategy	3.0
INFO 110	Human-Computer Interaction I	3.0
INFO 240	Introduction to Data Science	3.0
WEST 465	Special Topics in Media, Arts and Design	3.0
Electives		24.0
(Students are encouraged to work with their Advisor to select a minor)		
Other University Requirements		
CIVC 101	Introduction to Civic Engagement	1.0
COOP 101	Career Management and Professional Development	0.0
UNIV 101	The Drexel Experience	1.0
Total Credits		181.0

Sample Plan of Study

Term		Credits			Credits
Term 1					
EDLT 101	Learning, Culture Technology Workshop I	3.0		INFO 105	Introduction to Informatics
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0		PSY 101	General Psychology I
EDUC 105	Freshman Pedagogy Seminar	1.0		PHYS 151	Applied Physics
EDUC 120	Child Development I: Typical Development	3.0		Term Credits	15.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0		Term 5	
MATH 181	Mathematical Analysis I	3.0		CRTV 301	Foundations in Creativity
UNIV 101	The Drexel Experience	1.0		ECON 201	Principles of Microeconomics
Term Credits		17.0		EDLT 238	New Media Literacies
				EHRD 205	Organizational Learning Strategy
Term 2				Term Credits	13.0
CIVC 101	Introduction to Civic Engagement	1.0		Term 6	
CS 140	Introduction to Multimedia Programming	3.0		ANTH 101	Introduction to Cultural Diversity
EDUC 102	Foundations in Education II: Contemporary Issues	3.0		BIO 100	Applied Cells, Genetics Physiology
EDUC 105	Freshman Pedagogy Seminar	1.0		COOP 101	Career Management and Professional Development
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0		EDLT 339	Future Pedagogies
MATH 182	Mathematical Analysis II	3.0		EDUC 123	Adolescent Development
Term Credits		14.0		SOC 335	Sociology of Education
				Term Credits	15.0
Term 3				Term 7	
COM 111	Principles of Communication	3.0		BIO 101	Applied Biological Diversity, Ecology Evolution
EDLT 103	Foundation in Education III: Learning Sciences	3.0		EDLT 353	Play and Learning in Participatory Cultures
EDUC 105	Freshman Pedagogy Seminar	1.0		EDUC 201	Instructional Issues
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0		ENGL 200 - ENGL 335	
INFO 110	Human-Computer Interaction I	3.0		Free elective	3.0
MATH 183	Mathematical Analysis III	3.0		Term Credits	15.0
Term Credits		16.0		Term 8	
				CRTV 303	Creativity in the Workplace
Term 4				EDLT 301	Learning, Culture Technology Workshop III
DIGM 223	Creative Concept Design	3.0		EDLT 354	Learning In and Out of Schools
EDLT 201	Learning, Culture and Technology Workshop II	3.0		Free elective	3.0
				HIST 201 - HIST 203	3.0
				Term Credits	15.0
				Term 9	
				EDLT 250	Sociocultural Perspectives on Learning
				EDUC 324	Current Research in Curriculum Instruction
				EDUC 335	Engaging the Learner
				Free electives	6.0
				Term Credits	15.0
				Term 10	
				CHEM 111	General Chemistry I
				EDLT 491	Senior Project I
				INFO 240	Introduction to Data Science
				PSY 330	Cognitive Psychology
				WEST 465	Special Topics in Media, Arts and Design
				Term Credits	16.0
				Term 11	
				ANTH 370	Ethnographic Methods
				EDLT 492	Senior Project II
				EDUC 316	Teaching in Urban Contexts
				EDUC 322	Evaluation of Instruction

Free elective	3.0
Term Credits	15.0
Term 12	
EDLT 493 Senior Project III	3.0
MUSC 130 Introduction to Music	3.0
Free electives	9.0
Term Credits	15.0
Total Credit: 181.0	

Education Faculty

W. Edward Bureau, PhD (*University of Pennsylvania*) Director of the *Sacramento EdD*. Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD (*Arizona State University*). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

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Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

BS in Teacher Education

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0 - 191.5

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Program

The Bachelor of Science in Teacher Education program uses university-wide resources to prepare fully qualified teachers at the secondary education levels in various subjects of certification. The program applies the microcomputer in teaching and learning, and it is the only such program in the country to incorporate a six-month paid internship in industry related to the student's area of certification (for example, a prospective chemistry teacher might co-op at a chemical company). Students pursuing the appropriate majors in the College of Arts and Sciences may also complete the requirements for certification within their area of study.

The BS in Teacher Education, is focused on secondary education, and provides graduates with the background to work with students in grades 7-12* in a specific subject area. Students may work with their academic advisor to satisfy teacher certification requirements for multiple areas if desired. Available certification areas include:

- Biology (p. 439)
- Chemistry (p. 442)
- Earth & Space Science (p. 445)
- Environmental Education (p. 451)*
- English (p. 448)
- General Science (p. 454)
- Mathematics (p. 457)
- Physics (p. 460)
- Social Studies (p. 463)

* Environmental Education is grades K-12 certification area.

The program requires that students have a B average (3.0 GPA) in content courses needed for teacher certification in addition to the grade of B or better in each EDUC course throughout their time in the program. These requirements must be satisfied in order for Drexel to recommend the student for teacher certification upon graduation and/or be considered to have completed the program.

A benchmark to assist students in meeting the GPA and B grade requirements is the formal review of each student's content and pedagogy coursework at the end of the sophomore year. Students who meet these requirements, as well as pass the *Pre-Professional Skills Test* (PPST Reading, PPST Writing, PPST Mathematics) of the *ETS Praxis Exams* according to Pennsylvania standards at that time, are officially accepted into Drexel's Teacher Preparation Program. Students who do not meet the requirements work with their academic advisor to develop a plan of action to work toward meeting the requirements, continue in the program to work toward the BS degree without being recommended for a teaching certificate, or explore another major.

Students participate in classroom observations and limited direct teaching experiences as a component of many of their pedagogy courses beginning in their freshman year.

In the senior year, students who are officially accepted into the Teacher Preparation Program and maintain the GPA and grade requirements, enroll and complete the 12-week, full-time, student-teaching experience () in their primary area of certification. Students must receive a grade of at least B in (and if applicable) and in all pedagogy (EDUC) coursework, as well as maintain an overall 3.0 GPA to be recommended for teacher certification.

Students who were not officially accepted into the Teacher Preparation Program and/or do not maintain the GPA and grade requirements but who are working towards the BS degree without being recommended for teacher certification take other courses as assigned by the Teacher Education Program Director and/or academic advisor to fulfill needed credits for the degree in lieu of student teaching.

Students pursuing the appropriate majors in the College of Arts and Sciences may also complete the requirements for certification within their area of study. For more information, contact the Program Coordinator for the School of Education at 215-895-6770.

Additional information is available at the School of Education's (<http://www.drexel.edu/soe>) web site.

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Teacher Education: Biology

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 183.0

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Biology Concentration

Certification is for grades 7- 12

This certification option within the BS in Teacher Education (p. 438) emphasizes coursework in the biological sciences, including genetics, morphology and physiology, biochemistry, microbiology, and ecology. Students may also choose to pursue a second certification in chemistry and/or environmental education.

Additional Information

For more information about the program, visit the School of Education (<http://www.drexel.edu/soe>) website.

Degree Requirements

Degree Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
	English elective course between 200-329	3.0
HIST 280	History of Science: Ancient to Medieval	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
PHIL 251	Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 439)]	Educational Psychology	3.0
UNIV T101	The Drexel Experience	1.0
Science Requirements		
BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
BIO 201	Human Physiology I	4.0
BIO 214	Principles of Cell Biology	3.0
BIO 215 [WI (p. 439)]	Techniques in Cell Biology	2.5
BIO 218	Principles of Molecular Biology	4.0
BIO 219 [WI (p. 439)]	Techniques in Molecular Biology	3.0
BIO 220	Essential Microbiology	3.0
BIO 228	Evolutionary Biology & Human Health	3.0
BIO 270	Development Biology	3.0
BIO 271	Developmental Biology Laboratory	2.0
BIO 306	Biochemistry Laboratory	2.0
BIO 404	Structure and Function of Biomolecules	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 241	Organic Chemistry I	4.0
CHEM 242	Organic Chemistry II	4.0
CHEM 244	Organic Chemistry Laboratory I	3.0
CHEM 245	Organic Chemistry Laboratory II	3.0
ENVS 230	General Ecology	3.0
ENVS 284	Physiological and Population Ecology	3.0
PHYS 152	Introductory Physics I	4.0
PHYS 153	Introductory Physics II	4.0
Pedagogy Requirements		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 439)]	Literacy and Content Skill Development 7-12	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0

EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 439)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
Student Teaching Experience		
EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 439)]	Student Teaching	9.0
Total Credits		196.0

Biology Concentration: Plan of Study

Term 1		Credits
BIO 122	Cells and Genetics	4.5
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV T101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
BIO 124	Evolution Organismal Diversity	4.5
CIVC 101	Introduction to Civic Engagement	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
Term Credits		16.5
Term 3		
BIO 126	Physiology and Ecology	4.5
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 123	Adolescent Development	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

MATH 123	Calculus III	4.0	ENVS 230	General Ecology	3.0
Term Credits		18.5	PSY 101	General Psychology I	3.0
Term 4					
BIO 201	Human Physiology I	4.0	Term Credits 19.0		
BIO 218	Principles of Molecular Biology	4.0	Term 10		
BIO 219 [WI (p. 439)]	Techniques in Molecular Biology	3.0	EDUC 308	Creating a Positive Classroom Climate	3.0
CHEM 101	General Chemistry I	3.5	EDUC 409	Student Teaching Seminar I	9.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0	Term Credits 12.0		
EDUC 205	Sophomore Pedagogy Seminar	1.0	Term 11		
Term Credits		18.5	EDUC 325	Multimedia in Instructional Design	3.0
Term 5					
BIO 214	Principles of Cell Biology	3.0	EDUC	Student Teaching	9.0
BIO 215 [WI (p. 439)]	Techniques in Cell Biology	2.5	410 [WI (p. 439)]		
BIO 220	Essential Microbiology	3.0	Term Credits 12.0		
CHEM 102	General Chemistry II	4.5	Term 12		
EDUC 223	Teaching the Middle School Child	3.0	EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0	EDUC 405	Senior Pedagogy Seminar	1.0
Term Credits		19.0	ENVS 284	Physiological and Population Ecology	3.0
Term 6					
BIO 270	Development Biology	3.0	HIST 280	History of Science: Ancient to Medieval	3.0
BIO 271	Developmental Biology Laboratory	2.0	PHIL 251	Ethics	3.0
COOP 101	Career Management and Professional Development	0.0	PSY 320 [WI (p. 439)]	Educational Psychology	3.0
EDUC 258	Reading in the Content Areas	3.0	Term Credits 16.0		
EDUC 265	Instructing English Language Learners	3.0	Total Credit: 196.0		
EDUC 305 [WI (p. 439)]	Junior Pedagogy Seminar	1.0	Education Faculty		
PHYS 152	Introductory Physics I	4.0	W. Edward Bureau, PhD (<i>University of Pennsylvania</i>) Director of the <i>Sacramento EdD</i> . Clinical Associate Professor. Leadership, supervision, and capacity development.		
Term Credits		16.0	Holly Carpenter, PhD (<i>Arizona State University</i>). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.		
Term 7					
BIO 306	Biochemistry Laboratory	2.0	José Luis Chávez, EdD (<i>University of Southern California</i> .) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento. Clinical Professor. Higher education leadership and administration.		
CHEM 241	Organic Chemistry I	4.0	Ellen Clay, PhD (<i>University of Southwestern Louisiana</i>). Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.		
CHEM 244	Organic Chemistry Laboratory I	3.0	Rebecca Clothey, PhD (<i>University of Pittsburgh</i>) Director, Higher Education Program. Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.		
EDUC 312	Educational Policy, Law Advocacy	3.0	Marion Dugan, EdD (<i>University of Pennsylvania</i>). Auxiliary Associate Professor. Language arts, student teaching.		
PHYS 153	Introductory Physics II	4.0	Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.		
Term Credits		16.0	Salvatore V. Falletta, EdD (<i>North Carolina State University</i>) Director of the <i>Human Resource Development (HRD)</i> program at Drexel University.. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement,		
Term 8					
BIO 228	Evolutionary Biology Human Health	3.0			
CHEM 242	Organic Chemistry II	4.0			
CHEM 245	Organic Chemistry Laboratory II	3.0			
EDUC 315	Secondary Science Teaching Methods	3.0			
English Literature Elective 200-379		3.0			
Term Credits		16.0			
Term 9					
BIO 404	Structure and Function of Biomolecules	4.0			
EDEX 266 [WI (p. 439)]	Literacy and Content Skill Development 7-12	3.0			
EDUC 216	Diversity and Today's Teacher	3.0			
EDUC 324	Current Research in Curriculum Instruction	3.0			

and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Arotis N. Foster, PhD (*Michigan State University*). Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities).

Kathy Geller, PhD (*Fielding Graduate University*). Assistant Clinical Professor. Educational leadership and management.

Rajashi Ghosh, PhD (*University of Louisville, Kentucky*). Assistant Professor. Mentoring and leader development, workplace Incivility, workplace learning and development.

John M. Gould, PhD (*University of Pittsburgh*) *Harrisburg EdD Educational Leadership & Change Program*. Associate Clinical Professor. Change leadership, curriculum re-design, the impact of technology on learning.

Mary Jo Grdina, PhD (*Case Western Reserve University*). Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD (*Indiana University*). Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

Francis Harvey, EdD (*Harvard University*). Associate Professor. Enhanced learning, socio-cultural learning, distance education.

Elizabeth Haslam, PhD (*University of Pennsylvania*). Auxiliary Associate Professor. Educational field coordinator, instructional design, qualitative evaluation, writing across the curriculum.

Jennifer Katz-Buonincontro, MFA, PhD (*University of Oregon*). Assistant Professor. Educational administration.

Kristine Lewis, PhD (*Temple University*). Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD (*University of Maryland*) *Dean, Goodwin College of Professional Studies*. Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD (*Curtin University, Science and Mathematics Education Centre, Perth, Australia*). Assistant Professor.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD (*Saint Joseph's University*) *Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD (*Pennsylvania State University*). Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD (*Vanderbilt University*.) *Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching

and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD (*University of Virginia*). Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD (*Temple University*) *Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: Chemistry

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 185.0

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades 7 - 12

This certification option within the BS in Teacher Education (p. 438) emphasizes coursework in such areas as organic chemistry, physical chemistry, biochemistry, analytical chemistry, and inorganic chemistry. Students may also choose to pursue a second certification in biology.

Additional Information

For more information about the program, visit the School of Education (<http://www.drexel.edu/soe>) website.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
HIST 280	History of Science: Ancient to Medieval	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

English elective course between 200-329		3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
PHIL 251	Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 442)]	Educational Psychology	3.0
UNIV T101	The Drexel Experience	1.0

Science Requirements

BIO 107	Cells, Genetics & Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
BIO 109	Biological Diversity, Ecology & Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
BIO 306	Biochemistry Laboratory	2.0
CHEC 352	Physical Chemistry and Applications II	4.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
CHEM 230	Quantitative Analysis	4.0
CHEM 231 [WI (p. 442)]	Quantitative Analysis Laboratory	2.0
CHEM 241	Organic Chemistry I	4.0
CHEM 242	Organic Chemistry II	4.0
CHEM 243	Organic Chemistry III	3.0
CHEM 244	Organic Chemistry Laboratory I	3.0
CHEM 245	Organic Chemistry Laboratory II	3.0
CHEM 253	Thermodynamics and Kinetics	4.0
CHEM 357 [WI (p. 442)]	Physical Chemistry Laboratory I	2.5
CHEM 420	Molecular Symmetry and Group Theory Applied Chemistry	3.0
CHEM 421	Inorganic Chemistry I	3.0
CHEM 430	Analytical Chemistry I	3.0
ENVS 401	Chemistry of the Environment	3.0
PHEV 145	Weather I: Climate and Global Change	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 201	Fundamentals of Physics III	4.0

Pedagogy Requirements

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 442)]	Literacy and Content Skill Development 7-12	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0

EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 442)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 405	Senior Pedagogy Seminar	1.0

Student Teaching Experiences

EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 442)]	Student Teaching (Chemistry)	9.0

Total Credits **201.5**
Chemistry Concentration: Plan of Study**4 YR UG Co-op Concentration**

Term 1		Credits
CHEM 101	General Chemistry I	3.5
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
PSY 101	General Psychology I	3.0
UNIV T101	The Drexel Experience	1.0

Term Credits **18.5**

Term 2		
CIVC 101	Introduction to Civic Engagement	1.0
CHEM 102	General Chemistry II	4.5
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0

Term Credits **16.5**

Term 3		
CHEM 103	General Chemistry III	5.0
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 123	Adolescent Development	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0

Term Credits **19.0**
Term 4

BIO 107	Cells, Genetics Physiology	3.0	EDEX	Literacy and Content Skill Development 7-12	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0	266 [WI		
CHEM 230	Quantitative Analysis	4.0	(p. 442)]		
CHEM 231 [WI	Quantitative Analysis Laboratory	2.0	EDUC 216	Diversity and Today's Teacher	3.0
(p. 442)]			EDUC 324	Current Research in Curriculum Instruction	3.0
CHEM 241	Organic Chemistry I	4.0	Term Credits		17.5
EDEX 244	Inclusionary Practices for Exceptional Students	3.0	Term 10		
EDUC 205	Sophomore Pedagogy Seminar	1.0	EDUC 308	Creating a Positive Classroom Climate	3.0
Term Credits		18.0	EDUC 409	Student Teaching Seminar I	9.0
Term 5			Term Credits		
BIO 109	Biological Diversity, Ecology Evolution	3.0	Term 11		
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0	EDUC 325	Multimedia in Instructional Design	3.0
CHEM 242	Organic Chemistry II	4.0	EDUC 410 [WI	Student Teaching	9.0
CHEM 244	Organic Chemistry Laboratory I	3.0	(p. 442)]		
COOP 101	Career Management and Professional Development	0.0	Term Credits		12.0
EDUC 223	Teaching the Middle School Child	3.0	Term 12		
EDUC 322	Evaluation of Instruction	3.0	CHEM 430	Analytical Chemistry I	3.0
Term Credits		17.0	EDUC 316	Teaching in Urban Contexts	3.0
Term 6			EDUC 405	Senior Pedagogy Seminar	1.0
CHEM 243	Organic Chemistry III	3.0	ENVS 401	Chemistry of the Environment	3.0
CHEM 245	Organic Chemistry Laboratory II	3.0	HIST 280	History of Science: Ancient to Medieval	3.0
EDUC 258	Reading in the Content Areas	3.0	PHIL 251	Ethics	3.0
EDUC 265	Instructing English Language Learners	3.0	English (ENGL) course between 200-239		
EDUC 305 [WI	Junior Pedagogy Seminar	1.0	Term Credits		19.0
(p. 442)]			Total Credit: 201.5		
PHYS 101	Fundamentals of Physics I	4.0	Education Faculty		
Term Credits		17.0	W. Edward Bureau, PhD (<i>University of Pennsylvania</i>) Director of the <i>Sacramento EdD</i> . Clinical Associate Professor. Leadership, supervision, and capacity development.		
Term 7			Holly Carpenter, PhD (<i>Arizona State University</i>). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.		
CHEM 420	Molecular Symmetry and Group Theory Applied Chemistry	3.0	José Luis Chávez, EdD (<i>University of Southern California</i> .) Program Coordinator for the <i>MS in Higher Education Program at the Center for Graduate Studies in Sacramento</i> . Clinical Professor. Higher education leadership and administration.		
CHEM 421	Inorganic Chemistry I	3.0	Ellen Clay, PhD (<i>University of Southwestern Louisiana</i>). Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.		
EDUC 312	Educational Policy, Law Advocacy	3.0	Rebecca Clothey, PhD (<i>University of Pittsburgh</i>) Director, <i>Higher Education Program</i> . Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.		
MATH 200	Multivariate Calculus	4.0	Marion Dugan, EdD (<i>University of Pennsylvania</i>). Auxiliary Associate Professor. Language arts, student teaching.		
PHYS 102	Fundamentals of Physics II	4.0	Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.		
Term Credits		17.0			
Term 8					
CHEM 253	Thermodynamics and Kinetics	4.0			
EDUC 315	Secondary Science Teaching Methods	3.0			
PHEV 145	Weather I: Climate and Global Change	4.0			
PHYS 201	Fundamentals of Physics III	4.0			
PSY 320 [WI	Educational Psychology	3.0			
(p. 442)]					
Term Credits		18.0			
Term 9					
BIO 306	Biochemistry Laboratory	2.0			
CHEC 352	Physical Chemistry and Applications II	4.0			
CHEM 357 [WI	Physical Chemistry Laboratory I	2.5			
(p. 442)]					

Salvatore V. Falletta, EdD (*North Carolina State University*) *Director of the Human Resource Development (HRD) program at Drexel University.* Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Arotis N. Foster, PhD (*Michigan State University*). Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities.

Kathy Geller, PhD (*Fielding Graduate University*). Assistant Clinical Professor. Educational leadership and management.

Rajashi Ghosh, PhD (*University of Louisville, Kentucky*). Assistant Professor. Mentoring and leader development, workplace Incivility, workplace learning and development.

John M. Gould, PhD (*University of Pittsburgh*) *Harrisburg EdD Educational Leadership & Change Program.* Associate Clinical Professor. Change leadership, curriculum re-design, the impact of technology on learning.

Mary Jo Grdina, PhD (*Case Western Reserve University*). Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD (*Indiana University*). Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

Francis Harvey, EdD (*Harvard University*). Associate Professor. Enhanced learning, socio-cultural learning, distance education.

Elizabeth Haslam, PhD (*University of Pennsylvania*). Auxiliary Associate Professor. Educational field coordinator, instructional design, qualitative evaluation, writing across the curriculum.

Jennifer Katz-Buonincontro, MFA, PhD (*University of Oregon*). Assistant Professor. Educational administration.

Kristine Lewis, PhD (*Temple University*). Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD (*University of Maryland*) *Dean, Goodwin College of Professional Studies.* Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD (*Curtin University, Science and Mathematics Education Centre, Perth, Australia*). Assistant Professor.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD (*Saint Joseph's University*) *Program Director.* Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD (*Pennsylvania State University*). Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD (*Vanderbilt University*.) *Director of the Program in Mathematical Learning and Teaching.* Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD (*University of Virginia*). Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD (*Temple University*) *Associate Director of Research and Outreach Programs.* Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center.* Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation.* Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: Earth and Space Science

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades 7 - 12

This option within the BS in Teacher Education (p. 438) emphasizes interdisciplinary study, involving coursework in biology, chemistry, geology, physics and atmospheric science. Students may also choose to pursue a second certification in chemistry or physics.

Additional Information

For more information about the program, visit the School of Education (<http://www.drexel.edu/soe>) website.

Degree Requirements

General Education Requirements

CIVC 101

Introduction to Civic Engagement

1.0

ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HIST 280	History of Science: Ancient to Medieval	3.0
HIST 285	Technology in Historical Perspective	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
PHIL 251	Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 445)]	Educational Psychology	3.0
UNIV T101	The Drexel Experience	1.0
English elective course between 200-329		3.0
Science Requirements		
BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
ENVS 230	General Ecology	3.0
ENVS 260	Environmental Science and Society	3.0
ENVS 284	Physiological and Population Ecology	3.0
ENVS 285 [WI (p. 445)]	Population Ecology Laboratory	2.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 287	Community Ecology Laboratory	2.0
ENVS 330	Aquatic Ecology	3.0
ENVS 390	Marine Ecology	3.0
ENVS 441 [WI (p. 445)]	Issues in Global Change I: Seminar	2.0
GEO 101	Physical Geology	4.0
GEO 102	History of Life on Earth	4.0
PHEV 145	Weather I: Climate and Global Change	4.0
PHEV 146	Weather II: Analysis and Forecasting	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 131	Survey of the Universe	3.0
Pedagogy Requirements		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 445)]	Literacy and Content Skill Development 7-12	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0

EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 445)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
Student Teaching Experiences		
EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 445)]	Student Teaching	9.0
Total Credits		192.5

Earth and Space Science Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits
BIO 122	Cells and Genetics	4.5
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV T101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		
BIO 124	Evolution Organismal Diversity	4.5
CIVC 101	Introduction to Civic Engagement	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
Term Credits		16.5
Term 3		
BIO 126	Physiology and Ecology	4.5
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 123	Adolescent Development	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHEV 145	Weather I: Climate and Global Change	4.0
Term Credits		18.5
Term 4		

EDEX 244	Inclusionary Practices for Exceptional Students	3.0	ENVS 390	Marine Ecology	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0	Term Credits		18.0
ENVS 230	General Ecology	3.0	Term 10		
MATH 123	Calculus III	4.0	EDUC 308	Creating a Positive Classroom Climate	3.0
PHYS 101	Fundamentals of Physics I	4.0	EDUC 409	Student Teaching Seminar I	9.0
PSY 101	General Psychology I	3.0	Term Credits		12.0
Term Credits		18.0	Term 11		
Term 5			EDUC 325	Multimedia in Instructional Design	3.0
COOP 101	Career Management and Professional Development	0.0	EDUC 410 [WI (p. 445)]	Student Teaching	9.0
EDUC 223	Teaching the Middle School Child	3.0	Term Credits		12.0
EDUC 322	Evaluation of Instruction	3.0	Term 12		
GEO 102	History of Life on Earth	4.0	EDUC 316	Teaching in Urban Contexts	3.0
PHYS 102	Fundamentals of Physics II	4.0	EDUC 405	Senior Pedagogy Seminar	1.0
English elective course between 200-329		3.0	ENVS 330	Aquatic Ecology	3.0
Term Credits		17.0	HIST 280	History of Science: Ancient to Medieval	3.0
Term 6			PHIL 251	Ethics	3.0
CHEM 101	General Chemistry I	3.5	PHYS 131	Survey of the Universe	3.0
EDUC 258	Reading in the Content Areas	3.0	Term Credits		16.0
EDUC 265	Instructing English Language Learners	3.0	Total Credit: 192.5		
EDUC 305 [WI (p. 445)]	Junior Pedagogy Seminar	1.0	Education Faculty		
ENVS 284	Physiological and Population Ecology	3.0	W. Edward Bureau, PhD (<i>University of Pennsylvania</i>) Director of the <i>Sacramento EdD</i> . Clinical Associate Professor. Leadership, supervision, and capacity development.		
ENVS 286	Community and Ecosystem Ecology	3.0	Holly Carpenter, PhD (<i>Arizona State University</i>). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.		
Term Credits		16.5	José Luis Chávez, EdD (<i>University of Southern California</i> .) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento. Clinical Professor. Higher education leadership and administration.		
Term 7			Ellen Clay, PhD (<i>University of Southwestern Louisiana</i>). Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.		
CHEM 102	General Chemistry II	4.5	Rebecca Clothey, PhD (<i>University of Pittsburgh</i>) Director, <i>Higher Education Program</i> . Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.		
EDUC 312	Educational Policy, Law Advocacy	3.0	Marion Dugan, EdD (<i>University of Pennsylvania</i>). Auxiliary Associate Professor. Language arts, student teaching.		
ENVS 285 [WI (p. 445)]	Population Ecology Laboratory	2.0	Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.		
ENVS 441 [WI (p. 445)]	Issues in Global Change I: Seminar	2.0	Salvatore V. Falletta, EdD (<i>North Carolina State University</i>) Director of the <i>Human Resource Development (HRD)</i> program at Drexel University.. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic		
GEO 101	Physical Geology	4.0			
Term Credits		15.5			
Term 8					
EDUC 315	Secondary Science Teaching Methods	3.0			
ENVS 260	Environmental Science and Society	3.0			
HIST 285	Technology in Historical Perspective	3.0			
PSY 320 [WI (p. 445)]	Educational Psychology	3.0			
PHEV 146	Weather II: Analysis and Forecasting	4.0			
Term Credits		16.0			
Term 9					
ECON 201	Principles of Microeconomics	4.0			
EDEX 266 [WI (p. 445)]	Literacy and Content Skill Development 7-12	3.0			
EDUC 216	Diversity and Today's Teacher	3.0			
EDUC 324	Current Research in Curriculum Instruction	3.0			
ENVS 287	Community Ecology Laboratory	2.0			

models; web-based employee and organizational survey methods, and computational modeling.

Arotis N. Foster, PhD (*Michigan State University*). Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities).

Kathy Geller, PhD (*Fielding Graduate University*). Assistant Clinical Professor. Educational leadership and management.

Rajashi Ghosh, PhD (*University of Louisville, Kentucky*). Assistant Professor. Mentoring and leader development, workplace incivility, workplace learning and development.

John M. Gould, PhD (*University of Pittsburgh*) *Harrisburg EdD Educational Leadership & Change Program*. Associate Clinical Professor. Change leadership, curriculum re-design, the impact of technology on learning.

Mary Jo Grdina, PhD (*Case Western Reserve University*). Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD (*Indiana University*). Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

Francis Harvey, EdD (*Harvard University*). Associate Professor. Enhanced learning, socio-cultural learning, distance education.

Elizabeth Haslam, PhD (*University of Pennsylvania*). Auxiliary Associate Professor. Educational field coordinator, instructional design, qualitative evaluation, writing across the curriculum.

Jennifer Katz-Buonincontro, MFA, PhD (*University of Oregon*). Assistant Professor. Educational administration.

Kristine Lewis, PhD (*Temple University*). Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD (*University of Maryland*) *Dean, Goodwin College of Professional Studies*. Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD (*Curtin University, Science and Mathematics Education Centre, Perth, Australia*). Assistant Professor.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD (*Saint Joseph's University*) *Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD (*Pennsylvania State University*). Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD (*Vanderbilt University*.) *Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus);

improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD (*University of Virginia*). Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD (*Temple University*) *Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: English

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.5

Classification of Instructional Programs (CIP) code: 13.1205
Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades 7 - 12

This certification option within the BS in Teacher Education (p. 438) emphasizes coursework in areas such as American and British Literature, young adult fiction, and techniques for effectively teaching reading and writing skills. Students may also choose to pursue a second certification in any of the other certification areas.

Additional Information

For more information about the program, visit the School of Education (<http://www.drexel.edu/soe>) website.

Degree Requirements

General Education Requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
CIVC 101	Introduction to Civic Engagement	1.0
COM 230	Techniques of Speaking	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENVS 260	Environmental Science and Society	3.0
Select one American History course:		3.0
HIST 201	United States History to 1815	
HIST 202	United States History, 1815-1900	
HIST 203	United States History since 1900	
INFO 101	Introduction to Information Technology	3.0
LING 101	Introduction to Linguistics	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
MUSC 130	Introduction to Music	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 448)]	Educational Psychology	3.0
SOC 335	Sociology of Education	3.0
PHYS 181	Astronomy	3.0
WRIT 225 [WI (p. 448)]	Creative Writing	3.0
WRIT 301 [WI (p. 448)]	Writing Poetry	3.0
UNIV T101	The Drexel Experience	1.0
Science Sequence		8.0
Select one of the following:		
CHEM 111	General Chemistry I	
CHEM 112	General Chemistry II	
or		
PHYS 103	General Physics I	
PHYS 104	General Physics II	
English Requirements (option to minor in English)		
ENGL 200 [WI (p. 448)]	Classical to Medieval Literature	3.0
ENGL 201	Renaissance to the Enlightenment	3.0
ENGL 204	Post-Colonial Literature II	3.0
ENGL 205 [WI (p. 448)]	American Literature I	3.0
ENGL 206 [WI (p. 448)]	American Literature II	3.0
ENGL 211 [WI (p. 448)]	British Literature I	3.0
ENGL 212	British Literature II	3.0
ENGL 304	Young Adult Fiction	3.0
ENGL 325	Topics in World Literature	3.0
ENGL 335	Mythology	3.0
ENGL 355 [WI (p. 448)]	Women and Literature	3.0
Pedagogy Requirements		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0

EDEX 266 [WI (p. 448)]	Literacy and Content Skill Development 7-12	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar (Enroll 3 times)	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 448)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 358	English Teaching Methods	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
Student Teaching Experiences		
EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 448)]	Student Teaching	9.0

Total Credits **182.0**

English Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 181	Mathematical Analysis I	3.0
PHYS 103 or CHEM 111	General Physics I General Chemistry I	4.0
UNIV T101	The Drexel Experience	1.0
Term Credits		15.0
Term 2		
CIVC 101	Introduction to Civic Engagement	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 182	Mathematical Analysis II	3.0
PHYS 104 or CHEM 112	General Physics II General Chemistry II	4.0
Term Credits		15.0
Term 3		

EDEX 142	Special Education Foundations: Referral and Assessment	3.0	ARTH 101	History of Art I: Ancient to Medieval	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0	ECON 201	Principles of Microeconomics	4.0
EDUC 123	Adolescent Development	3.0	EDUC 324	Current Research in Curriculum Instruction	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	ENGL 355 [WI (p. 448)]	Women and Literature	3.0
MATH 183	Mathematical Analysis III	3.0	ENGL 335	Mythology	3.0
PSY 101	General Psychology I	3.0			
Term Credits		16.0	Term Credits		16.0
Term 4			Term 9		
COM 230	Techniques of Speaking	3.0	EDEX 266 [WI (p. 448)]	Literacy and Content Skill Development 7-12	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0	EDUC 216	Diversity and Today's Teacher	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0	ENGL 205 [WI (p. 448)]	American Literature I	3.0
INFO 101	Introduction to Information Technology	3.0	ENGL 212	British Literature II	3.0
LING 101	Introduction to Linguistics	3.0	ENGL 325	Topics in World Literature	3.0
Select one of the following:		3.0	EDUC 358	English Teaching Methods	3.0
HIST 201	United States History to 1815				
HIST 202	United States History, 1815-1900				
HIST 203	United States History since 1900				
Term Credits		16.0	Term Credits		18.0
Term 5			Term 10		
COOP 101	Career Management and Professional Development	0.0	EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 223	Teaching the Middle School Child	3.0	EDUC 409	Student Teaching Seminar I	9.0
EDUC 322	Evaluation of Instruction	3.0			
ENGL 201	Renaissance to the Enlightenment	3.0	Term Credits		12.0
NFS 100	Nutrition, Foods, and Health	2.0	Term 11		
NFS 101	Introduction to Nutrition Food	1.0	EDUC 325	Multimedia in Instructional Design	3.0
WRIT 301 [WI (p. 448)]	Writing Poetry	3.0	EDUC 410 [WI (p. 448)]	Student Teaching	9.0
Term Credits		15.0	Term Credits		12.0
Term 6			Term 12		
EDUC 258	Reading in the Content Areas	3.0	EDUC 316	Teaching in Urban Contexts	3.0
EDUC 265	Instructing English Language Learners	3.0	EDUC 405	Senior Pedagogy Seminar	1.0
EDUC 305 [WI (p. 448)]	Junior Pedagogy Seminar	1.0	ENGL 206 [WI (p. 448)]	American Literature II	3.0
ENGL 200 [WI (p. 448)]	Classical to Medieval Literature	3.0	ENVS 260	Environmental Science and Society	3.0
ENGL 204	Post-Colonial Literature II	3.0	PSY 320 [WI (p. 448)]	Educational Psychology	3.0
WRIT 225 [WI (p. 448)]	Creative Writing	3.0	SOC 335	Sociology of Education	3.0
Term Credits		16.0	Term Credits		16.0
Term 7			Total Credit: 182.0		
EDUC 312	Educational Policy, Law Advocacy	3.0	Education Faculty		
ENGL 211 [WI (p. 448)]	British Literature I	3.0	W. Edward Bureau, PhD (<i>University of Pennsylvania</i>) Director of the <i>Sacramento EdD</i> . Clinical Associate Professor. Leadership, supervision, and capacity development.		
ENGL 304	Young Adult Fiction	3.0	Holly Carpenter, PhD (<i>Arizona State University</i>). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.		
MUSC 130	Introduction to Music	3.0	José Luis Chávez, EdD (<i>University of Southern California</i> .) Program Coordinator for the MS in Higher Education Program at the Center for		
PHYS 181	Astronomy	3.0			
Term Credits		15.0			
Term 8					

Graduate Studies in Sacramento. Clinical Professor. Higher education leadership and administration.

Ellen Clay, PhD (*University of Southwestern Louisiana*). Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.

Rebecca Clothey, PhD (*University of Pittsburgh*) *Director, Higher Education Program*. Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.

Marion Dugan, EdD (*University of Pennsylvania*). Auxiliary Associate Professor. Language arts, student teaching.

Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

Salvatore V. Falletta, EdD (*North Carolina State University*) *Director of the Human Resource Development (HRD) program at Drexel University*. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Aroutis N. Foster, PhD (*Michigan State University*). Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities).

Kathy Geller, PhD (*Fielding Graduate University*). Assistant Clinical Professor. Educational leadership and management.

Rajashi Ghosh, PhD (*University of Louisville, Kentucky*). Assistant Professor. Mentoring and leader development, workplace Incivility, workplace learning and development.

John M. Gould, PhD (*University of Pittsburgh*) *Harrisburg EdD Educational Leadership & Change Program*. Associate Clinical Professor. Change leadership, curriculum re-design, the impact of technology on learning.

Mary Jo Grdina, PhD (*Case Western Reserve University*). Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD (*Indiana University*). Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

Francis Harvey, EdD (*Harvard University*). Associate Professor. Enhanced learning, socio-cultural learning, distance education.

Elizabeth Haslam, PhD (*University of Pennsylvania*). Auxiliary Associate Professor. Educational field coordinator, instructional design, qualitative evaluation, writing across the curriculum.

Jennifer Katz-Buonincontro, MFA, PhD (*University of Oregon*). Assistant Professor. Educational administration.

Kristine Lewis, PhD (*Temple University*). Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD (*University of Maryland*) *Dean, Goodwin College of Professional Studies*. Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD (*Curtin University, Science and Mathematics Education Centre, Perth, Australia*). Assistant Professor.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD (*Saint Joseph's University*) *Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD (*Pennsylvania State University*). Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD (*Vanderbilt University*) *Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD (*University of Virginia*). Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD (*Temple University*) *Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: Environmental Education

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades K - 12

This certification option within the BS in Teacher Education (p. 438) emphasizes coursework in such areas of environmental issues as biology and chemistry. Students may also choose to pursue a second certification in biology.

Additional Information

For more information about the program, visit the School of Education (<http://www.drexel.edu/soe>) website.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HIST 280	History of Science: Ancient to Medieval	3.0
HIST 285	Technology in Historical Perspective	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
PHIL 251	Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 451)]	Educational Psychology	3.0
UNIV T101	The Drexel Experience	1.0
	English elective course between 200-329	3.0

Science Requirements

BIO 122	Cells and Genetics	4.5
BIO 124	Evolution & Organismal Diversity	4.5
BIO 126	Physiology and Ecology	4.5
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
ENVS 230	General Ecology	3.0
ENVS 260	Environmental Science and Society	3.0
ENVS 270	History of Life on Earth	4.0
ENVS 272	Physical Geology	4.0
ENVS 284	Physiological and Population Ecology	3.0
ENVS 285 [WI (p. 451)]	Population Ecology Laboratory	2.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 287	Community Ecology Laboratory	2.0
ENVS 330	Aquatic Ecology	3.0
ENVS 390	Marine Ecology	3.0
GEO 201 [WI (p. 451)]	Earth Systems Processes	3.0
PHEV 145	Weather I: Climate and Global Change	4.0

PHEV 146	Weather II: Analysis and Forecasting	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 131	Survey of the Universe	3.0

Pedagogy Requirements

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 451)]	Literacy and Content Skill Development 7-12	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 451)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 405	Senior Pedagogy Seminar	1.0

Student Teaching Experiences

EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 451)]	Student Teaching	9.0

Total Credits **193.5**

Environmental Education Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits
BIO 122	Cells and Genetics	4.5
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV T101	The Drexel Experience	1.0
Term Credits		16.5
Term 2		Credits
BIO 124	Evolution Organismal Diversity	4.5
CIVC 101	Introduction to Civic Engagement	1.0

EDUC 105	Freshman Pedagogy Seminar	1.0	EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0	ENVS 260	Environmental Science and Society	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	HIST 285	Technology in Historical Perspective	3.0
MATH 122	Calculus II	4.0	PHEV 146	Weather II: Analysis and Forecasting	4.0
	Term Credits	16.5	PSY 320 [WI (p. 451)]	Educational Psychology	3.0
Term 3			Term Credits		16.0
BIO 126	Physiology and Ecology	4.5	Term 9		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0	ECON 201	Principles of Microeconomics	4.0
EDUC 105	Freshman Pedagogy Seminar	1.0	EDEX 266 [WI (p. 451)]	Literacy and Content Skill Development 7-12	3.0
EDUC 123	Adolescent Development	3.0	EDUC 216	Diversity and Today's Teacher	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	EDUC 324	Current Research in Curriculum Instruction	3.0
PHEV 145	Weather I: Climate and Global Change	4.0	ENVS 287	Community Ecology Laboratory	2.0
	Term Credits	18.5	ENVS 390	Marine Ecology	3.0
Term 4			Term Credits		18.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0	Term 10		
EDUC 205	Sophomore Pedagogy Seminar	1.0	EDUC 308	Creating a Positive Classroom Climate	3.0
ENVS 230	General Ecology	3.0	EDUC 409	Student Teaching Seminar I	9.0
MATH 123	Calculus III	4.0	Term Credits		12.0
PHYS 101	Fundamentals of Physics I	4.0	Term 11		
PSY 101	General Psychology I	3.0	EDUC 325	Multimedia in Instructional Design	3.0
	Term Credits	18.0	EDUC 410 [WI (p. 451)]	Student Teaching	9.0
Term 5			Term Credits		12.0
COOP 101	Career Management and Professional Development	0.0	Term 12		
EDUC 223	Teaching the Middle School Child	3.0	EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0	EDUC 405	Senior Pedagogy Seminar	1.0
ENVS 270	History of Life on Earth	4.0	ENVS 330	Aquatic Ecology	3.0
PHYS 102	Fundamentals of Physics II	4.0	HIST 280	History of Science: Ancient to Medieval	3.0
English elective course between 200-329		3.0	PHIL 251	Ethics	3.0
	Term Credits	17.0	PHYS 131	Survey of the Universe	3.0
Term 6			Term Credits		16.0
CHEM 101	General Chemistry I	3.5	Total Credit: 193.5		
EDUC 258	Reading in the Content Areas	3.0	Education Faculty		
EDUC 265	Instructing English Language Learners	3.0	W. Edward Bureau, PhD (<i>University of Pennsylvania</i>) Director of the <i>Sacramento EdD</i> . Clinical Associate Professor. Leadership, supervision, and capacity development.		
EDUC 305 [WI (p. 451)]	Junior Pedagogy Seminar	1.0	Holly Carpenter, PhD (<i>Arizona State University</i>). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.		
ENVS 284	Physiological and Population Ecology	3.0	José Luis Chávez, EdD (<i>University of Southern California</i> .) Program Coordinator for the <i>MS in Higher Education Program at the Center for Graduate Studies in Sacramento</i> . Clinical Professor. Higher education leadership and administration.		
ENVS 286	Community and Ecosystem Ecology	3.0	Ellen Clay, PhD (<i>University of Southwestern Louisiana</i>). Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.		
	Term Credits	16.5			
Term 7					
CHEM 102	General Chemistry II	4.5			
EDUC 312	Educational Policy, Law Advocacy	3.0			
ENVS 272	Physical Geology	4.0			
ENVS 285 [WI (p. 451)]	Population Ecology Laboratory	2.0			
GEO 201 [WI (p. 451)]	Earth Systems Processes	3.0			
	Term Credits	16.5			
Term 8					

Rebecca Clothey, PhD (*University of Pittsburgh*) Director, *Higher Education Program*. Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.

Marion Dugan, EdD (*University of Pennsylvania*). Auxiliary Associate Professor. Language arts, student teaching.

Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

Salvatore V. Falletta, EdD (*North Carolina State University*) Director of the *Human Resource Development (HRD) program at Drexel University*. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Aroutis N. Foster, PhD (*Michigan State University*). Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities).

Kathy Geller, PhD (*Fielding Graduate University*). Assistant Clinical Professor. Educational leadership and management.

Rajashi Ghosh, PhD (*University of Louisville, Kentucky*). Assistant Professor. Mentoring and leader development, workplace Incivility, workplace learning and development.

John M. Gould, PhD (*University of Pittsburgh*) *Harrisburg EdD Educational Leadership & Change Program*. Associate Clinical Professor. Change leadership, curriculum re-design, the impact of technology on learning.

Mary Jo Grdina, PhD (*Case Western Reserve University*). Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD (*Indiana University*). Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

Francis Harvey, EdD (*Harvard University*). Associate Professor. Enhanced learning, socio-cultural learning, distance education.

Elizabeth Haslam, PhD (*University of Pennsylvania*). Auxiliary Associate Professor. Educational field coordinator, instructional design, qualitative evaluation, writing across the curriculum.

Jennifer Katz-Buonincontro, MFA, PhD (*University of Oregon*). Assistant Professor. Educational administration.

Kristine Lewis, PhD (*Temple University*). Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD (*University of Maryland*) *Dean, Goodwin College of Professional Studies*. Professor. Curriculum and educational leadership,

educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD (*Curtin University, Science and Mathematics Education Centre, Perth, Australia*). Assistant Professor.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD (*Saint Joseph's University*) *Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD (*Pennsylvania State University*). Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD (*Vanderbilt University*) *Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD (*University of Virginia*). Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD (*Temple University*) *Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: General Science

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 181.5

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades 7 - 12

This certification option within the BS in Teacher Education (p. 438) is a well-rounded program incorporating biology, chemistry, mathematics, and

physics. Students may also choose to pursue a second certification in any of the other certification areas. A sample plan of study is available.

Additional Information

For more information about the program, visit the School of Education (<http://www.drexel.edu/soe>) website.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HIST 280	History of Science: Ancient to Medieval	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
PHIL 251	Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 454)]	Educational Psychology	3.0
UNIV T101	The Drexel Experience	1.0
Free Electives		6.0
English (ENGL) course between 200-329		3.0

Science Requirements

BIO 107	Cells, Genetics & Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
BIO 109	Biological Diversity, Ecology & Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
CHEM 103	General Chemistry III	5.0
ENVS 284	Physiological and Population Ecology	3.0
ENVS 285 [WI (p. 454)]	Population Ecology Laboratory	2.0
ENVS 286	Community and Ecosystem Ecology	3.0
ENVS 390	Marine Ecology	3.0
GEO 101	Physical Geology	4.0
GEO 102	History of Life on Earth	4.0
PHEV 145	Weather I: Climate and Global Change	4.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
PHYS 131	Survey of the Universe	3.0
Science, Technology and Human Affairs Elective (see program advisor)		6.0

Pedagogy Requirements

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 454)]	Literacy and Content Skill Development 7-12	3.0

EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 454)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 405	Senior Pedagogy Seminar	1.0

Student Teaching Experiences

EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 454)]	Student Teaching	9.0

Total Credits **180.0**

General Science Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits
CHEM 101	General Chemistry I	3.5
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
UNIV T101	The Drexel Experience	1.0
Term Credits		15.5

Term 2		Credits
CHEM 102	General Chemistry II	4.5
CIVC 101	Introduction to Civic Engagement	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
Term Credits		16.5

Term 3		Credits
CHEM 103	General Chemistry III	5.0
EDEX 142	Special Education Foundations: Referral and Assessment	3.0

EDUC 105	Freshman Pedagogy Seminar	1.0	EDUC 324	Current Research in Curriculum Instruction	3.0
EDUC 123	Adolescent Development	3.0	ENVS 390	Marine Ecology	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	HIST 280	History of Science: Ancient to Medieval	3.0
Term Credits		15.0	Science, Technology and Human Affairs elective (See program advisor)		3.0
Term 4					
BIO 107	Cells, Genetics Physiology	3.0	Term Credits		18.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0	Term 10		
EDEX 244	Inclusionary Practices for Exceptional Students	3.0	EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0	EDUC 409	Student Teaching Seminar I	9.0
MATH 123	Calculus III	4.0	Term Credits		12.0
PHYS 101	Fundamentals of Physics I	4.0	Term 11		
Term Credits		16.0	EDUC 325	Multimedia in Instructional Design	3.0
Term 5					
BIO 109	Biological Diversity, Ecology Evolution	3.0	EDUC	Student Teaching	9.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0	410 [WI		
COOP 101	Career Management and Professional Development	0.0	(p. 454)]		
EDUC 223	Teaching the Middle School Child	3.0	Term Credits		12.0
EDUC 322	Evaluation of Instruction	3.0	Term 12		
GEO 102	History of Life on Earth	4.0	EDUC 316	Teaching in Urban Contexts	3.0
Term Credits		14.0	EDUC 405	Senior Pedagogy Seminar	1.0
Term 6					
EDUC 258	Reading in the Content Areas	3.0	PHIL 251	Ethics	3.0
EDUC 265	Instructing English Language Learners	3.0	English (ENGL) course between 200-329		3.0
EDUC	Junior Pedagogy Seminar	1.0	Science, Technology and Human Affairs elective (See program advisor)		3.0
305 [WI			Free Electives		3.0
(p. 454)]			Term Credits		16.0
ENVS 284	Physiological and Population Ecology	3.0	Total Credit: 180.0		
PHYS 102	Fundamentals of Physics II	4.0	Education Faculty		
PSY 101	General Psychology I	3.0	W. Edward Bureau, PhD (<i>University of Pennsylvania</i>) Director of the <i>Sacramento EdD</i> . Clinical Associate Professor. Leadership, supervision, and capacity development.		
Term Credits		17.0	Holly Carpenter, PhD (<i>Arizona State University</i>). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.		
Term 7					
EDUC 312	Educational Policy, Law Advocacy	3.0	José Luis Chávez, EdD (<i>University of Southern California</i> .) Program Coordinator for the MS in Higher Education Program at the Center for Graduate Studies in Sacramento. Clinical Professor. Higher education leadership and administration.		
ENVS	Population Ecology Laboratory	2.0	Ellen Clay, PhD (<i>University of Southwestern Louisiana</i>). Auxiliary Assistant Professor. Professional development opportunities for teachers in the area of mathematics and mathematical thinking.		
285 [WI			Rebecca Clothey, PhD (<i>University of Pittsburgh</i>) Director, <i>Higher Education Program</i> . Auxiliary Assistant Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.		
(p. 454)]			Marion Dugan, EdD (<i>University of Pennsylvania</i>). Auxiliary Associate Professor. Language arts, student teaching.		
GEO 101	Physical Geology	4.0	Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.		
PHYS 131	Survey of the Universe	3.0			
Free Elective		3.0			
Term Credits		15.0			
Term 8					
EDUC 315	Secondary Science Teaching Methods	3.0			
ENVS 286	Community and Ecosystem Ecology	3.0			
PHEV 145	Weather I: Climate and Global Change	4.0			
PSY 320 [WI	Educational Psychology	3.0			
(p. 454)]					
Term Credits		13.0			
Term 9					
EDEX	Literacy and Content Skill Development 7-12	3.0			
266 [WI					
(p. 454)]					
EDUC 216	Diversity and Today's Teacher	3.0			

Salvatore V. Falletta, EdD (*North Carolina State University*) Director of the Human Resource Development (HRD) program at Drexel University.. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

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Mary Jo Grdina, PhD (*Case Western Reserve University*). Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD (*Indiana University*). Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

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Jennifer Katz-Buonincontro, MFA, PhD (*University of Oregon*). Assistant Professor. Educational administration.

Kristine Lewis, PhD (*Temple University*). Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD (*University of Maryland*) *Dean, Goodwin College of Professional Studies*. Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD (*Curtin University, Science and Mathematics Education Centre, Perth, Australia*). Assistant Professor.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD (*Saint Joseph's University*) *Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD (*Pennsylvania State University*). Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD (*Vanderbilt University*.) *Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD (*University of Virginia*). Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD (*Temple University*) *Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: Mathematics

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.5

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades 7 - 12

This certification option within the BS in Teacher Education (p. 438) emphasizes coursework in such areas of mathematics as calculus, linear algebra, differential equations, probability and statistics, techniques of mathematical proof, and discrete mathematics. Students may also choose to pursue a second certification in physics or one of the other sciences.

Additional Information

For more information about the program, visit the School of Education (<http://www.drexel.edu/soe>) website.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
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COOP 101	Career Management and Professional Development	0.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
English elective course between 200-329		3.0
HIST 280	History of Science: Ancient to Medieval	3.0
INFO 108	Foundations of Software	3.0
PHIL 251	Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 457)]	Educational Psychology	3.0
UNIV T101	The Drexel Experience	1.0
Mathematics Requirements		
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra	4.0
MATH 205	Survey of Geometry	3.0
MATH 210	Differential Equations	4.0
MATH 220 [WI (p. 457)]	Introduction to Mathematical Reasoning	3.0
MATH 221	Discrete Mathematics	3.0
MATH 311	Probability and Statistics I	4.0
MATH 312	Probability and Statistics II	4.0
MATH 331	Abstract Algebra I	4.0
Science Requirements		
BIO 107	Cells, Genetics & Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
BIO 109	Biological Diversity, Ecology & Evolution	3.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
ENVS 260	Environmental Science and Society	3.0
PHYS 101	Fundamentals of Physics I	4.0
PHYS 102	Fundamentals of Physics II	4.0
Pedagogy Requirements		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 457)]	Literacy and Content Skill Development 7-12	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0

EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 457)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
MTED 428	Cultural and Historical Significance of Mathematics	3.0
MTED 419	Teaching Secondary Mathematics	3.0
Student Teaching Experience		
EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 457)]	Student Teaching	9.0
Total Credits		182.0

Mathematics Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
PSY 101	General Psychology I	3.0
UNIV T101	The Drexel Experience	1.0
Term Credits		15.0
Term 2		Credits
CIVC 101	Introduction to Civic Engagement	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
INFO 108	Foundations of Software	3.0
MATH 122	Calculus II	4.0
Term Credits		15.0
Term 3		Credits
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 123	Adolescent Development	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 123	Calculus III	4.0
Term Credits		14.0
Term 4		Credits
BIO 107	Cells, Genetics Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0

EDUC 205	Sophomore Pedagogy Seminar	1.0
MATH 200	Multivariate Calculus	4.0
Term Credits		12.0

Term 5

BIO 109	Biological Diversity, Ecology Evolution	3.0
CHEM 101	General Chemistry I	3.5
COOP 101	Career Management and Professional Development	0.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 322	Evaluation of Instruction	3.0
MATH 221	Discrete Mathematics	3.0
PSY 320 [WI (p. 457)]	Educational Psychology	3.0
Term Credits		18.5

Term 6

EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 457)]	Junior Pedagogy Seminar	1.0
MATH 210	Differential Equations	4.0
MATH 311	Probability and Statistics I	4.0
PHYS 101	Fundamentals of Physics I	4.0
Term Credits		19.0

Term 7

EDUC 312	Educational Policy, Law Advocacy	3.0
MATH 220 [WI (p. 457)]	Introduction to Mathematical Reasoning	3.0
MTED 428	Cultural and Historical Significance of Mathematics	3.0
MATH 312	Probability and Statistics II	4.0
PHYS 102	Fundamentals of Physics II	4.0
Term Credits		17.0

Term 8

CHEM 102	General Chemistry II	4.5
ECON 201	Principles of Microeconomics	4.0
HIST 280	History of Science: Ancient to Medieval	3.0
MATH 331	Abstract Algebra I	4.0
MTED 419	Teaching Secondary Mathematics	3.0
Term Credits		18.5

Term 9

EDUC 216	Diversity and Today's Teacher	3.0
EDUC 324	Current Research in Curriculum Instruction	3.0
EDEX 266 [WI (p. 457)]	Literacy and Content Skill Development 7-12	3.0
MATH 201	Linear Algebra	4.0
MATH 205	Survey of Geometry	3.0
Term Credits		16.0

Term 10

EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 409	Student Teaching Seminar I	9.0
Term Credits		12.0

Term 11

EDUC 325	Multimedia in Instructional Design	3.0
EDUC 410 [WI (p. 457)]	Student Teaching	9.0
Term Credits		12.0

Term 12

EDUC 316	Teaching in Urban Contexts	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
ENVS 260	Environmental Science and Society	3.0
PHIL 251	Ethics	3.0
English (ENGL) course between 200-329		3.0
Term Credits		13.0

Total Credit: 182.0**Education Faculty**

W. Edward Bureau, PhD (*University of Pennsylvania*) Director of the *Sacramento EdD*. Clinical Associate Professor. Leadership, supervision, and capacity development.

Holly Carpenter, PhD (*Arizona State University*). Assistant Clinical Professor. Higher education policy development and implementation, community college/university articulation, and online education.

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John M. Gould, PhD (*University of Pittsburgh*) *Harrisburg EdD Educational Leadership & Change Program*. Associate Clinical Professor. Change leadership, curriculum re-design, the impact of technology on learning.

Mary Jo Grdina, PhD (*Case Western Reserve University*). Auxiliary Assistant Professor. Undergraduate studies, science education, curriculum design.

Dominic F. Gullo, PhD (*Indiana University*). Professor. Studying the relative and long-range effects of early schooling experiences in prekindergarten and kindergarten on children's achievement and social adaptation to school routine.

Francis Harvey, EdD (*Harvard University*). Associate Professor. Enhanced learning, socio-cultural learning, distance education.

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Kristine Lewis, PhD (*Temple University*). Assistant Professor. Experiences of students of African descent at predominantly white colleges and universities, college access and college student development, youth civic engagement in urban school reform, qualitative research and evaluation.

William Lynch, PhD (*University of Maryland*) *Dean, Goodwin College of Professional Studies*. Professor. Curriculum and educational leadership, educational technology, distance learning policy development, higher and adult education.

Sonya Martin, PhD (*Curtin University, Science and Mathematics Education Centre, Perth, Australia*). Assistant Professor.

Michel Miller, PhD (*University of Miami, Florida*). Auxiliary Assistant Professor. Special education.

Sarah P. Reynolds, EdD (*Saint Joseph's University*) *Program Director*. Associate Clinical Professor. Emphasis in cross-cultural, language and academic development.

Ellen B. Scales, PhD (*Pennsylvania State University*). Auxiliary Assistant Professor. Literacy, mathematics education, special education.

Jason Silverman, PhD (*Vanderbilt University*) *Director of the Program in Mathematical Learning and Teaching*. Assistant Professor. Teaching and learning of advanced mathematical ideas (algebra and calculus); improving teachers' ability to orchestrate and sustain inquiry-based and discussion-based instruction; technology in mathematics education.

David A. Urias, PhD (*University of Virginia*). Assistant Professor. International education, educational assessment, the influence of corporate philanthropy on higher education.

Sheila Vaidya, PhD (*Temple University*) *Associate Director of Research and Outreach Programs*. Associate Professor. Educational psychology, school psychology, research design.

Charles A. Williams, PhD (*Temple University*). Associate Teaching Professor. Prevention of school-aged violence.

Interdepartmental Faculty

Barbara Jean Hoekje, PhD (*University of Pennsylvania*) *Director of English Language Center*. Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Fredricka K. Reisman, PhD (*Syracuse University*) *Director of the Torrance Center for Creativity and Innovation*. Professor. Mathematics education, learning mathematics, mathematics pedagogy, teacher education, heuristic diagnostic learning and teaching, theory and research in creativity and applied creativity.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: Physics

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.5

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades 7- 12

This certification option within the BS in Teacher Education (p. 438) emphasizes coursework in physics and atmospheric science, including such topics as classical mechanics, electromagnetic fields, quantum mechanics, and physics of high fidelity, and survey of the universe. Students may also choose to pursue a second certification in mathematics.

Additional Information

For more information about the program, visit the School of Education (<http://drexel.edu/soe>) website.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HIST 280	History of Science: Ancient to Medieval	3.0
MATH 121	Calculus I	4.0
MATH 122	Calculus II	4.0
MATH 123	Calculus III	4.0
MATH 200	Multivariate Calculus	4.0
MATH 201	Linear Algebra	4.0

MATH 210	Differential Equations	4.0
PHIL 251	Ethics	3.0
PSY 101	General Psychology I	3.0
PSY 320 [WI (p. 460)]	Educational Psychology	3.0
UNIV T101	The Drexel Experience	1.0
	English elective course between 200-329	3.0

Science Requirements

BIO 107	Cells, Genetics & Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
BIO 109	Biological Diversity, Ecology & Evolution	3.0
CHEM 101	General Chemistry I	3.5
CHEM 102	General Chemistry II	4.5
ENVS 260	Environmental Science and Society	3.0
PHEV 141 [WI (p. 460)]	Atmospheric Science I: Climate and Global Change	3.0
PHYS 113	Contemporary Physics I	5.0
PHYS 114	Contemporary Physics II	5.0
PHYS 115	Contemporary Physics III	5.0
PHYS 131	Survey of the Universe	3.0
PHYS 201	Fundamentals of Physics III	4.0
PHYS 217	Thermodynamics	4.0
PHYS 311	Classical Mechanics I	4.0
PHYS 312	Classical Mechanics II	4.0
PHYS 321	Electromagnetic Fields I	4.0
PHYS 326	Quantum Mechanics I	4.0

Pedagogy Requirements

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 460)]	Literacy and Content Skill Development 7-12	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 460)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 315	Secondary Science Teaching Methods	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 405	Senior Pedagogy Seminar	1.0

Student Teaching Experiences

EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 460)]	Student Teaching	9.0

Total Credits **188.0**
Physics Concentration: Plan of Study**4Yr UG Co-op Concentration**

Term 1		Credits
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 121	Calculus I	4.0
PHYS 113	Contemporary Physics I	5.0
UNIV T101	The Drexel Experience	1.0

Term Credits **17.0**

Term 2		
CIVC 101	Introduction to Civic Engagement	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 122	Calculus II	4.0
PHYS 114	Contemporary Physics II	5.0

Term Credits **17.0**

Term 3		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 123	Adolescent Development	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHYS 115	Contemporary Physics III	5.0

Term Credits **15.0**

Term 4		
BIO 107	Cells, Genetics Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
CHEM 101	General Chemistry I	3.5
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
MATH 123	Calculus III	4.0

Term Credits **15.5**

Term 5		
BIO 109	Biological Diversity, Ecology Evolution	3.0
COOP 101	Career Management and Professional Development	0.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 322	Evaluation of Instruction	3.0
MATH 200	Multivariate Calculus	4.0

Term Credits **13.0**

Term 6		
EDUC 258	Reading in the Content Areas	3.0

EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 460)]	Junior Pedagogy Seminar	1.0
MATH 201	Linear Algebra	4.0
PHYS 217	Thermodynamics	4.0
PHYS 311	Classical Mechanics I	4.0
Term Credits		19.0
Term 7		
CHEM 102	General Chemistry II	4.5
EDUC 312	Educational Policy, Law Advocacy	3.0
MATH 210	Differential Equations	4.0
PHYS 131	Survey of the Universe	3.0
PHYS 312	Classical Mechanics II	4.0
Term Credits		18.5
Term 8		
EDUC 315	Secondary Science Teaching Methods	3.0
HIST 280	History of Science: Ancient to Medieval	3.0
PHEV 141 [WI (p. 460)]	Atmospheric Science I: Climate and Global Change	3.0
PHYS 201	Fundamentals of Physics III	4.0
PHYS 321	Electromagnetic Fields I	4.0
Term Credits		17.0
Term 9		
EDEX 266 [WI (p. 460)]	Literacy and Content Skill Development 7-12	3.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 324	Current Research in Curriculum Instruction	3.0
PSY 101	General Psychology I	3.0
English (ENGL) course between 200-329		3.0
Term Credits		15.0
Term 10		
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 409	Student Teaching Seminar I	9.0
Term Credits		12.0
Term 11		
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 410 [WI (p. 460)]	Student Teaching	9.0
Term Credits		12.0
Term 12		
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
ENVS 260	Environmental Science and Society	3.0
PHIL 251	Ethics	3.0
PSY 320 [WI (p. 460)]	Educational Psychology	3.0
PHYS 326	Quantum Mechanics I	4.0
Term Credits		17.0

Total Credit: 188.0

Education Faculty

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Stephen C. Ehrmann Associate Clinical Professor. Learning technologies, learning science, assessment, evaluation, and professional development strategies, used to help educators make visible improvements in programmatic learning outcomes.

Salvatore V. Falletta, EdD (*North Carolina State University*) Director of the *Human Resource Development (HRD) program at Drexel University*.. Associate Clinical Professor. Human Resource intelligence (i.e., HR research and analytics practices); HRD assessment, measurement, and evaluation models and taxonomies; organizational diagnostic models; web-based employee and organizational survey methods, and computational modeling.

Aroutis N. Foster, PhD (*Michigan State University*). Assistant Professor. Educational psychology and educational technology, especially the following: Motivation; Technological Pedagogical Content Knowledge (TPACK); Immersive Interactive Digital Environments (simulation, games, virtual realities).

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Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Teacher Education: Social Studies

Major: Teacher Education

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 184.0

Classification of Instructional Programs (CIP) code: 13.1205

Standard Occupational Classification (SOC) code: 25-2031

About the Concentration

Certification is for grades 7 - 12

This certification option within the BS in Teacher Education (p. 438) is designed to prepare students to teach social studies using appropriate pedagogy strategies. Topics include history, geography, civics, economics and psychology.

Additional Information

For more information about the program, visit the School of Education (<http://goodwin.drexel.edu/soe>) website.

Degree Requirements

General Education and Concentration Content Requirements

ANTH 101	Introduction to Cultural Diversity	3.0
ANTH 110	Human Past: Anthropology and Prehistoric Archeology	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
ENGL 205 [WI (p. 463)]	American Literature I	3.0
HIST 161	Themes in World Civilization I	3.0
HIST 162	Themes in World Civilization II	3.0
HIST 163	Themes in World Civilization III	3.0
HIST 201	United States History to 1815	3.0
HIST 202	United States History, 1815-1900	3.0
HIST 203	United States History since 1900	3.0
HIST 212	Themes in African-American History	3.0
HIST 216	Freedom in America	3.0
HIST 222	History of Work & Workers in America	3.0
HIST 224	Women in American History	3.0
HIST 276	The History of Philadelphia	3.0
HIST 285	Technology in Historical Perspective	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
PSCI 110	American Government I	4.0

PSCI 140	Introduction to Comparative Political Analysis	4.0
PSCI 150	International Politics	4.0
PSCI 220	Constitutional Law I	4.0
PSCI 240	Comparative Government	4.0
PSCI 329	Theories of Justice	3.0
PSCI 375	Politics of Immigration	3.0
PSY 101	General Psychology I	3.0
PSY 150	Introduction to Social Psychology	3.0
PSY 320 [WI (p. 463)]	Educational Psychology	3.0
SOC 101	Introduction to Sociology	3.0
SOC 210	Race, Ethnicity and Social Inequality	3.0
SOC 335	Sociology of Education	3.0
UNIV T101	The Drexel Experience	1.0
Pedagogy Requirements		
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDEX 266 [WI (p. 463)]	Literacy and Content Skill Development 7-12	3.0
EDGE 210	Geography Education	3.0
EDGE 211	Geography Education: Teacher Laboratory	1.5
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	3.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
EDUC 123	Adolescent Development	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 265	Instructing English Language Learners	3.0
EDUC 305 [WI (p. 463)]	Junior Pedagogy Seminar	1.0
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 312	Educational Policy, Law & Advocacy	3.0
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 356	Secondary Social Studies Methods	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
Student Teaching Experience		
EDUC 409	Student Teaching Seminar I	9.0
EDUC 410 [WI (p. 463)]	Student Teaching	9.0
Total Credits		196.5

Social Studies Concentration: Plan of Study

4 YR UG Co-op Concentration

Term 1		Credits
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HIST 161	Themes in World Civilization I	3.0
MATH 181	Mathematical Analysis I	3.0
PSY 101	General Psychology I	3.0
UNIV T101	The Drexel Experience	1.0
Term Credits		17.0
Term 2		
HIST 162	Themes in World Civilization II	3.0
ANTH 101	Introduction to Cultural Diversity	3.0
CIVC 101	Introduction to Civic Engagement	1.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 123	Adolescent Development	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 182	Mathematical Analysis II	3.0
Term Credits		17.0
Term 3		
ANTH 110	Human Past: Anthropology and Prehistoric Archeology	3.0
COOP 101	Career Management and Professional Development	0.0
EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDUC 105	Freshman Pedagogy Seminar	1.0
EDUC 113	Organizational Structure of Secondary Schools	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 183	Mathematical Analysis III	3.0
Term Credits		16.0
Term 4		
SOC 101	Introduction to Sociology	3.0
EDEX 244	Inclusionary Practices for Exceptional Students	3.0
EDUC 205	Sophomore Pedagogy Seminar	1.0
EDUC 223	Teaching the Middle School Child	3.0
EDUC 265	Instructing English Language Learners	3.0
HIST 203	United States History since 1900	3.0
PSY 150	Introduction to Social Psychology	3.0
Term Credits		19.0
Term 5		
ENGL 205 [WI (p. 463)]	American Literature I	3.0
HIST 276	The History of Philadelphia	3.0
PSCI 110	American Government I	4.0
PSCI 140	Introduction to Comparative Political Analysis	4.0

SOC 210	Race, Ethnicity and Social Inequality	3.0
Term Credits		17.0
Term 6		
ECON 201	Principles of Microeconomics	4.0
EDEX 266 [WI (p. 463)]	Literacy and Content Skill Development 7-12	3.0
EDUC 258	Reading in the Content Areas	3.0
EDUC 324	Current Research in Curriculum Instruction	3.0
EDUC 356	Secondary Social Studies Methods	3.0
Term Credits		16.0
Term 7		
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 312	Educational Policy, Law Advocacy	3.0
EDUC 322	Evaluation of Instruction	3.0
HIST 201	United States History to 1815	3.0
PSCI 240	Comparative Government	4.0
PSCI 329	Theories of Justice	3.0
Term Credits		19.0
Term 8		
HIST 163	Themes in World Civilization III	3.0
HIST 216	Freedom in America	3.0
SOC 335	Sociology of Education	3.0
EDGE 210	Geography Education	3.0
EDGE 211	Geography Education: Teacher Laboratory	1.5
EDUC 305 [WI (p. 463)]	Junior Pedagogy Seminar	1.0
PSCI 150	International Politics	4.0
Term Credits		18.5
Term 9		
HIST 202	United States History, 1815-1900	3.0
HIST 222	History of Work Workers in America	3.0
HIST 285	Technology in Historical Perspective	3.0
PSCI 220	Constitutional Law I	4.0
PSY 320 [WI (p. 463)]	Educational Psychology	3.0
Term Credits		16.0
Term 10		
EDUC 308	Creating a Positive Classroom Climate	3.0
EDUC 409	Student Teaching Seminar I	9.0
Term Credits		12.0
Term 11		
EDUC 325	Multimedia in Instructional Design	3.0
EDUC 410 [WI (p. 463)]	Student Teaching	9.0
Term Credits		12.0
Term 12		
EDUC 316	Teaching in Urban Contexts	3.0
EDUC 405	Senior Pedagogy Seminar	1.0
ECON 202	Principles of Macroeconomics	4.0
HIST 212	Themes in African-American History	3.0

HIST 224	Women in American History	3.0
PSCI 375	Politics of Immigration	3.0
Term Credits		17.0

Total Credit: 196.5

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Patricia Henry Russell, MS (*Drexel University*). Teaching Professor. Probability and statistics.

Minor in Education

The minor in education provides a structured academic opportunity for students who wish to add a fundamental understanding of the field of education as well as practical knowledge in the art and science of teaching and learning to their undergraduate experience.

Designed for students with a strong interest in education and training, the minor will not necessarily lead to the student being recommended for a state teaching certificate. However, should a student decide to also pursue a teaching certificate as a component of his or her major—or in post-baccalaureate work—the courses required for the minor are applicable to Pennsylvania State certification.

Required Courses

EDEX 142	Special Education Foundations: Referral and Assessment	3.0
EDEX 246 [WI (p. 466)]	Literacy and Content Skill Development PreK-8	3.0
EDUC 101	Foundations in Education I: A Historical and Philosophical Perspective	3.0
EDUC 120 or EDUC 123	Child Development I: Typical Development or Adolescent Development	3.0
EDUC 216	Diversity and Today's Teacher	3.0
EDUC 322	Evaluation of Instruction	3.0
EDUC 324	Current Research in Curriculum & Instruction	3.0
EDUC 325	Multimedia in Instructional Design	3.0
Total Credits		24.0

Minor in STEM Education

This minor, which can be coupled with a variety of STEM majors and students pursuing the DragonsTeach program, will provide an opportunity for STEM majors to explore STEM Education, and to develop core knowledge and practices in secondary STEM Education. Successful STEM minor students may build upon the minor's course work to readily complete course work leading to recommendation for PA teaching certification as a secondary teacher (grades 7-12) in one or more STEM content areas. Additional course work includes for teacher certification includes Student Teaching and required special education and English language learner courses (an additional 3 courses + student teaching).

Introductory Courses

ESTM 201	DragonsTeach: Step 1	1.5
ESTM 210	DragonsTeach: Step 2	1.5

STEM Education Core Courses

ESTM 301	Knowing and Learning in Mathematics and Science	3.0
ESTM 302	Classroom Interactions	3.0
ESTM 303	Research and Practice in Science and Mathematics Education	3.0

ESTM 350	Problem-Based Instruction	4.0
EDUC 428	Cultural and Historical Significance of Mathematics *	3.0

or HIST 288 History of Science: Medieval to Enlightenment

STEM Research Methods

ESTM 380	Research Methods **	3.0
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Special Education Courses

Select one of the following:

EDEX 142	Special Education Foundations: Referral and Assessment	
EDUC 244	Inclusionary Practices for Exceptional Students	
EDUC 265	Instructing English Language Learners	

Total Credits **22.0**

* Math majors should take EDUC 428 and Science majors should take HIST 288.

** A Research/Methods/Design course from the student's home department may be substituted with consultation from the DragonsTeach advisor.

PRST 330	Career & Professional Development	
WRIT 220 [WI]	Creative Nonfiction Writing (p. 467)]	

WRIT 225 [WI]	Creative Writing (p. 467)]	
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Total Credits **18.0-20.0**

Certificate in Creativity and Innovation

Certificate Level: Undergraduate

Admission Requirements: High school diploma

Certificate Type: Certificate

Number of Credits to Completion: 18.0 - 20.0

Instructional Delivery: Campus

Calendar Type: Quarter

Expected Time to Completion: 2 years

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 30.9999

Standard Occupational Classification (SOC) Code: 11-9199

The undergraduate certificate in Creativity and Innovation seeks to produce individuals who are equipped with the fundamental creative problem solving competencies that are indicative of creative leaders. The certificate is designed to provide knowledge of the major creativity theories, to enhance a student's latent creative strengths, to foster ability to apply creativity in the workplace, and to present methods for assessing creative strengths.

Students have the option of completing this undergraduate certificate as a stand-alone professional development credential or as a concentration within their baccalaureate degree.

Requirements

Core Courses

CRTV 301	Foundations in Creativity	3.0
CRTV 302	Tools and Techniques in Creativity	3.0
PRST 450	Creative Leadership for Professionals	3.0

Electives

Select three of the following: 9.0-11.0

CRTV 303	Creativity in the Workplace	
GSTD 210	Fact & Fiction in Film	
MGMT 260	Introduction to Entrepreneurship	
MGMT 364	Technology Management	

School of Public Health

About the School

The Dornsife School of Public Health promotes the health of communities through an integrated program of education, research, service and practice. The School is committed to identifying societal conditions required for people to be healthy, and to advancing practices that improve the health of vulnerable populations. The School enhances the health of communities by creating partnerships based on community values, strengths and assets. Its curriculum, stresses the importance of understanding and addressing the connection between human rights and health status.

The mission of the Dornsife School of Public Health (<http://publichealth.drexel.edu>) is to promote health and quality of life through graduate education, applied research, and community service in the prevention and control of disease, injury, and disability. The curriculum combines knowledge of the disciplines of public health and practical applications of that knowledge. By working collaboratively with community groups, agencies, and populations, professionals are prepared to effectively address today's most pressing public health problems.

Preparation and Partnership

The School believes that professionals can best meet the needs of today and tomorrow with expertise in the integration and practical application of all disciplines of public health. The Dornsife School of Public Health's educational and research programs are built upon partnerships with communities and the organizations that serve them.

The School prepares professionals to assess population health; to ensure appropriate services through programmatic, economic, and organizational interventions; and to develop and evaluate policy interventions.

Majors

- Public Health (p. 468)

Minor

- Public Health (p. 470)

Public Health

Major: Public Health

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 181.0

Classification of Instructional Programs (CIP) code: 51.2201

Standard Occupational Classification (SOC) code: 11-9111; 21-1091; 21-1094

About the Program

Public health is the science of protecting and improving the health and well-being of communities. Where clinical professionals such as doctors and nurses focus on treating individuals after they become sick or are injured, public health professionals are concerned with the health of entire populations, attempting to prevent problems from occurring or recurring through education, policy development, advocacy, service and research.

Reflecting the interdisciplinary approach of the School of Public Health (<http://publichealth.drexel.edu>), students in the major will take courses originating from the various public health core disciplines, which include epidemiology, community health and prevention, environmental and occupational health, and health management and policy. The diversity in course offerings provides the students with the general foundations of each discipline within public health. Student learning is enhanced by faculty expertise from a wide array of backgrounds ranging from epidemiology, community health, global health, sociology, psychology, medicine, health policy, health economics, industrial hygiene and anthropology in addition to many more. As the students progress through the major, they will gain more breadth and depth in the specific discipline of their choosing through the co-op experience as well as the capstone courses in their senior year.

The School of Public Health is dedicated to the integration of social justice and human rights in academic public health and being a model for interdisciplinary collaboration and civic engagement. Additionally, a commitment to global engagement is core to the School's mission. The Global Public Health Initiative was created to provide opportunities for all public health student to gain rich and meaningful experiences working on health issues that transcend national boundaries or that may be influenced by circumstances or experiences in other countries.

Upon completion of the degree, students will be better equipped to complete graduate education in public health or health sciences. Students will have acquired skills that could be translated into the workplace (city, state or local government, non for profit, etc.) or other post baccalaureate educational settings such as an MPH, JD or MD.

Goals and Objectives

By the conclusion of the major, all students will be able to:

1. Illustrate the interdisciplinary nature of public health in disease prevention and health promotion on both individuals and populations.
2. Recognize the interconnectedness between physical and natural sciences and how each address population-based health challenges.
3. Illustrate the fundamental relationship between health and human rights and the role of social justice and ethics.
4. Highlight the important role that epidemiology and surveillance play in shaping and protecting the health of populations.
5. Recognize the importance of historical context regarding public health milestones as they shape policies and programs.
6. Obtain a greater understanding of the role of culture and values and how they influence relationships between social determinants of health and the built environment.
7. Identify and address population health challenges through the various public health concentrations.
8. Illustrate the overarching role that the social determinants of health have in promoting or hindering health.
9. Acquire a working knowledge of the US healthcare and healthcare delivery system.

Degree Requirements

General Education Requirements

COM 230	Techniques of Speaking	3.0
COM 320 [WI (p. 468)]	Science Writing	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PBHL 101	Public Health 101	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV PH101	The Drexel Experience	2.0
Students must select one of the following math sequences:		12.0

MATH 101 Introduction to Analysis I
& MATH 102 and Introduction to Analysis II
& MATH 239 and Mathematics for the Life Sciences

Or

MATH 121 Calculus I
& MATH 122 and Calculus II
& MATH 123 and Calculus III

Physical and Life Sciences Requirements 19.0

Students must select one of the following biology sequences:

BIO 107 Cells, Genetics & Physiology
& BIO 108 and Cells, Genetics and Physiology Laboratory
& BIO 109 and Biological Diversity, Ecology & Evolution
& BIO 110 and Biological Diversity, Ecology and Evolution Laboratory

Or

BIO 122 Cells and Genetics
& BIO 124 and Evolution & Organismal Diversity
& BIO 126 and Physiology and Ecology

*Please note that student who take the BIO 122, BIO 124, and BIO 126 sequence will be required to take fewer free electives.

Students must select one of the following chemistry sequences:

CHEM 111 General Chemistry I
& CHEM 112 and General Chemistry II

Or

CHEM 101 General Chemistry I
& CHEM 102 and General Chemistry II

Social Science Requirements

PSY 101	General Psychology I	3.0
SOC 101	Introduction to Sociology	3.0
Select 7 additional social science electives from the following list:		21.0

ANTH 240 Urban Anthropology

ANTH 250 Anthropology of Immigration

ANTH 370 Ethnographic Methods

ECON 201 Principles of Microeconomics

ECON 202 Principles of Macroeconomics

ECON 240 Economics of Health Care Systems

ENVE 455 Geographic Information Systems

ENSS 345 Sociology of the Environment

HIST 222 History of Work & Workers in America

HIST 223 Women and Work in America

HIST 224 Women in American History

HRMT 323 Principles of Human Resource Administration

IAS 320 Building Global Bridges

MIS 200 Management Information Systems

ORGB 300 [WI Organizational Behavior
(p. 468)]

PHIL 321 Biomedical Ethics

PSCI 353 International Human Rights

PSY 120 Developmental Psychology

PSY 240 [WI Abnormal Psychology
(p. 468)]

PSY 250 [WI Industrial Psychology
(p. 468)]

PSY 368 Critical Psychology

SOC 115 Social Problems

SOC 210 Race, Ethnicity and Social Inequality

SOC 235 Sociology of Health and Illness

WGST 275 Women's Health and Human Rights

Public Health Core Course Requirements

PBHL 301	Epidemiology in Public Health	3.0
PBHL 302	Introduction to the History of Public Health	3.0
PBHL 303	Overview of Issues in Global Health	3.0
PBHL 304	Introduction to Health & Human Rights	3.0
PBHL 306	Introduction to Community Health	3.0
PBHL 308	The U.S. Public Health System	3.0
PBHL 309	Public Health Ethics	3.0
PBHL 311	Public Health Biology	3.0
PBHL 312	Public Health Data Analysis	3.0
PBHL 313	The Social Determinants of Health and Well-Being	3.0
PBHL 314	Environmental and Occupational Health	3.0
PBHL 315	Public Health Leadership	3.0
PBHL 317	The World's Water	3.0

Select five of the following Public Health courses: 15.0

ENVS 341 Equatorial Guinea: Society & Environment

PBHL 305 Women and Children: Health & Society

PBHL 307 Injury Prevention and Control

PBHL 310 Burden of Disease

PBHL 316 Drugs, Society, and Public Health

PBHL 318 Violence and Trauma in Public Health

Public Health Capstone Experience

PBHL 497	Capstone Experience I	3.0
PBHL 498	Capstone Experience II	3.0
PBHL 499	Capstone Experience III	3.0

Free Electives 39.0

Total Credits 181.0

Sample Plan of Study

Term 1		Credits
BIO 107	Cells, Genetics Physiology	3.0
BIO 108	Cells, Genetics and Physiology Laboratory	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0

MATH 101 or 121	Introduction to Analysis I Calculus I	4.0
PBHL 101	Public Health 101	3.0
UNIV PH101	The Drexel Experience	2.0
Term Credits		16.0
Term 2		
BIO 109	Biological Diversity, Ecology Evolution	3.0
BIO 110	Biological Diversity, Ecology and Evolution Laboratory	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102 or 121	Introduction to Analysis II Calculus I	4.0
UNIV PH101	The Drexel Experience	1.0
Social Science elective		3.0
Term Credits		15.0
Term 3		
Social Science		3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 239 or 123	Mathematics for the Life Sciences Calculus III	4.0
Free Elective		6.0
Term Credits		16.0
Term 4		
CHEM 111	General Chemistry I	4.0
CHEM 113	General Chemistry I Laboratory	1.5
PBHL 303	Overview of Issues in Global Health	3.0
PBHL 305	Women and Children: Health Society	3.0
Social Science elective		3.0
Term Credits		14.5
Term 5		
CHEM 112	General Chemistry II	4.0
CHEM 114	General Chemistry II Laboratory	1.5
PBHL 301	Epidemiology in Public Health	3.0
PBHL 304	Introduction to Health Human Rights	3.0
Free elective		3.0
Term Credits		14.5
Term 6		
Free elective		3.0
PBHL 302	Introduction to the History of Public Health	3.0
Public Health (PBHL) required course		3.0
Social Science electives		6.0
Term Credits		15.0
Term 7		
Public Health (PBHL) required courses		6.0
Social Science elective		3.0
Free electives		6.0
Term Credits		15.0
Term 8		
COM 230	Techniques of Speaking	3.0
Public Health (PBHL) required courses		6.0
Public Health (PBHL) elective		3.0

Social Science elective		3.0
Term Credits		15.0
Term 9		
COM 320 [WI (p. 468)]	Science Writing	3.0
Public Health (PBHL) required courses		6.0
Public Health (PBHL) elective		3.0
Social Science elective		3.0
Term Credits		15.0
Term 10		
PBHL 497	Capstone Experience I	3.0
Public Health (PBHL) elective		3.0
Social Science elective		3.0
Free electives		6.0
Term Credits		15.0
Term 11		
PBHL 498	Capstone Experience II	3.0
Public Health (PBHL) elective		3.0
Social Science elective		3.0
Free electives		6.0
Term Credits		15.0
Term 12		
PBHL 499	Capstone Experience III	3.0
Public Health (PBHL) elective		3.0
Free electives		9.0
Term Credits		15.0
Total Credit: 181.0		

Minor in Public Health

The Drexel University School of Public Health trains new leaders to tackle society's current and future health challenges. The Public Health minor is designed to provide students with a broad overview of the field's diversity. Reflecting the interdisciplinary approach of the School, students are required to take courses originating from various public health core disciplines, which include: epidemiology; community health and prevention; environmental and occupational health; and health management and policy.

This minor will be a relevant course of study for students pursuing pre-med, pre-law, biology and business curricula as well as students interested in population-based applications of psychology, sociology and communications theory. Completion of the minor will provide students with an exposure to the breadth and depth of topics within public health, population-level challenges and solutions, as well as possible career options.

Requirements

Please note: PBHL 101 is a prerequisite for all required PBHL courses in this minor.

Required Courses

PBHL 301	Epidemiology in Public Health	3.0
PBHL 302	Introduction to the History of Public Health	3.0
PBHL 303	Overview of Issues in Global Health	3.0

PBHL 304	Introduction to Health & Human Rights	3.0
Elective Choices		
Complete 12 credits from the following courses:		12.0
BIO 318	Biology of Cancer	
ECON 240	Economics of Health Care Systems	
PBHL 305	Women and Children: Health & Society	
PBHL 307	Injury Prevention and Control	
PBHL 310	Burden of Disease	
PBHL 316	Drugs, Society, and Public Health	
PBHL 318	Violence and Trauma in Public Health	
PHIL 321	Biomedical Ethics	
PSCI 353	International Human Rights	
PSY 355	Health Psychology	
PSY 368	Critical Psychology	
SOC 210	Race, Ethnicity and Social Inequality	
SOC 220	Wealth and Power	
SOC 235	Sociology of Health and Illness	
WGST 275	Women's Health and Human Rights	
Total Credits		24.0

Additional Information

For more information about this program, please contact the Program

Director:

Jennifer Breaux, DrPH, MPH

Director, Undergraduate Public Health Education

Drexel University School of Public Health

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The Pennoni Honors College

About the College

The mission of Drexel University's Pennoni Honors College is to enrich the University experience for talented and ambitious students from all majors. The College has five units: the Honors Program, the Center for Interdisciplinary Inquiry (which includes the Great Works Symposium and the Custom-Designed Major), the Office of Undergraduate Research (which includes the STAR and SuperNova Programs), the Drexel Fellowships Office, and the Center for Cultural Outreach (which includes *TheSmartSet.com* and *The Drexel InterView*). Students have the opportunity to apply to the Pennoni Honors Program as late as the spring term of their second year. The other programs in the College are open to all students at the University with the appropriate interests and record of achievement. The College also administers the High School Scholars Program for exceptional high-school students.

The Pennoni Honors College was endowed by Annette and C.R. "Chuck" Pennoni, CEO of Pennoni Associates. Mr. Pennoni, a Drexel graduate, was a two-time interim president of the University. He embodies the qualities of leadership, integrity, intellectual curiosity, and commitment to Drexel and the larger world that the College seeks to imbue in its students.

Major

- Custom-Designed Major (p. 473)
(within the Center for Interdisciplinary Inquiry)

Custom-Designed Major

Major: Custom-Designed Major

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 24.0101

Standard Occupational Classification (SOC) code: 11-9199

About the Program

The Custom-Designed Major enables students to pursue an individualized course of study at Drexel University not readily available through an existing major, or a combination of existing majors and/or minors. The program is designed for highly motivated students whose interdisciplinary curiosity and career ambitions cannot be satisfied by a traditional major.

The major offers students an opportunity for an early intensive research experience, incorporates cooperative education as part of its degree requirements, and culminates in an original, interdisciplinary senior-year project.

Each student accepted into the program will be advised by the Program Director and closely mentored by one or more Drexel faculty members expert in at least one of the disciplines comprising the student's proposed course of study. Students may be admitted as entering freshmen or by transfer. For additional information about applying to this program, contact the Program Director or the The Pennoni Honors College (<http://drexel.edu/pennoni>).

Admission Requirements

Admission to the custom-designed major will be determined on the basis of an application portfolio. In addition to the standard Admissions application, the portfolio will contain:

- a **vision statement** describing in detail what the student hopes to accomplish during his or her time in the program, as well as explaining why the student's educational goals cannot be met by pursuing a regular Drexel major, a double major, or a major combined with minors. The vision statement should also contain a plausible plan of study for achieving the student's aims by drawing upon two or more existing Drexel programs.
- **student transcript**
- **SAT scores**
- **two letters of support** from individuals who can speak to the student's desire and ability to embark on an unconventional, individualized course of study.
- **examples** of projects completed independently by the student, in either a school or an extracurricular setting.

Degree Requirements

Foundation Requirements

CSDN 101 [WI (p. 473)]	Introduction to Multi-Disciplinary Methods	1.0
CSDN 102	Knowledge by Design Seminar	1.0
WEST 210	Innovative Problem Solving	4.0
WEST 220	Multimodal Research	4.0
COOP 101	Career Management and Professional Development	0.0

HNRS 200	Introduction to Honors Program	1.0
UNIV X101	The Drexel Experience	2.0
Humanities courses		9.0
Social sciences courses		9.0
Mathematics courses		6.0
Science courses		8.0

Written Evaluation

At the conclusion of the spring term of the freshman year (or after 3 terms of study for transfers) the student will receive a written evaluation and personal consultation regarding his or her progress. At this point each student will either be allowed to continue in the Custom-Designed Major or will be advised to transfer to another major at Drexel University.

Additional Program Requirements

CSDN 203	Custom-Designed Major Seminar (two terms) *	2.0
Three 300- or 400-level courses in each discipline comprising a significant component of the custom-designed curriculum **		9.0
Three terms of (CSDN) self-directed major project sequence courses		9.0

Guided Course Selection

Students will complete the courses in their agreed-upon customized programs of study under the guidance of the Program Director and other faculty as appropriate. Each student will receive sustained guidance on course selection and sequencing. In addition, at the completion of each academic year, each student will meet with the Program Director to refine and update their vision statement as needed.

Total Credits **180.0**

* Taken for one credit each in the sophomore and junior years.

** All prerequisite courses for these selected courses must also be satisfied.

Co-op and Career Services

Students in the program have the option of two co-op cycles: one is a 5-year program with 3 co-op cycles (5COP), and the second option is 4-year program with one co-op cycle (4COP). Students will meet with their career services adviser during their time in the program to closely match career objectives with curriculum design and co-op/research opportunities.

Westphal College of Media Arts and Design

The Antoinette Westphal College of Media Arts and Design curricula include general studies in liberal arts and science, and experiential learning in studio, lab, and classroom settings within the disciplines.

Mission Statement

The Antoinette Westphal College of Media Arts & Design (<http://www.drexel.edu/westphal>) (The Westphal College) is a community of learning within the areas of media, design, fine arts, performing arts, and the management of creative enterprise that values experiential and immersive education. Students are encouraged to give form to ideas by learning to recognize invention and innovation in a rapidly changing world through creative, critical, and collaborative approaches. The Westphal College's diverse programs seek to foster innovation and leadership in progressively interconnected disciplines and areas of study.

The academic programs are rigorous, and provide the appropriate balance of a solid foundation with individual creative direction, cultural awareness, strong technical skills, and an understanding of management and professional practice. The College is committed to continual review of curricula, processes and outcomes in order to make those improvements and refinements necessary to further enrich the students' education, and to continue to foster independent thinkers, astute leaders, and creative problem solvers.

Majors

- Animation and Visual Effects (p. 478)
- Architecture (p. 482)
- Art History (p. 558)
- Dance (p. 490)
- Design & Merchandising (p. 495)
- Entertainment and Arts Management (p. 501)
- Fashion Design (p. 513)
- Film and Video (p. 517)
- Game Design and Production (p. 522)
- Graphic Design (p. 525)
- Interior Design (p. 528)
- Interactive Digital Media (p. 554)
- Music Industry (p.)
- Photography (p. 536)
- Product Design (p. 540)
- Screenwriting and Playwriting (p. 543)
- TV Production & Media Management (p. 548)
- Westphal Studies Program (p. 557)

Certificates

- Dance Studies (p. 577)
- Retail Leadership (p. 574)

Minors

- Animation and Visual Effects (p. 481)
- Architecture (p. 488)

- Art History (p. 558)
- Dance (p. 494)
- Digital Media (p. 567)
- Film Studies (p. 520)
- Fine Art (p. 567)
- Interactive Digital Media (p. 556)
- Interdisciplinary Smart Initiatives (p. 568)
- Jazz and African-American Music (p. 568)
- Music (p. 569)
- Music Performance (p. 571)
- Music Theory and Composition (p. 572)
- Performing Arts (p. 573)
- Photography (p. 539)
- Product Design (p. 542)
- Retail (p. 575)
- Screenwriting (p. 575)
- Somatics (p. 575)
- Sustainability in the Built Environment (p. 576)
- Television Industry and Enterprise (p. 576)
- TV Production & Media Management (p. 577)
- Theatre (p. 577)
- Video Production (p. 521)

Undergraduate Co-operative Education

Co-op is an essential component in defining the "Drexel Difference" in the Antoinette Westphal College of Media Arts & Design.

Westphal College students spend a minimum of six months (two terms) applying classroom and studio skills in positions within their chosen professions. Often referred to as "The Ultimate Internship," a co-op is a valuable, direct way to learn about a career, work with other professionals, and gain skills and experience that set Drexel graduates apart from students who complete their professional education in more traditional academic settings.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Special Programs

The Westphal College offers a number of special programs including Study Abroad, Accelerated Dual Degree, Accelerated Summer Courses, Enrichment Programs and Dance for Professionals.

Study Abroad

Many students in the College participate in study abroad ranging from ten days to two terms. Some of the more popular programs are: Drexel in London, Fashion in London, Australia, Rome, France and Prague. Students interested in study abroad should consult with their Program Director, Academic Advisor and the Study Abroad Office, 215-895-1704.

Enrichment Programs

The Department of Architecture & Interiors runs summer study tours abroad to Rome and Paris as elective course offerings in history and

theory. These programs focus the travel portion into three-week periods to accommodate student work commitments.

Accelerated Dual Degree Programs

Dual degree programs enable academically qualified students to earn both a bachelor's and an advanced degree in five years.

The following Accelerated Degree Programs are available to qualified High School students entering their freshman year in the Westphal College:

- **BS Music Industry/MBA:** This program offers the highly motivated and musically focused student an opportunity to combine music theory and technology with the MBA degree. The program is available to qualified Music Industry majors.
- **BS Entertainment & Arts Management/MBA:** This program allows high-achieving students preparing for leadership roles in media companies and arts organizations the opportunity to earn their MBA degree. The program is available to qualified Entertainment & Arts management majors.
- **BS in Design & Merchandising/MBA:** This program combines study in the area of fashion retail merchandising with the MBA degree. The program is available to qualified Design and Merchandising majors.

The following Accelerated Degree Programs are available to qualified matriculated students in the Westphal College:

- **BS/MS in Digital Media Programs:** This program allows highly motivated students to complete both the BS (Animation & Visual Effects, Game Art & Production, Interactive Digital Media) and MS degrees in Digital Media programs in five years.
- **BS Interior Design/MS in Interior Architecture & Design:** This program combines the Interior Design undergraduate and the graduate Interior Architecture & Design degrees in an intensive five-year program that provides an opportunity for the student to focus on an area of specialization.
- **BS Dance/MS in Elementary Education:** This career focus, dance in education, prepares students for jobs as elementary school teachers (grades Pre-Kindergarten through 4) who may also serve as school dance specialists. Students choosing this option will earn a BS degree in Dance through the Department of Performing Arts and may elect to continue for a fifth year of study to earn an MS in the Teaching, Learning and Curriculum-Teacher Certification through the School of Education.
- **BS Entertainment & Arts Management/MS in Arts Administration:** While not an accelerated program, students who complete the EAM program may also choose to pursue a graduate degree at Drexel in Arts Administration. Students who apply for the graduate Arts Administration program and graduate with a 3.5 GPA in the last two years of the EAM degree program are automatically accepted into the program.

Accelerated Summer Courses

With departmental permission, students may enroll in Visual Studies accelerated courses over the summer. These typically include courses in Accelerated Design I, II, III, Introductory Drawing and Figure Drawing I. These courses primarily are offered so that new undergraduate transfer students and pre-graduate students can complete their future programs in an economical time frame. Students with some experience in studio

coursework may be eligible to take accelerated courses. A portfolio review is required to determine eligibility.

Dance Part Time Professionals

The Part Time Professional Option of the Dance Major is designed for professional dancers interested in pursuing a BS degree in Dance while continuing their performance careers, or at the conclusion of their performing careers. This program grants "professional life experience" credits and an extended period of time to fulfill the remaining required courses.

Ensembles

Choral Ensembles

University Chorus (MUSC 101/001) Dr. Steven Powell, Director
As auditioned, 60-voice group which performs concert choir literature, both a cappella and with instrumental accompaniment.

Chamber Singers (MUSC 102/001) Dr. Steven Powell, Director
A select group of 18 singers chosen by audition from the University Chorus. They perform secular music from the Renaissance period (Madrigals).

Vocal Jazz Ensemble (MUSC 103/001) Dr. Steven Powell, Director
A select group of 16 singers chosen by audition from the University Chorus. They perform "anything that swings," doing a variety of pieces from the 20's to the 10's with a three-piece back-up band.

All College Choir (MUSC 104/001) Scott Bacon, Director
A large un-auditioned choir that performs a varied repertoire including light classics, spirituals, and popular music.

Gospel Choir (MUSC 115/001) Rev. Greg Ross, Director
The Gospel Choir is a group of approximately 60 singers that is open to all Drexel Students. This ensemble performs contemporary gospel music with its own backup band.

Instrumental Ensembles

Concert Band (MUSC 105/001) Dr. Wesley Broadnax, Director
Students who are proficient on woodwind, brass, or percussion instruments may become members of this large instrumental ensemble by auditioning for the director. Membership is based on the student's ability and the instrumental needs of the ensemble.

The Basketball Pep Band (MUSC 116/001) Dr. Wesley Broadnax, Director
This band is made up of brass players, saxophone players, and trap drummers drawn from the membership of the Concert Band.

Jazz Orchestra (MUSC 107/001) Dr. George Starks, Director
Performs music which is associated with and/or inspired by acknowledged masters of the jazz tradition such as Duke Ellington, Count Basie, Charlie Parker, Dizzy Gillespie, Miles Davis, Charles Mingus, Thad Jones, and others.

The Jazztet (MUSC 108/001) Dr. George Starks, Director
This ensemble performs small group masterpieces such as literature associated with Art Blakey, Horace Silver, Clifford Brown, John Coltrane, and others.

String Ensemble [University Orchestra] (MUSC 109/001)
This is a full orchestra centered around the nucleus of a full compliment of strings. Winds, brass, and percussionists are drawn from the Concert Band as repertoire demands.

Fusion Band (MUSC 112/001) Lynn Riley, Director

A small combo utilizing a rhythm section and any varying combination of saxes and brass. The repertoire includes music of the styles of jazz, Latin, funk, and rock.

Percussion Ensemble (MUSC 113/001) Mark Beecher, Director
Students in this group will have the opportunity to play, improve and perform on many instruments of the percussion family including: snare drum, bass drum, xylophone, marimba, timpani- and even hands and feet.

Mediterranean Ensemble (MUSC 114/001) Bruce Kaminsky, Director
Students perform traditional music from Southeastern Europe, the Middle East and Northern Africa. All traditional and Western instruments are welcomed including oud, bouzouki and saz along with guitar, violin and sax. Percussionists can play Drexel's wide assortment of traditional drums including doumbek, riq and djimbe. Students will have the opportunity to perform 7/8 and 9/8 rhythms from Greece, 10/8 rhythms from Turkey, learn songs in Greek, Turkish, Arabic and Hebrew. The ensemble also has a dance component.

Guitar Ensemble II (MUSC 106/002) Joe Napoli, Director
An auditioned group of approximately ten guitarists plus bass players and a drummer. Repertoire includes a side range of styles utilizing music reading ability and improvisation skills

Guitar Ensemble I (MUSC 106/001) Greg Wright, Director
An un-auditioned group of ten to fifteen guitarists who use repertoire to sharpen their musical and technical skills.

Keyboard Ensemble (MUSC 110) Wanda Canfield, Director
A group of twelve keyboardists who utilize acoustic and electronic pianos to play a variety of repertoire.

Rock Ensemble (MUSC 117) Joe Napoli, Director
A small combo of vocalists, guitarists, bassists, keyboardist, and drummers who perform repertoire ranging from classic rock to alternative.

Drexel University Dance Program

Dr. Miriam Giguere, Director, Dance Ensemble (DANC 131)
Elegant, exciting, sophisticated, sleek are all words commonly used to describe the Drexel Dance Ensemble. Performing ballet, jazz, tap and modern dance, the Drexel Dancers are both versatile and original.

The Drexel Dance Ensemble DANC 131
A professional caliber dance company presenting two fully-produced concerts in the Mandell Theater each year. Students participating in the 60 member ensemble are given the opportunity to explore their artistry through working with professional choreographers, both faculty and guests artists, as well as a selection of student choreographers. The diversity of choreographic talent promises a show with dimension and unique perspectives on contemporary and classical dance forms. Entrance into this company is open to any dancers beyond their freshman year by audition twice yearly.

The FreshDance Ensemble DANC 131
Dance company open exclusively to freshmen at Drexel. The 30 dancers in the ensemble perform two fully produced concerts at the Mandell Theater each year. Works by both professional and student choreographers are performed in a variety of genres including ballet, modern, jazz and hip-hop. Entrance into the company is open twice yearly by audition.

The Youth Performance Exchange Touring Ensemble DANC 131

This 8-10 member dance troupe performs assembly style lecture demonstration programs introducing student K-8 to the art of dance. Students learn the program each fall and perform for 15-20 elementary and middle school each Friday morning in winter and spring terms. Open by audition each fall term.

Drexel University Theatre Program

Mr. Nick Anselmo, Director of Theatre Programs

Main Stage Performance (THTR 131/001)
Studio Performance (THTR 131/002)
Theater Performance Ensemble (THTR 131/002)
Main Stage Production (THTR 132/001)
Late Night Open Mic (THTR 132/002)
Studio Production (THTR 132/003)

Students participate in all aspects of theatre performance and production, including; acting, directing, design, costumes, lighting, sets, sound, publicity, and box office.

Facilities

Designed to be an incubator for tomorrow's creative leaders, The URBN Center is the award-winning home for many of the programs in the Antoinette Westphal College of Media Arts & Design, providing students with rigorous, studio intensive instruction with the latest technological resources. Majors that share this space include Animation & Visual Effects, Architecture, Design & Merchandising, Entertainment & Arts Management, Fashion Design, Game Design & Production, Graphic Design, Interactive Digital Media, Interior Design, Music Industry and Product Design.

The URBN Center also provides a black box theater for our Theatre program, a 3,500 square foot Leonard Pearlstein Gallery, two MIDI labs and MAD Dragon Records Suite, a Motion Capture studio, a Hybrid Making Lab featuring Universal Laser Cutters and 3D printing and prototyping, the Robert and Penny Fox (<http://www.drexel.edu/westphal/resources/FHCC>) Historic Costume Collection (<http://www.drexel.edu/westphal/resources/FHCC>), the Charles Evans Fashion Design Library, a multi-use screening & lecture room, and offices for the College's administrative functions.

The Paul Peck Problem Solving & Research Building is home to our Photography major and Department of Art & Art History. Within this facility, the Westphal College occupies a 10,000- square-foot photography lab, lighting studios, two digital imaging labs, as well as six lecture/ laboratory spaces for our Visual Studies courses.

In University Crossings, a 25,000 square foot space houses offices for Film & Video, Screenwriting & Playwriting and Television faculty. Also in this building are two state-of-the-art digital editing facilities, a shooting studio with special effects capability, two screening rooms, a digital audio post production studio, several multi-media classrooms, and a well-stocked equipment room.

MacAlister Hall serves students in the Westphal College with: digital audio labs and recording studios for Music Industry; The Mandell Theater, a 420-seat proscenium theater with scene shop and dressing rooms; the Ellen Forman Memorial Dance Studio; and a high-definition studio space for our college-operated television station, DUTV, which reaches over 400,000 households.

Performing Arts Faculty

Luke Abruzzo, MM (*Rutgers University, Mason Gross School of the Arts*) *Music Program Director*. Assistant Teaching Professor. Music theory, electronic music, guitar.

Nicholas Anselmo, MFA (*University of California*) *Theater Program Director; Director of the Mandell Professionals in Residence Project (MPIRP)*. Associate Teaching Professor. Directing, acting, musical theater and scene study.

Scott Bacon, MS (*Drexel University*) *Ensemble Coordinator*. Assistant Teaching Professor. Rock music, introduction to music, piano class and private percussion instruction.

Karen Banos, BFA (*University of Pennsylvania*). Adjunct Instructor. Violin and viola.

Farid Barron Adjunct Instructor. Jazz piano instruction

Mark Beecher Adjunct Instructor. Percussion ensemble and instruction.

Angela Bilger, MA (*Julliard School of Music*). Adjunct Instructor. French horn.

Bobbi Block, MA (*Villanova University*). Adjunct Instructor. Theatrical improvisation.

Damon Bonetti, MFA (*Florida State University*). Adjunct Instructor. Acting fundamentals, scene study and play direction.

Jenna Simone Boyes, DPT (*Drexel University*). Adjunct Professor. Kinesiology for dance.

Perry Brisbon, MM (*Temple University*). Adjunct Instructor. Voice.

Wesley Broadnax, DMA (*Michigan State*) *Director of Concert Band and Pep Band*. Assistant Professor. An active guest conductor, clinician and adjudicator; conducted several All-State and honors bands both nationally and internationally.

Jim Bunting, BFA (*University of the Arts, Philadelphia*). Adjunct Instructor. Jazz dance.

Wanda Canfield, MA (*Temple University*). Adjunct Instructor. Piano.

Jose-Antonio (Dom) Chacon, MFA (*Temple University*). Adjunct Instructor. Theater production; lighting design.

Antoinette Coward-Gilmore, MA (*New York University*). Adjunct Instructor. African dance, modern dance.

Peter DiMuro, MFA (*Connecticut College*). Associate Teaching Professor. Professional modern dancer, actor and choreographer focusing on group process driven, collaborative work. Specializes in community based projects with wide ranging social concerns.

Mina Estrada, MFA (*Temple University*). Adjunct Assistant Professor. Dance ensemble and FreshDance producer, FreshDance assistant director, modern, jazz, improvisation, choreography.

Clyde Evans Adjunct Assistant Professor. Director of Chosen Dance Company; hip-hop.

Ellen Gerdes, EdM (*Temple University*). Adjunct Instructor. Pedagogy and politics of dance in China and Taiwan; dance and cultural studies.

Miriam Giguere, PhD (*Temple University*) *Department Head, Performing Arts*. Associate Professor. Professional modern dancer, choreographer and dance educator whose research centers on cognition during the creative process. She has published nationally and internationally and is a frequent presenter on the integration of dance and academics at national and international conferences.

Tania Isaac, MFA (*Temple University*). Assistant Teaching Professor. Caribbean-American dancer/choreographer; fusion of choreography with personal documentary and social commentary to grapple with identity, post-colonial issues, feminism and juxtapositions of European and African influences.

Lucinda Lea, BA (*Indiana University*). Adjunct Assistant Professor. Ballet.

Marcie Mamura, MFA (*University of Oregon*). Adjunct Assistant Professor. Assistant Director, FreshDance.

Beth McNamara, MFA (*Drexel University*). Survey of Dance/Movement Therapy.

Jennifer Morley, MFA (*Temple University*). Assistant Teaching Professor. Master Pilates instructor and director of the Drexel Pilates Teaching Training program; modern dance, choreography.

Dawn Morningstar, MA (*Drexel University*). Adjunct Assistant Professor. Practicing dance/movement therapist.

Carl Paris, PhD (*Temple University*). Adjunct Associate Professor. Interdisciplinary approach to dance studies, cultural studies and issues around black dance and performance.

Steven Powell, DMus (*Indiana University*). Professor. Successful composer and the author of articles on sound synthesis and choral performance techniques. He owns his own music publishing company, does professional music engraving, is the author of music publication software, and is an expert in desktop publishing.

Olive Prince, MFA (*Temple University*). Adjunct Assistant Professor. Choreography, creative process and improvisation; Director of Olive Prince Dance.

Meredith Rainey Adjunct Assistant Professor. Former soloist with Pennsylvania Ballet and director of Carbon Dance Theater. Ballet, choreography.

Heather Smalley, BS (*Drexel University*). Adjunct Assistant Professor. Arts administration.

George L. Starks, Jr., PhD (*Wesleyan*). Professor. Jazz and classical saxophonist who has received recognition from Downbeat magazine, and is a nationally respected scholar and ethnomusicologist who has published on many aspects of the African-American musical tradition.

Ximena Varela, MA (*Drexel University*). Assistant Professor. Comparative cultural policy, linkages between changes in economic and social policy and shifts in models of organization in the arts.

Stephen Welsh, MFA (*Temple University*). Adjunct Assistant Professor. Choreography, modern dance.

Animation and Visual Effects

Major: Animation and Visual Effects
Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 186.0

Classification of Instructional Programs (CIP) code: 36.0113

Standard Occupational Classification (SOC) code: 27-1014

About the Program

The animation & visual effects major provides students with the technological, story-telling and design skills to succeed as animators and visual effects artists in the highly competitive entertainment and design worlds.

Animation and visual effects are no longer used only when creating animation or big budget theatrical films. Today, these production techniques are widely used in feature films, medical research, engineering, television, web content, the performing arts, corporate communications and higher education. While an understanding of the multiple facets of digital media remains important to students' educational development, the depth and complexity of the field necessitates a rigorous course of study specifically focused on animation and visual effects.

To best prepare students for the demands of careers in these cutting-edge disciplines, they will pursue a foundation of design and technology, taking core courses in all aspects of digital media, completing a six month co-op and delving into rigorous coursework in many areas of specialization. Students will learn the underlying principles of animation, along with industry-standard software technology. The entire creative pipeline from storyboarding through modeling and animation is covered in depth, allowing students to experience all aspects of production.

Additional Information

To find out more about this major, visit the Westphal College's Animation & Visual Effects Major (<http://www.drexel.edu/westphal/undergraduate/ANIM>) web page.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
PHYS 121	Physical Science for Design I	4.0
PHYS 122	Physical Science for Design II	4.0
UNIV A101	The Drexel Experience	2.0
Arts and Humanities elective		3.0
History (HIST) elective		3.0
Literature (ENGL) elective		3.0
Social Science electives		9.0
Free electives		24.0

Art and Art History Requirements

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 300 [WI (p. 478)]	History of Modern Design	3.0

VSST 108	Design I for Media	3.0
VSST 109	Design II for Media	3.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0
VSST 210	Painting Basics	3.0

Media and Computer Science Requirements

FMVD 110	Basic Shooting and Lighting	3.0
FMVD 206	Audio Production and Post	3.0
VSCM 240	Typography I	3.0
SCRIP 270 [WI (p. 478)]	Screenwriting I	3.0
CS 140 or CS 171	Introduction to Multimedia Programming or Computer Programming I	3.0
ANIM 231	Scripting for Animation and Visual Effects	3.0

Digital Media Core Requirements

ANIM 140	Computer Graphics Imagery I	3.0
ANIM 141	Computer Graphics Imagery II	3.0
ANIM 152	Multimedia Timeline Design	3.0
ANIM 211	Animation I	3.0
DIGM 100	Digital Design Tools	3.0
DIGM 105	Overview of Digital Media	3.0
DIGM 223	Creative Concept Design	3.0
DIGM 250	Professional Practices	3.0
DIGM 350 [WI (p. 478)]	Digital Storytelling	3.0
DIGM 451 [WI (p. 478)]	Explorations in New Media	3.0
DIGM 475 [WI (p. 478)]	Seminar: The Future of Digital Media	3.0
DIGM 490	Digital Media Senior Project	9.0
DIGM 491	Digital Media Senior Project Studio	3.0
GMAP 260	Overview of Computer Gaming	3.0
IDM 100	Introduction to Web Development	3.0

Animation Requirements

ANIM 212	Animation II	3.0
ANIM 215	History of Animation	3.0
ANIM 220	Digital Compositing I	3.0
ANIM 221	Digital Compositing II	3.0
ANIM 247	Organic Modeling	3.0
ANIM 314	Character Animation I	3.0

Animation Electives

Select two of the following:		6.0
ANIM 248	Advanced Lighting	
ANIM 315	Character Animation II	
ANIM 321	Immersive Animation	
ANIM 388	Spatial Data Capture	
ANIM 410	Advanced Compositing	
ANIM 411	Advanced Animation	

Total Credits 186.0

Sample Plan of Study

Term 1		Credits			
DIGM 100	Digital Design Tools	3.0		ANIM 221	Digital Compositing II
DIGM 105	Overview of Digital Media	3.0		COM 230	Techniques of Speaking
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0		COOP 101	Career Management and Professional Development
PHYS 121	Physical Science for Design I	4.0		DIGM 250	Professional Practices
UNIV A101	The Drexel Experience	1.0		DIGM 350 [WI (p. 478)]	Digital Storytelling
VSST 110	Introductory Drawing	3.0		FMVD 206	Audio Production and Post
	Term Credits	17.0			Term Credits
					15.0
Term 2				Term 8	
ANIM 140	Computer Graphics Imagery I	3.0		ANIM 231	Scripting for Animation and Visual Effects
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0		ANIM 314	Character Animation I
FMVD 110	Basic Shooting and Lighting	3.0		ARTH 300 [WI (p. 478)]	History of Modern Design
PHYS 122	Physical Science for Design II	4.0		Free elective	3.0
VSST 108	Design I for Media	3.0		Animation elective*	3.0
UNIV A101	The Drexel Experience	1.0			
	Term Credits	17.0			Term Credits
					15.0
Term 3				Term 9	
ANIM 141	Computer Graphics Imagery II	3.0		ANIM 410	Advanced Compositing
ANIM 152	Multimedia Timeline Design	3.0		DIGM 451 [WI (p. 478)]	Explorations in New Media
CIVC 101	Introduction to Civic Engagement	1.0		Animation elective*	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0		Arts and Humanities elective	3.0
MATH 101	Introduction to Analysis I	4.0		Social Science elective	3.0
VSST 109	Design II for Media	3.0			
	Term Credits	17.0			Term Credits
					15.0
Term 4				Term 10	
ANIM 211	Animation I	3.0		ANIM 411	Advanced Animation
DIGM 223	Creative Concept Design	3.0		DIGM 490	Digital Media Senior Project
GMAP 260	Overview of Computer Gaming	3.0		DIGM 491	Digital Media Senior Project Studio
CS 140 or 171	Introduction to Multimedia Programming or Computer Programming I	3.0		Free elective	3.0
VSST 111	Figure Drawing I	3.0		Arts and Humanities elective	3.0
	Term Credits	15.0		Social Science elective	3.0
					Term Credits
					16.0
Term 5				Term 11	
ANIM 212	Animation II	3.0		DIGM 490	Digital Media Senior Project
ANIM 215	History of Animation	3.0		DIGM 491	Digital Media Senior Project Studio
ARTH 102	History of Art II: High Renaissance to Modern	3.0		Social Science elective	3.0
IDM 100	Introduction to Web Development	3.0		Free electives	6.0
VSST 210	Painting Basics	3.0			
	Term Credits	15.0			Term Credits
					13.0
Term 6				Term 12	
ANIM 220	Digital Compositing I	3.0		DIGM 475 [WI (p. 478)]	Seminar: The Future of Digital Media
ANIM 247	Organic Modeling	3.0		DIGM 490	Digital Media Senior Project
ARTH 103	History of Art: Early to Late Modern	3.0		DIGM 491	Digital Media Senior Project Studio
SCRP 270 [WI (p. 478)]	Screenwriting I	3.0		Arts and Humanities elective	3.0
Elective		3.0		Free electives	6.0
	Term Credits	15.0			Term Credits
					16.0
Term 7				Total Credit: 186.0	

* See degree requirements (p. 479).

Dual/Accelerated Degrees

The accelerated degree program enables academically qualified students to earn both their bachelor's degree and a master's degree in digital media — graduating sooner than they would in traditional programs. Current Drexel animation and visual effects students may apply for the accelerated BS/MS degree through the Graduate College of Drexel University after completing 90.0 credits, but no more than 120.0 credits. Contact the Graduate College of Drexel University (<http://www.drexel.edu/graduatecollege>) for further information.

The Animation and Visual Effects Minor requires the completion of eight courses (minimum 24.0 credits). The minor provides basic foundation in the technological, story-telling and design skills used by animators and visual effects artists in the highly competitive entertainment and design worlds, with the opportunity for individualized tailoring according to the student's interests.

Required Courses:

DIGM 100	Digital Design Tools	3.0
ANIM 140	Computer Graphics Imagery I	3.0
ANIM 141	Computer Graphics Imagery II	3.0
ANIM 152	Multimedia Timeline Design	3.0
ANIM 211	Animation I	3.0
Select three of the following:		9.0
ANIM 212	Animation II	
ANIM 215	History of Animation	
ANIM 220	Digital Compositing I	
ANIM 221	Digital Compositing II	
ANIM 247	Organic Modeling	
ANIM 248	Advanced Lighting	
ANIM 314	Character Animation I	
ANIM 315	Character Animation II	
ANIM 388	Spatial Data Capture	
ANIM 410	Advanced Compositing	
ANIM 411	Advanced Animation	
Total Credits		24.0

Facilities

Our facilities include more than 100 triple-boot MacPro and Boxx Technology workstations, a 16 camera Vicon motion capture studio, green screen room, a 2-ton motion platform theme park ride, FTIR multitouch displays, laser scanner, stereoscopic projector, eye tracker, fNIR and EEG brain interfaces, and 3D theater, recording studios, etc. Students use professional software including Unreal, Unity3D, Maya, 3D Studio Max, Houdini, Massive, etc.

More information can be found at Drexel RePlay Lab's Facilities (<http://replay.drexel.edu/facilities.html>) page.

Cinema and Television Faculty

Ian N. Abrams, BA (*Duke University*) Program Director, Screenwriting and Playwriting Program. Associate Professor. Movies, film, TV, screenwriting, Hollywood.

Ted Artz, BFA (*Tyler School of Art, Temple University*). Associate Professor. Digital media.

John Avarese, BS (*Drexel University*). Assistant Teaching Professor. Composer, film and video scores, mixing and sound design.

David Culver, AS (*Graham Junior College*) Manager of the Paul F. Harron Studios/DUTV. Associate Teaching Professor. Film and video.

David Deneen, BFA (*Philadelphia College of Art*). Associate Teaching Professor. Film & video.

Paul Diefenbach, PhD (*University of Pennsylvania*) Associate Program Director, Game Art & Production. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA (*Pennsylvania State University*). Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

Troy Finamore, MS (*Drexel University*) Associate Program Director, Interactive Digital Media. Assistant Teaching Professor. Advertising, design and interactivity.

Bruce Graham, BA (*Indiana University of Pennsylvania*). Associate Teaching Professor. Playwright.

Gerard M. Hooper, MFA (*Temple University*). Associate Teaching Professor. Film and video; European and non-western cinema.

D. B. Jones, PhD (*Stanford University*) Dean, Pennoni Honors College. Professor. Film and video; cinema studies.

Nick Jushchyshyn, MFA (*Academy of Art University*) Associate Program Director, Animation and Visual Effects. Visual effects, digital media and animation.

Matt Kauffhold, MA (*University of North Carolina*). Associate Teaching Professor. Screenwriting.

Karin P. Kelly, MFA (*New York University*) Program Director, Film and Video. Associate Professor. Film and video; filmmaker and author.

Yvonne D. Leach, MFA (*Temple University*) Department Head, Cinema and Television Studies. Associate Professor. Television studies.

David Mauriello, BA (*Lafayette College*). Assistant Professor. 3D modeling and animation.

Jocelyn Motter, MFA (*American Film Institute*). Assistant Teaching Professor. Editing.

Glen Muschio, PhD (*Temple University*). Associate Professor. Digital media, society, communication.

Lise Raven, MFA (*New York University*). Assistant Professor. Filmmaker.

Philip W. Salas, BS (*Temple University*). Assistant Teaching Professor. Utilization of advanced set top box data to measure fragmented viewing behavior. Impact of new television distribution technologies on traditional broadcasters and multichannel program providers.

David A. Schwartz, BA (*Rider University*). Associate Teaching Professor. Steadicam operator; cameraman.

Andrew Susskind, BA (*Harvard University*) Program Director of *TV Production & Media Management*. Associate Teaching Professor. Independent television producer and director.

Albert S. Tedesco, MA (*University of Pennsylvania*) Director of the *Paul F. Harron Graduate Program in Television Management*. Associate Teaching Professor. Impact of digital media on broadcast television; broadcasters' response to the challenge of new media; management of publicly and privately held communications companies.

Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor. Digital media, interactive multimedia.

Christine Vachon Visiting Professor. Independent film production.

Michael Wagner, PhD (*Vienna University of Technology*) Program Director, *Digital Media*. Associate Professor. Educational use of digital media and computer games.

Gregory S. Wolmart, MFA (*University of Pennsylvania*). Assistant Professor. Cinema studies; film history.

Jichen Zhu, PhD (*Georgia Institute of Technology*). Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Interdepartmental Faculty

Lawrence Epstein, MBA (*Cornell University*) Interim Department Head, *Arts & Entertainment Enterprise*. Associate Teaching Professor.

Architecture

Major: *Architecture*

Degree Awarded: *Bachelor of Architecture Degree (BArch)*

Calendar Type: *Quarter*

Total Credit Hours: *227.0*

Classification of Instructional Programs (CIP) code: *04.0201*

Standard Occupational Classification (SOC) code: *17-1011*

About the Program

The practice of architecture requires a unique skill set—creative thinking and aesthetic sensitivity balanced with technical knowledge, cultural understanding, and social responsibility. Critical thinking and communication skills are needed. Drexel's Bachelor of Architecture program encompasses foundation courses in the applied and social sciences, the humanities, and a wide range of professional architecture courses to prepare students for careers in architecture and related fields. At the heart of the curriculum are the design studios where students are challenged to apply their knowledge acquired from the above disciplines to consequential design problems.

Drexel's work/study program is an experiential-based learning model that complements and provides an alternative to traditional full-time academic architecture programs. The Drexel model provides a practical, high-quality education to those students who seek early exposure to daily architectural practice as well as an affordable alternative to students who could not otherwise be able to enter the profession.

At Drexel there are two paths to an accredited Bachelor of Architecture degree, serving two distinct populations: the 2+4 option and the part-time evening option.

The Architecture Program's advising guidelines (<http://www.drexel.edu/westphal/undergraduate/ARCH/Curriculum/#c3>) include scheduling guidelines, studio advancement requirements, and general studio policies.

Accreditation

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (<http://www.naab.org>) (NAAB), which is the sole agency authorized to accredit US professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

Drexel University, Antoinette Westphal College of Media Arts & Design, Department of Architecture + Interiors offers the following NAAB-accredited degree program(s):

2+4 Option: 6 year program (2 years full-time, 4 years part-time)
Bachelor of Architecture
227.0 undergraduate quarter-term credits

Part-Time Evening Option: 7 year part-time program
Bachelor of Architecture
227.0 undergraduate quarter-term credits

Next accreditation visit for both tracks: 2018

About the 2+4 Option

The 2+4 option is an accelerated route designed for a small class of well-prepared students entering directly from high school. In this program two years of full-time coursework address the basic principles of architectural design and satisfy fundamental University core requirements in the arts and sciences as well as those job-related skills that are needed for entry-level professional positions. A comprehensive review of performance will take place after each year to ensure that students are making sufficient progress in all areas. After successfully completing the minimum requirements of the full-time phase, students find full-time employment in the building industry, including architecture firms, while continuing their academic program part-time in the evening for four additional years. By combining work and study, Drexel students may be able to simultaneously satisfy their required internship for licensure (IDP) while completing their professional degree, thus qualifying for the registration exam on graduation in most jurisdictions.

About the Part-time Evening Program

The part-time evening option is one of only two part-time evening architectural programs in the United States, leading to an accredited Bachelor of Architecture degree. Designed for non-traditional and transfer students, this program offers all courses part-time in the evening, enabling students to work full-time. The evening program sequence is seven years,

but transfer students with university-level design credits can reduce its length by meeting specific program requirements through transcript and portfolio review.

Both tracks of the Bachelor of Architecture program are accredited by the National Architectural Accrediting Board (NAAB). All Drexel architecture students may be able to receive credit in the Intern Development Program (IDP) for work experience obtained before graduation, which is part of most state licensure requirements.

Additional Information

For more information, visit the Architecture Program (<http://www.drexel.edu/westphal/undergraduate/ARCH>) website. For advising and transfer information please review the Architecture Program's curriculum (<http://www.drexel.edu/westphal/undergraduate/ARCH/Curriculum>) page.

Note: Architecture vs Architectural Engineering

Because Drexel University offers two programs with "architecture" in their titles, it is useful to point out the significant differences between them:

- *Architects* design buildings to meet people's spatial, organizational, and aesthetic needs; they also coordinate the building design process. After earning a Bachelor of Architecture degree, graduates become registered architects by completing the required work experience and state licensing examinations.
- *Architectural engineers* specialize in the design of engineering systems within buildings. Architectural engineers earn Bachelor of Science degrees and become professional engineers with the required experience and state examinations. Students whose interests are focused on the technological and engineering aspects of buildings should review Drexel's major in architectural engineering offered by the College of Engineering.

Degree Requirements (2 + 4 Option)

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0
PHIL 317	Ethics and Design Professions	3.0
PHYS 182	Applied Physics I	3.0
PHYS 183	Applied Physics II	3.0
UNIV A101	The Drexel Experience	2.0
Humanities electives		6.0
Natural Science elective		3.0
Social Science electives		9.0
Free electives		30.0

Studios (must be taken in order)

ARCH 181	Architecture Studio 1A	4.0
ARCH 182	Architecture Studio 1B	4.0
ARCH 183	Architecture Studio 1C	4.0
ARCH 281	Architecture Studio 2A	4.0
ARCH 282	Architecture Studio 2B	4.0

ARCH 283	Architecture Studio 2C	4.0
ARCH 381	Architecture Studio 3A	4.0
ARCH 382	Architecture Studio 3B	4.0
ARCH 383	Architecture Studio 3C	4.0
ARCH 481	Architecture Studio 4A	4.0
ARCH 482	Architecture Studio 4B	4.0
ARCH 483	Architecture Studio 4C	4.0
ARCH 487	Architecture Studio 5A	4.0
ARCH 488	Architecture Studio 5B	4.0
ARCH 489	Architecture Studio 5C	4.0
ARCH 493	Senior Project I	4.0
ARCH 494	Senior Project II	4.0
ARCH 495	Senior Project III	4.0

Required Professional Courses (2 + 4 Option)

ARCH 141	Architecture and Society I	3.0
ARCH 142	Architecture and Society II	3.0
ARCH 143	Architecture and Society III	3.0
ARCH 144	Architecture and Society IV	3.0
ARCH 170	Architectural Technology I	3.0
ARCH 172	Architectural Technology II	3.0
ARCH 173	Architectural Technology III	3.0
ARCH 211	Architectural Representation I	2.0
ARCH 212	Architectural Representation II	2.0
ARCH 213	Architectural Representation III	2.0
ARCH 224	Architectural Representation IV	2.0
ARCH 225	Architectural Representation V	2.0
ARCH 226	Architectural Representation VI	2.0
ARCH 274	Architectural Technology IV	3.0
ARCH 275	Architectural Technology V	3.0
ARCH 276	Architectural Technology VI	3.0
ARCH 335	Professional Practice I	3.0
ARCH 336	Professional Practice II	3.0
ARCH 377	Architectural Technology VII	3.0
ARCH 378	Architectural Technology VIII	3.0
ARCH 379	Architectural Technology IX	3.0
ARCH 431 [WI (p. 482)]	Architectural Programming	3.0

History and Theory Electives

Select three of the following:		9.0
ARCH 340	American Architecture & Urbanism	
ARCH 341 [WI (p. 482)]	Theories of Architecture I	
ARCH 342 [WI (p. 482)]	Theories of Architecture II	
ARCH 343	Theories of Architecture III	
ARCH 344 [WI (p. 482)]	History of Modern Architecture I	
ARCH 346 [WI (p. 482)]	History of Philadelphia Architecture	
ARCH 347 [WI (p. 482)]	Architectural Study Tour	
ARCH 348 [WI (p. 482)]	Studies in Vernacular Architecture	

ARCH 350	Contemporary Architecture	
ARCH 421 [WI]	Environmental Psychology and Design Theory (p. 482)]	
ARCH 441	Urban Design Seminar	
ARCH 442	Urban Design Seminar II	
ARCH 499 [WI]	Special Topics in Architecture (p. 482)]	
Professional Electives		
Select three of the following:		9.0
ARCH 432	The Development Process	
ARCH 451	Advanced Drawing	
ARCH 455	Computer Applications in Architecture I	
ARCH 456	Computer Applications in Architecture II	
ARCH 463	Emerging Architectural Technology	
ARCH 464	Building Enclosure Design	
ARCH 465	Energy and Architecture	
ARCH 491	Advanced Topics in Architecture	
ARCH 499 [WI]	Special Topics in Architecture (p. 482)]	
An approved Construction Management (CMGT) course		
Total Credits		227.0

Sample Plan of Study (2 + 4) Option

Freshman

Term 1		Credits
ARCH 141	Architecture and Society I	3.0
ARCH 181	Architecture Studio 1A	4.0
ARCH 211	Architectural Representation I	2.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV A101	The Drexel Experience	1.0
Term Credits		17.0

Term 2

ARCH 142	Architecture and Society II	3.0
ARCH 182	Architecture Studio 1B	4.0
ARCH 212	Architectural Representation II	2.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
UNIV A101	The Drexel Experience	1.0
Term Credits		17.0

Term 3

ARCH 143	Architecture and Society III	3.0
ARCH 183	Architecture Studio 1C	4.0
ARCH 213	Architectural Representation III	2.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Humanities elective		3.0
UNIV 101	The Drexel Experience	1.0
Term Credits		16.0

Sophomore

Term 4		
ARCH 144	Architecture and Society IV	3.0
ARCH 170	Architectural Technology I	3.0
ARCH 281	Architecture Studio 2A	4.0
ARCH 224	Architectural Representation IV	2.0
Free elective		3.0
Social Science Elective		3.0
Term Credits		18.0

Term 5

ARCH 172	Architectural Technology II	3.0
ARCH 225	Architectural Representation V	2.0
ARCH 282	Architecture Studio 2B	4.0
PHYS 182	Applied Physics I	3.0
Free elective		3.0
Humanities elective		3.0
Term Credits		18.0

Term 6

ARCH 173	Architectural Technology III	3.0
ARCH 226	Architectural Representation VI	2.0
ARCH 283	Architecture Studio 2C	4.0
PHYS 183	Applied Physics II	3.0
Free electives		6.0
Term Credits		18.0

Third Year (Part-Time)

Term 7		
ARCH 274	Architectural Technology IV	3.0
ARCH 381	Architecture Studio 3A	4.0
History/Theory elective		3.0
Term Credits		10.0

Term 8

ARCH 275	Architectural Technology V	3.0
ARCH 382	Architecture Studio 3B	4.0
Free elective		3.0
Term Credits		10.0

Term 9

ARCH 276	Architectural Technology VI	3.0
ARCH 383	Architecture Studio 3C	4.0
Social Science elective		3.0
Term Credits		10.0

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Term 10		
Summer Quarter		
Social Science elective		3.0
Free electives		6.0
Term Credits		9.0

Fourth Year (Part-Time)

Term 11		
ARCH 377	Architectural Technology VII	3.0
ARCH 481	Architecture Studio 4A	4.0
Term Credits		7.0

Term 12		
ARCH 378	Architectural Technology VIII	3.0
ARCH 482	Architecture Studio 4B	4.0
Free elective		3.0
Term Credits		10.0

Term 13		
ARCH 379	Architectural Technology IX	3.0
ARCH 483	Architecture Studio 4C	4.0
Term Credits		7.0

Term 14		
Summer Quarter		
History/Theory elective		3.0
Professional elective		3.0
Free elective		3.0
Term Credits		9.0

Fifth Year (Part-Time)

Term 15		
ARCH 335	Professional Practice I	3.0
ARCH 487	Architecture Studio 5A	4.0
Term Credits		7.0

Term 16		
ARCH 336	Professional Practice II	3.0
ARCH 488	Architecture Studio 5B	4.0
Term Credits		7.0

Term 17		
ARCH 489	Architecture Studio 5C	4.0

PHIL 317	Ethics and Design Professions	3.0
Term Credits		7.0

Term 18		
Summer Quarter		
Professional elective		3.0
History/Theory elective		3.0
Free elective		3.0
Term Credits		9.0

Sixth Year (Part-Time)

Term 19		
ARCH 431	Architectural Programming [WI (p. 482)]	3.0
ARCH 493	Senior Project I	4.0
Term Credits		7.0

Term 20		
ARCH 494	Senior Project II	4.0
Professional elective		3.0
Term Credits		7.0

Term 21		
ARCH 495	Senior Project III	4.0
Free elective		3.0
Term Credits		7.0

Total Credit: 227.0

Degree Requirements (Part-time Evening Option)

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
MATH 183	Mathematical Analysis III	3.0
PHIL 317	Ethics and Design Professions	3.0
PHYS 182	Applied Physics I	3.0
PHYS 183	Applied Physics II	3.0
UNIV 101	The Drexel Experience	2.0
Humanities electives		6.0
Social Science electives		9.0
Natural Science elective		3.0
Free electives		24.0

Studios (Must be taken in order)

ARCH 107	Foundation Design I	2.0
ARCH 108	Foundation Design II	2.0
ARCH 109	Foundation Design III	2.0
ARCH 181	Architecture Studio 1A	4.0
ARCH 182	Architecture Studio 1B	4.0
ARCH 183	Architecture Studio 1C	4.0
ARCH 281	Architecture Studio 2A	4.0
ARCH 282	Architecture Studio 2B	4.0
ARCH 283	Architecture Studio 2C	4.0
ARCH 381	Architecture Studio 3A	4.0
ARCH 382	Architecture Studio 3B	4.0
ARCH 383	Architecture Studio 3C	4.0
ARCH 481	Architecture Studio 4A	4.0
ARCH 482	Architecture Studio 4B	4.0
ARCH 483	Architecture Studio 4C	4.0
ARCH 487	Architecture Studio 5A	4.0
ARCH 488	Architecture Studio 5B	4.0
ARCH 489	Architecture Studio 5C	4.0
ARCH 493	Senior Project I	4.0
ARCH 494	Senior Project II	4.0
ARCH 495	Senior Project III	4.0

Required Professional Courses (Part-time Evening Option)

ARCH 141	Architecture and Society I	3.0
ARCH 142	Architecture and Society II	3.0
ARCH 143	Architecture and Society III	3.0
ARCH 144	Architecture and Society IV	3.0
ARCH 211	Architectural Representation I	2.0
ARCH 212	Architectural Representation II	2.0
ARCH 213	Architectural Representation III	2.0
ARCH 224	Architectural Representation IV	2.0
ARCH 225	Architectural Representation V	2.0
ARCH 226	Architectural Representation VI	2.0
ARCH 170	Architectural Technology I	3.0
ARCH 172	Architectural Technology II	3.0
ARCH 173	Architectural Technology III	3.0
ARCH 274	Architectural Technology IV	3.0
ARCH 275	Architectural Technology V	3.0
ARCH 276	Architectural Technology VI	3.0
ARCH 335	Professional Practice I	3.0
ARCH 336	Professional Practice II	3.0
ARCH 377	Architectural Technology VII	3.0
ARCH 378	Architectural Technology VIII	3.0
ARCH 379	Architectural Technology IX	3.0
ARCH 431 [WI (p. 482)]	Architectural Programming	3.0

History and Theory Electives

Select three of the following:		9.0
ARCH 340	American Architecture & Urbanism	
ARCH 341 [WI (p. 482)]	Theories of Architecture I	
ARCH 342 [WI (p. 482)]	Theories of Architecture II	
ARCH 343	Theories of Architecture III	

ARCH 346 [WI (p. 482)]	History of Philadelphia Architecture	
ARCH 347 [WI (p. 482)]	Architectural Study Tour	
ARCH 348 [WI (p. 482)]	Studies in Vernacular Architecture	
ARCH 350	Contemporary Architecture	
ARCH 421 [WI (p. 482)]	Environmental Psychology and Design Theory	
ARCH 441	Urban Design Seminar	
ARCH 442	Urban Design Seminar II	
ARCH 499 [WI (p. 482)]	Special Topics in Architecture	

Professional Electives

Select three of the following:		9.0
ARCH 432	The Development Process	
ARCH 451	Advanced Drawing	
ARCH 455	Computer Applications in Architecture I	
ARCH 456	Computer Applications in Architecture II	
ARCH 463	Emerging Architectural Technology	
ARCH 464	Building Enclosure Design	
ARCH 465	Energy and Architecture	
ARCH 499 [WI (p. 482)]	Special Topics in Architecture	

Total Credits **227.0****Sample Plan of Study (Part-time Evening Option)**

This curriculum format is adjustable to each student's academic situation. Transfer credit evaluation, prior architectural experience, and other considerations may restructure the student's yearly program schedule.

First Year (Part-Time)

Term 1		Credits
ARCH 107	Foundation Design I	2.0
ARCH 141	Architecture and Society I	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		9.0
Term 2		
ARCH 108	Foundation Design II	2.0
ARCH 142	Architecture and Society II	3.0
MATH 181	Mathematical Analysis I	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		9.0
Term 3		
ARCH 109	Foundation Design III	2.0
ARCH 143	Architecture and Society III	3.0
MATH 182	Mathematical Analysis II	3.0
Term Credits		8.0
Term 4		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0

The minor requires design studio courses, courses in architectural history, and architectural elective courses. No more than 9.0 credits from a student's major can be used to fulfill the minor requirements.

Required Courses

ARCH 141	Architecture and Society I	3.0
ARCH 142	Architecture and Society II	3.0
ARCH 143	Architecture and Society III	3.0
Elective Architecture Courses *		6.0
Required Architecture Studios **		10.0-12.0
ARCH 107	Foundation Design I	
ARCH 108	Foundation Design II	
ARCH 109	Foundation Design III	
ARCH 111	Studio 1-1	
or ARCH 181	Architecture Studio 1A	
ARCH 112	Studio 1-2	
or ARCH 182	Architecture Studio 1B	
ARCH 113	Studio 1-3	
or ARCH 183	Architecture Studio 1C	
ARCH 231	Studio 3-1	
or ARCH 381	Architecture Studio 3A	
ARCH 232	Studio 3-2	
or ARCH 382	Architecture Studio 3B	

Total Credits 25.0-27.0

* Chosen from BArch required professional courses, history/theory electives and professional electives appearing on the degree requirements page. Selection should be made after consultation with the Program Director or Academic Advisor.

** Students who have successfully completed INTR 233 should enter the studio sequence at the second-year level (ARCH 183). Students who have successfully completed ARCH 192 should start the studio sequence with (ARCH 181).

*** Students without Design background will be required to take the following studios: ARCH 107, ARCH 108, ARCH 109 and ARCH 181

Facilities

The Department's offices, studios and teaching facilities are located on the 4th floor of the URBN Center at 3501 Market Street. Additional teaching facilities are located on the ground floor, on the 3rd floor and on the 3rd and 4th mezzanine levels of the same building.

Architecture + Interiors Faculty

David Ade, AIA, BArch (*Drexel University*). Adjunct Associate Professor. Principal, SMP Architects.

Dr.-Ing. Ulrike Altenmüller-Lewis, AIA, Dr.-Ing., (*Bauhaus Universität Weimar*) Program Director. Assistant Professor. Research on educational environments; translations of architectural theory texts. Design studios, lectures and seminar courses.

Stephen Bonitatibus, AIA, MArch (*University of Pennsylvania*). Adjunct Professor. Principal, Bonitatibus Associates.

Mark Brack, PhD (*University of California at Berkeley*). Associate Professor. British and American architecture from 1700 to the present;

Hispanic colonial architecture in the American Southwest; vernacular architecture; historic preservation.

Michael Burns, RA, BArch (*Drexel University*). Adjunct Associate Professor. Principal, Michael Burns Architects.

Jon Coddington, AIA, MArch (*University of Pennsylvania*) Department Head, Department of Architecture + Interiors. Professor. Architecture, urban design and planning.

Rena Cumby, BArch, MS (*Drexel University*) Associate Department Head of the Department of Architecture + Interiors. Associate Professor. Interior designer; foundation studies and design education.

Eugenia Ellis, PhD (*Virginia Polytechnic State University*). Associate Professor. Registered architect; interior design, extended-care facilities design, research on spatial visualization, perception and imagination.

Jeff Fama, MArch (*State University of New York at Buffalo*). Adjunct Associate Professor. Retail, entertainment, and theater design. Graduate interiors thesis advisor.

Gary Garofalo, BS Arch Eng (*Pennsylvania State University*). Adjunct Assistant Professor. Principal Lighting Design Collaborative. Lighting expert. Lighting design.

Don Jones, AIA, MArch (*University of Pennsylvania*). Adjunct Professor. Ewing Cole.

Nicole Koltick, MArch (*University of California*). Assistant Professor. Researching possibilities for architecture and design through the use of unexpected and innovative interdisciplinary models. Foundation design studios, fabrication and technology seminars.

Karin Kuenstler, MS (*Bank Street College of Education and Parsons*). Associate Professor. Interior designer; interior design for corporate and commercial facilities, history of corporate interiors, fiber art.

Maria Kuttruff, MS (*Drexel University*). Adjunct Assistant Professor. Residential interior design. Design studios.

Diana S. Nicholas, AIA, MFA (*University of the Arts, Philadelphia*). Assistant Teaching Professor. Principal of Switched on Design. Design studios, analog and digital visualization.

Karen Pelzer, BS (*Drexel University*) Associate Director of the MS in Interior Architecture and Design Program. Assistant Teaching Professor. Interior designer, hospitality design. Design studios.

Marilynne L. Rose, MS (*Drexel University*). Associate Teaching Professor. NCIDQ interior designer; residential and commercial design. Design studios, lecture and seminar courses.

Debra Ruben, MS (*Drexel University*). Associate Professor. NCIDQ, Interior designer; residential and commercial design. Research on user participation and the design process.

Paul Salvaggio, AIA, BArch (*Pennsylvania State University*). Adjunct Assistant Professor. Principal, Arcus Design Group. Foundation design studios.

Joseph Scanlon, BArch (*Drexel University*). Adjunct Professor. Foundation design studios.

Rachel Schade, AIA, MArch. (*University of Pennsylvania*). Associate Teaching Professor. Principal, Schade & Bolender Architects. Work-study placement. Design studios.

Virginia Smith, MS (*Drexel University*). Adjunct Associate Professor. Exhibit/graphic design, interior design, interior and architectural visualization.

Erik Sundquist, MArch (*Florida International University*) Director of the *Hybrid Making Lab of AW CoMAD*. Assistant Teaching Professor. Design studios, analog and digital architectural representation and fabrication.

Feenan Susan, BArch (*Temple University*). Adjunct Instructor. Institutional and commercial. Design documentation and graduate thesis.

Simon Tickell, AIA, MArch (*University of Pennsylvania*) Associate Director of the *Architecture Evening Program*. Associate Teaching Professor. Design studios and professional practice/electives; educational and museum buildings.

Nancy Trainer, FAIA, MArch (*University of Pennsylvania*). Adjunct Professor. Principal, Venturi Scott Brown and Associates, Architects and Planners. Design studios.

Ada Tremonte, BS (*Drexel University*) Associate Director of the *BS Program in Interior Design*. Assistant Teaching Professor. NCIDQ Interior designer, corporate/commercial design. Design studios, lecture and seminar courses.

Frank de Santis, AIA (*Yale University*). Assistant Teaching Professor. Design studios, analog and digital architectural representation.

Emeritus Faculty

Judith Bing, MArch (*Yale University*). Professor Emeritus. Design studios, lecture and seminar courses.

Sylvia Clark, MArch (*University of Pennsylvania*). Professor Emeritus.

Paul M. Hirshorn, AIA, MArch, MCP, (*University of Pennsylvania*). Professor Emeritus. Design studios. Former Department Head.

Marjorie Kriebel, B.Arch (*University of Pennsylvania*). Professor Emeritus.

Dance

Major: Dance

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 185.0

Classification of Instructional Program (CIP) code: 50.0399

Standard Occupational Classification (SOC) code: 25-1071; 27-2031

About the Program

The dance program at Drexel University provides intensive exploration of dance in its physical, intellectual, creative and therapeutic aspects. The major is designed for students to focus on one of three tracks: *Dance/Movement Therapy* or *Dance in Education* or *Physical Therapy*.

The dance major at Drexel University has a unique curriculum design and focus. Rather than focusing on training performers, this program combines rigorous academic coursework with extensive stage and studio dance experiences to prepare students for three possible career paths within dance: dance/movement therapy, dance in education and physical

therapy. Students participating in this major will earn a BS degree in dance with an optional minor in psychology.

Students focused on **dance/movement therapy** will prepare for jobs as dance/movement therapists. These are psychological counselors working in a variety of settings including hospitals, out-patient clinics and residential treatment centers. Students pursuing this option will earn a BS degree in dance at the Westphal College, through the Department of Performing Arts, for the first four years of study. They will then have the option to continue on to two years of study in the College of Nursing and Health Professions to earn an MA in Creative Arts in Therapy and become a licensed dance therapist.

The second career focus, **dance in education**, prepares students for jobs as elementary school teachers (grades Pre-K through 4) who may also serve as school dance specialists. Students choosing this option will earn a BS degree in dance through the Department of Performing Arts and may elect to continue for a fifth year of study to earn an MS in the Science of Instruction through the School of Education. Students who successfully complete the five year BS /MS option in education will then be recommended to the State for a Pennsylvania Teaching Certificate in the area of Elementary Education for Pre-K to 4 certification, general education.

The third career focus, **physical therapy**, prepares students to work as physical therapists in a variety of settings, including hospitals, treatment centers, schools, and private practice. Students interested in the physical therapy option will complete the four-year BS degree in dance, along with a series of recommended electives in the physical sciences. After completion of the BS degree, students will continue their education for an additional three years in the College of Nursing and Health Professions to earn a DPT and become a licensed physical therapist.

The student who enters the dance major at Drexel University is an academically achieving student who has a passion for dance, but does not see him or herself as necessarily pursuing a career exclusively in performance. He or she is looking for extensive experiences to improve as a dancer, choreographer and performer while being stimulated academically. This student wants to study dance—both physically and cognitively—in college while being offered the possibility of gainful employment after graduation.

For more information about this major, visit the Westphal College's Dance (<http://www.drexel.edu/westphal/academics/undergraduate/dance>) page.

Degree Requirements

General Education Requirements

COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HIST 201	United States History to 1815	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
PSY 101	General Psychology I	3.0
PSY 120	Developmental Psychology	3.0

PSY 240 [WI (p. 490)]	Abnormal Psychology	3.0
UNIV A101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Two English (ENGL) Electives		6.0
Two Natural Science Electives		8.0
Free Electives		40.0

Dance Major Requirements**Foundation and Theory Requirements**

ARTH 103	History of Art: Early to Late Modern	3.0
MUSC 331	World Musics	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
THTR 240	Theatre Production I	3.0
DANC 201 [WI (p. 490)]	Dance Appreciation	3.0
DANC 210	Introduction to Dance	3.0
DANC 225	Dance Repertory	4.0
DANC 230	Survey of Dance and Movement Therapy	3.0
DANC 240	Dance Composition I	3.0
DANC 241	Dance Composition II	3.0
DANC 260	Injury Prevention for Dance	3.0
DANC 261	Foundations of Somatic Theory and Practice	3.0
DANC 310 [WI (p. 490)]	Dance Aesthetics and Criticism	3.0
DANC 325 [WI (p. 490)]	Twentieth Century Dance	3.0
DANC 330	Introduction to Laban Movement Analysis	3.0
DANC 340	Dance Pedagogy	3.0
DANC 355	Rhythmic Study for Dance	3.0
DANC 360	Dance Kinesiology	3.0

Performance Requirements

DANC 131	Dance Practicum in Performance (1.0 credit course repeated for a total of 11.0 credits) <small>For DANC 131: Sections 001, 005, 006, 007, 008 ONLY</small>	11.0
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or DANC 133 Dance Practicum in Choreography

Technique Requirements

DANC 140	Ballet Technique I (2.0 credit course repeated for a total of 12.0 credits)	12.0
or DANC 141	Ballet Technique II	
or DANC 142	Ballet Dance Technique III	
DANC 150	Modern Dance Technique I (2.0 credit course repeated for a total of 12.0 credits)	12.0
or DANC 151	Modern Dance Technique II	
or DANC 152	Modern Dance Technique III	
DANC 180	Dance Improvisation	2.0
Select five of the following:		10.0

DANC 160 Jazz Dance Technique I

DANC 161 Jazz Dance Technique II

DANC 162 Jazz Dance Technique III

DANC 170 Hip-Hop Dance Technique I

DANC 171 Hip-Hop Dance Technique II

DANC 181 Dance Improvisation II

DANC 190 African Dance Technique I

DANC 191 African Dance Technique II

Total Credits**185.0****Sample Plan of Study**

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 181	Mathematical Analysis I	3.0
DANC 131	Dance Practicum in Performance	1.0
DANC 261	Foundations of Somatic Theory and Practice	3.0
DANC 140	Ballet Technique I	2.0
DANC 150	Modern Dance Technique I	2.0
UNIV A101	The Drexel Experience	1.0
Term Credits		15.0

Term 2		Credits
DANC 355	Rhythmic Study for Dance	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 182	Mathematical Analysis II	3.0
DANC 140, 141, or 142	Ballet Technique I Ballet Technique II Ballet Dance Technique III	2.0
DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0
CIVC 101	Introduction to Civic Engagement	1.0
PSY 101	General Psychology I	3.0
Term Credits		16.0

Term 3		Credits
ARTH 103	History of Art: Early to Late Modern	3.0
DANC 210	Introduction to Dance	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0
DANC 140, 141, or 142	Ballet Technique I Ballet Technique II Ballet Dance Technique III	2.0
Select one of the following:		2.0

DANC 160 Jazz Dance Technique I

DANC 161 Jazz Dance Technique II

DANC 170 Hip-Hop Dance Technique I

DANC 171 Hip-Hop Dance Technique II

DANC 190 African Dance Technique I

DANC 191 African Dance Technique II

Free Elective 3.0

Term Credits**17.0**

Term 4		Credits
DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0
DANC 180	Dance Improvisation	2.0
DANC 325 [WI (p. 490)]	Twentieth Century Dance	3.0

DANC 330	Introduction to Laban Movement Analysis	3.0	DANC 131	Dance Practicum in Performance	1.0
DANC 150, 151, or 152	Modern Dance Technique I Modern Dance Technique II Modern Dance Technique III	2.0	or 133	Dance Practicum in Choreography	
PSY 240 [WI (p. 490)]	Abnormal Psychology	3.0	DANC 150, 151, or 152	Modern Dance Technique I Modern Dance Technique II Modern Dance Technique III	2.0
Term Credits		14.0	Select one of the following:		2.0
Term 5					
DANC 230	Survey of Dance and Movement Therapy	3.0	DANC 160	Jazz Dance Technique I	
DANC 240	Dance Composition I	3.0	DANC 161	Jazz Dance Technique II	
DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0	DANC 170	Hip-Hop Dance Technique I	
DANC 340	Dance Pedagogy	3.0	DANC 171	Hip-Hop Dance Technique II	
PSY 120	Developmental Psychology	3.0	DANC 190	African Dance Technique I	
Select one of the following:		2.0	DANC 191	African Dance Technique II	
DANC 160	Jazz Dance Technique I		Free Electives		9.0
DANC 170	Hip-Hop Dance Technique I		Term Credits		14.0
DANC 171	Hip-Hop Dance Technique II		Term 9		
DANC 190	African Dance Technique I		DANC 140, 141, or 142	Ballet Technique I Ballet Technique II Ballet Dance Technique III	2.0
DANC 161	Jazz Dance Technique II		DANC 150, 151, or 152	Modern Dance Technique I Modern Dance Technique II Modern Dance Technique III	2.0
Term Credits		15.0	DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0
Term 6					
DANC 201 [WI (p. 490)]	Dance Appreciation	3.0	Natural Science Elective		4.0
THTR 240	Theatre Production I	3.0	Free Electives		6.0
DANC 140, 141, or 142	Ballet Technique I Ballet Technique II Ballet Dance Technique III	2.0	Term Credits		15.0
DANC 150, 151, or 152	Modern Dance Technique I Modern Dance Technique II Modern Dance Technique III	2.0	Term 10		
DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0	DANC 241	Dance Composition II	3.0
DANC 225	Dance Repertory	4.0	DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0
Term Credits		15.0	NFS 100	Nutrition, Foods, and Health	2.0
Term 7					
COOP 101	Career Management and Professional Development	0.0	NFS 101	Introduction to Nutrition Food	1.0
DANC 260	Injury Prevention for Dance	3.0	Free Elective		3.0
DANC 310 [WI (p. 490)]	Dance Aesthetics and Criticism	3.0	Select two of the following:		4.0
DANC 140, 141, or 142	Ballet Technique I Ballet Technique II Ballet Dance Technique III	2.0	DANC 160	Jazz Dance Technique I	
DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0	DANC 161	Jazz Dance Technique II	
HIST 201	United States History to 1815	3.0	DANC 170	Hip-Hop Dance Technique I	
Free Elective		3.0	DANC 171	Hip-Hop Dance Technique II	
English (ENGL) ELECTIVE		3.0	DANC 190	African Dance Technique I	
Term Credits		18.0	DANC 191	African Dance Technique II	
Term 8					
Term Credits		14.0	Term Credits		14.0
Term 11					
DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0	DANC 131	Dance Practicum in Performance	1.0
DANC 150, 151, or 152	Modern Dance Technique I Modern Dance Technique II Modern Dance Technique III	2.0	or 133	Dance Practicum in Choreography	
Natural Science Elective		4.0	DANC 150, 151, or 152	Modern Dance Technique I Modern Dance Technique II Modern Dance Technique III	2.0
Free Electives		10.0	Natural Science Elective		4.0
Term Credits		17.0	Free Electives		10.0
Term 12					
MUSC 331	World Musics	3.0	Term Credits		17.0
DANC 360	Dance Kinesiology	3.0	Term 11		
English (ENGL) Elective		3.0	DANC 131 or 133	Dance Practicum in Performance Dance Practicum in Choreography	1.0

Free Electives	6.0
Term Credits	15.0
Total Credit: 185.0	

Co-op/Career Opportunities

The dance major is designed for students to focus on one of three career options. Each option can lead to graduate study at Drexel or be completed at the end of four years. Each also includes a co-op experience that allows for extended interaction with the professional dance therapy, physical therapy and education communities. Students wishing to change career focus throughout the course of the undergraduate curriculum will have the option to do so.

Students focusing on **dance/movement therapy** participate in a six month co-op experience during the spring and summer terms of their junior year. These students may participate in co-op with a practicing dance/movement therapist, community dance artist, or mental health professional in a mental health, social service, rehabilitation, medical, special education or community arts setting.

Students focusing on **physical therapy**, will participate in a six month co-op in which they work in a setting with a physical therapist, such as a hospital, treatment center, school, or private practice. Co-op experiences where students are able to work with physical therapists working on dancers as clients will be encouraged. Students choosing this option may participate in either co-op cycle.

Students focusing on **dance in education** participate in after school dance clubs, artist in residence school programs and auditorium lecture demonstration programs as part of a community outreach dance company run by the dance program at Drexel, or other dance education focused activities in a school or studio setting, during the fall and winter of their junior year as their co-op experience.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Dual-Degree Option

BS/MS Dance and Elementary Education

About the Accelerated Degree Program

Qualified students in Dance have the option of continuing on into the graduate Science of Instruction program to obtain a BS in Dance and MS in Science of Instruction with Elementary Education certification. This program would allow highly motivated students to graduate with both degrees in a total of 5 years. Students apply for this accelerated program when they complete 90 credits of coursework and before completing 120 credits.

BS in Dance

Incoming students, 2014/2015

Bachelor of Science Degree: 185.0 quarter credits

General Education Requirements

COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0

ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
HIST 201	United States History to 1815	3.0
MATH 181	Mathematical Analysis I	3.0
MATH 182	Mathematical Analysis II	3.0
PSY 101	General Psychology I	3.0
PSY 120	Developmental Psychology	3.0
PSY 240 [WI (p. 490)]	Abnormal Psychology	3.0
UNIV A101	The Drexel Experience	1.0
CIVC 101	Introduction to Civic Engagement	1.0
Two English (ENGL) Electives		6.0
Two Natural Science Electives		8.0
Free Electives		40.0

Dance Major Requirements

Foundation and Theory Requirements

ARTH 103	History of Art: Early to Late Modern	3.0
MUSC 331	World Musics	3.0
NFS 100	Nutrition, Foods, and Health	2.0
NFS 101	Introduction to Nutrition & Food	1.0
THTR 240	Theatre Production I	3.0
DANC 201 [WI (p. 490)]	Dance Appreciation	3.0
DANC 210	Introduction to Dance	3.0
DANC 225	Dance Repertory	4.0
DANC 230	Survey of Dance and Movement Therapy	3.0
DANC 240	Dance Composition I	3.0
DANC 241	Dance Composition II	3.0
DANC 260	Injury Prevention for Dance	3.0
DANC 261	Foundations of Somatic Theory and Practice	3.0
DANC 310 [WI (p. 490)]	Dance Aesthetics and Criticism	3.0
DANC 325 [WI (p. 490)]	Twentieth Century Dance	3.0
DANC 330	Introduction to Laban Movement Analysis	3.0
DANC 340	Dance Pedagogy	3.0
DANC 355	Rhythmic Study for Dance	3.0
DANC 360	Dance Kinesiology	3.0

Performance Requirements

DANC 131 Dance Practicum in Performance (1.0 credit course 11.0 repeated for a total of 11.0 credits) ^{For DANC 131:}
Sections 001, 005, 006, 007, 008 ONLY

or DANC 133 Dance Practicum in Choreography

Technique Requirements

DANC 140 Ballet Technique I (2.0 credit course repeated for a total of 12.0 credits)

or DANC 141 Ballet Technique II

or DANC 142 Ballet Dance Technique III

DANC 150 Modern Dance Technique I (2.0 credit course repeated for a total of 12.0 credits)

or DANC 151 Modern Dance Technique II

or DANC 152 Modern Dance Technique III

DANC 180 Dance Improvisation 2.0

Select five of the following: 10.0

DANC 160	Jazz Dance Technique I	
DANC 161	Jazz Dance Technique II	
DANC 162	Jazz Dance Technique III	
DANC 170	Hip-Hop Dance Technique I	
DANC 171	Hip-Hop Dance Technique II	
DANC 181	Dance Improvisation II	
DANC 190	African Dance Technique I	
DANC 191	African Dance Technique II	
Total Credits		185.0

MS in Science of Instruction

A minimum of 45.0 credits is required for students with or without prior certification (including 15.0 credits of professional electives).

Core Courses

At a minimum, 23.0 pedagogy credits will be required from the core courses for those without prior teacher certification. Students with prior certification or those seeking an add-on certification will select 11.0 credits from the core courses.

EDUC 520	Professional Studies in Instruction *	3.0
EDUC 522	Evaluation of Instruction	3.0
EDUC 523	Diagnostic Teaching	4.0
EDUC 524	Current Research in Curriculum & Instruction	3.0
EDUC 525	Multi-Media Instructional Design	3.0
EDUC 526	Language Arts Processes	3.0
EDUC 540	Field Experience *	3.0
Total Credits		22.0

* Not available to those with prior teacher certification.

Content Categories

For students without prior teacher certification, 7 credits are required, selected from the following content categories. (A list of suggested courses is available from the department.) Students with prior certification or those seeking add-on certification select 19 credits from the content categories.

1. Mathematics and science
2. Technological pedagogy
3. Applied pedagogy

Evaluation of transcripts by a program advisor in relation to Pennsylvania state standards determines the required content courses for initial certification and add-on certification. To satisfy state certification requirements, undergraduate courses may be taken in instances where graduate courses are not appropriate. These undergraduate courses will not satisfy graduate degree requirements. However, they will satisfy certification requirements and may satisfy requirements for salary increments in certain school districts. For those with prior certification who do not wish add-on certification, but desire to further professional competence, a distribution of courses from areas A, B, and C is selected under advisement on an individual basis.

Professional Electives

Students with or without prior certification select 15 credits of professional electives. Professional electives are selected with the advice of a program

advisor to strengthen mathematics and science knowledge, to refine and update pedagogy competence, to broaden general education, to gain knowledge about the nature of information and information materials, to develop and refine skills in integrating technology into instruction, and to ensure that certification standards are satisfied. Professional electives may be taken from the core courses or from any course in the content categories. Any graduate course offered in the University may serve as a professional elective if the student has adequate preparation to take the course and it is deemed appropriate by the program advisor. The 15.0 credits of professional electives may comprise a combination of up to three Performance Learning Systems (PLS) courses and/or approved transfer credits. PLS courses must be taken at Drexel to count toward the master's degree.

Minor in Dance

The minor in dance offers students an opportunity to explore dance in the studio through technique classes, and in the classroom through academic classes in dance. Participation in the dance ensemble class(s) is required, although performance with the ensemble is not. There is no audition for the dance minor program.

Required Courses

DANC 140	Ballet Technique I	2.0
DANC 150	Modern Dance Technique I	2.0
DANC 160	Jazz Dance Technique I	2.0
or DANC 170	Hip-Hop Dance Technique I	
DANC 210	Introduction to Dance	3.0
DANC 240	Dance Composition I	3.0
DANC 325 [WI (p. 490)]	Twentieth Century Dance	3.0
DANC 355	Rhythmic Study for Dance	3.0
THTR 240	Theatre Production I	3.0
Electives in Dance (DANC 140-DANC 495)		3.0
Dance Practicum (6 terms from DANC 131-DANC 133)		0.0
Total Credits		24.0

Dance Faculty

Lindsay Browning, BFA (*Radford University*). Yoga.

Jim Bunting, BFA (<https://www.drexel.edu/westphal/contact/directory/BuntingJim>) (*University of the Arts, Philadelphia*). Adjunct Instructor. Jazz dance.

K. C. Chun-Manning, MFA (<http://www.drexel.edu/westphal/contact/directory/Chun-ManningKC>) (*University of Illinois*). Adjunct Instructor. Dance ensembles.

Antoinette Coward-Gilmore, MA (<http://www.drexel.edu/westphal/contact/directory/Coward-GilmoreAntoinette>) (*New York University*). Adjunct Instructor. African dance, modern dance.

Clyde Evans (<http://drexel.edu/westphal/contact/directory/EvansJrClyde>) Adjunct Assistant Professor. Director of Chosen Dance Company; hip-hop.

Chris Farrell, MBA (<http://www.drexel.edu/westphal/contact/directory/FarrellChris>) (*Fordham University*). Adjunct Assistant Professor. Rhythmic Studies, Accompaniment.

Miriam Giguere, PhD (<http://www.drexel.edu/westphal/about/faculty/?id=204>) (*Temple University*) Program Director, Dance. Associate Professor. Professional modern dancer, choreographer and dance educator whose research centers on cognition during the creative process. She has published nationally and internationally and is a frequent presenter on the integration of dance and academics at national and international conferences.

Tania Isaac, MFA (<http://drexel.edu/westphal/contact/directory/IsaacTania>) (*Temple University*). Assistant Teaching Professor. Caribbean-American dancer/choreographer; fusion of choreography with personal documentary and social commentary to grapple with identity, post-colonial issues, feminism and juxtapositions of European and African influences.

Lucinda Lea, BA (<http://drexel.edu/westphal/contact/directory/LeaLucinda>) (*Indiana University*). Adjunct Assistant Professor. Ballet.

Beth McNamara, MFA (*Drexel University*). Survey of Dance/Movement Therapy.

Jennifer Morley, MFA (<http://drexel.edu/westphal/contact/directory/MorleyJennifer>) (*Temple University*). Adjunct Assistant Professor. Master Pilates instructor and director of the Drexel Pilates Teaching Training program; modern dance, choreography.

Carl Paris, PhD (<http://drexel.edu/westphal/contact/directory/ParisCarl>) (*Temple University*). Adjunct Associate Professor. Interdisciplinary approach to dance studies, cultural studies and issues around black dance and performance.

Olive Prince, MFA (<http://drexel.edu/westphal/contact/directory/PrinceOlive>) (*Temple University*). Adjunct Assistant Professor. Choreography, creative process and improvisation; Director of Olive Prince Dance.

Meredith Rainey (<http://drexel.edu/westphal/contact/directory/RaineyMeredith>) Adjunct Assistant Professor. Former soloist with Pennsylvania Ballet and director of Carbon Dance Theater. Ballet, choreography.

Heather Smalley, BS (<http://drexel.edu/westphal/contact/directory/SmalleyHeather>) (*Drexel University*) Assistant Director, Dance Ensemble. Adjunct Assistant Professor. Arts administration.

Leah Stein, BA (<http://www.drexel.edu/westphal/contact/directory/SteinLeah>) (*Wesleyan University*). Adjunct Assistant Professor. Modern technique, Improvisation.

Lauren Stepanski, DPT (<http://www.drexel.edu/westphal/contact/directory/StepanskiLauren>) (*Drexel University*). Adjunct Assistant Professor. Dance Kinesiology

Jessica Warchal-King, MFA (*Temple University*). Modern technique.

Design & Merchandising

Major: Design and Merchandising

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 181.0

Classification of Instructional Programs (CIP) code: 50.0499

Standard Occupational Classification (SOC) code: 13-1022

About the Program

Students in the Design & Merchandising program develop an appreciation for style and product quality, learn to communicate verbally and visually about design across traditional and emerging media, and gain the business knowledge and skills required to promote an aesthetically grounded point of view in the global marketplace.

The Design & Merchandising program at Drexel University's Antoinette Westphal College of Media Arts & Design educates and prepares students to effect change via creative problem-solving in design and commerce. Through an interdisciplinary approach, we strive to graduate adaptable, creative, confident and passionate professionals who are technologically adept and globally aware.

Through the classroom, co-op experience and study abroad opportunities, the program prepares students to create, merchandise, market, promote and distribute fashion product, based on a knowledge of visual/aesthetic and business considerations. Design & Merchandising students graduate with the knowledge and skills needed for success in traditional and emerging roles in the global marketplace, and as practical and responsible corporate citizens who will make the world a more compelling, beautiful place in which to live and work.

Design & Merchandising majors typically focus study in the areas of fashion and fashion-related retail merchandising, product development and product promotions. Elective credits may be used for a concentration in Retail Buying & Merchandising; Fashion Product Development; Fashion Promotion & Special Events; Merchandising Technologies; and Design Management for Design & Merchandising. Elective credits may also provide students with an option to minor in business administration, art history, product design, another discipline, or to pursue other specific educational goals.

For more information about this major, visit the College's Design & Merchandising (<http://www.drexel.edu/westphal/academics/undergraduate/designmerch>) page.

Degree Requirements

Students pursuing the Bachelor of Science in Design & Merchandising may complete a concentration in an area of study using free electives. Students may pursue more than one concentration or combine a concentration with a minor.

Concentration in Retail Buying & Merchandising

This concentration is designed to broaden students' practical and theoretical understanding of consumption as it relates to retail buying, management and merchandising. With the growth in cross-channel retail, students need to develop their skills not only for careers in traditional brick-and-mortar retailing establishments, but other retail models. These include: print and electronic based retailing (catalog, television, and Internet). In this concentration, students explore all major retail merchandising and marketing channels and their requirements for buying, staffing, technology, logistics, distribution, and organizational behavior.

Concentration in Fashion Product Development

This concentration analyzes the dominant forces shaping 21st century merchandising decisions, including global product sourcing, international retail development, and the increasingly important role of the consumer in product design. Students successfully completing this concentration develop practical applications to critical issues facing industry decision makers, understand supply chain management from the producer and retailer perspective, identify new markets for products and create

strategies for entering those markets, implement merchandising strategies in sectors across the design industries and gain exposure to the latest technology and communication tools that support the industry.

Concentration in Fashion Promotion and Special Events

Through the Fashion Promotion and Special Events concentration students who are interested in a career in public relations, special events planning and marketing, creative and media direction within the design industries will have the opportunity to take classes inside and outside the AW College of Media Arts & Design. These partnerships will enhance the students' background in this area of specialization, and dramatically increase networking and employment opportunities.

Concentration in Merchandising Technologies

Merchandising utilizes technology on the front end for fashion product promotion and on the back end to research, design, source, produce and distribute fashion and home product. In this concentration, students will study topical issues in merchandising technologies through a variety of theory and "hands on" based courses. Upon completion of this concentration students will be familiar with the current technologies in play, analyze the appropriate uses of available technology and be familiar with emerging trends.

Concentration in Design Management in Design & Merchandising

Design management is a relatively new area of study for the design and merchandising student. This concentration is specifically designed to prepare the student to pursue Design Management at the graduate level.

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
PHYS 121	Physical Science for Design I	4.0
PHYS 122	Physical Science for Design II	4.0
UNIV A101	The Drexel Experience	2.0
Arts and Humanities Electives *		9.0
Social Science Electives **		9.0
Free Electives		31.0

Visual Studies Requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
PHTO 110	Photography	3.0
VSST 101	Design I	4.0
VSST 102	Design II	4.0
VSST 103	Design III	4.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0
VSST 201	Multimedia: Performance	4.0
VSST 202	Multimedia: Space	4.0
VSST 203	Multimedia: Materials	4.0

Professional Requirements

ACCT 115	Financial Accounting Foundations	4.0
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ARTH 300 [WI (p. 495)]	History of Modern Design	3.0
DSMR 100	Computer Imaging I	3.0
DSMR 201	Analysis of Product	3.0
DSMR 210	Presentation Techniques Design and Merchandising	3.0
DSMR 211	Computer Design for Design and Merchandising	3.0
DSMR 230	Textiles for Design and Merchandising	3.0
DSMR 231	Retail Principles	3.0
DSMR 232	Retail Merchandise Planning	4.0
DSMR 310	Computer Integrated Merchandising Management	3.0
DSMR 311	Visual Merchandising	4.0
DSMR 333	Fashion Product Development	3.0
DSMR 477 [WI (p. 495)]	Design and Merchandising Seminar	3.0
DSMR 496 [WI (p. 495)]	Senior Problem in Design and Merchandising	3.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FASH 201	Survey of the Fashion Industry	3.0
MKTG 301	Introduction to Marketing Management	4.0
Art History Electives ***		6.0
Total Credits		181.0

* Suggested arts and humanities electives: ENGL 303 Science Fiction; ENGL 335 Mythology (Women in Literature); HIST 163 Themes in World Civilization III; HIST 220 History of American Business; HIST 224 Women in American History; ENGL 335 Mythology; any foreign language.

** Suggested social science electives: SOC 210 Race, Ethnicity and Social Inequality; SOC 215 Sociology of Work; SOC 240 Urban Sociology; SOC 345 Sociology for the Environment; SOC 340 Globalization; SOC 495 Independent Studies in Sociology.

*** Suggested art history electives: ARTH 335 History of Costume I: Preclassical to Directoire [WI (p. 495)]; ARTH 336 History of Costume II: Directoire to World War I [WI (p. 495)]; ARTH 477 Art History Seminar.

Concentration Options

Retail Buying & Merchandising Concentration

Required Courses

DSMR 313	International Fashion Merchandising	3.0
DSMR 314	Visual Merchandising III	4.0
DSMR 324	Retail Directions	3.0
DSMR 325	Retail Buying and Assortment Strategies	4.0
Select three from the following:		11.0
DSMR 309	Color and Trend Forecasting	
DSMR 326	Fashion Product Promotion	
MKTG 324	Marketing Channels and Distribution Systems	
MKTG 344	Professional Personal Selling	
MKTG 355	Interactive Marketing	
MKTG 356	Consumer Behavior	

Total Credits **25.0**

Fashion Product Development Concentration

Required Courses

DSMR 313	International Fashion Merchandising	3.0
DSMR 320	Merchandising and Design Directions	3.0
DSMR 434	Fashion Product Sourcing	3.0
Select four from the following:		14.0
COM 362	International Negotiations	
DSMR 326	Fashion Product Promotion	
INTB 200	International Business	
INTB 334	International Trade	
MKTG 347	New Product Development	
MKTG 357	Global Marketing	

Total Credits 23.0

Fashion Promotion and Special Events Concentration

Required Courses

DSMR 205	eFashion Promotion	3.0
DSMR 326	Fashion Product Promotion	4.0
Select one of the following:		2.0-3.0
DSMR 312	Visual Merchandising II	
DSMR 315 [WI (p. 495)]	Media Merchandising I	
DSMR 321 [WI (p. 495)]	Fashion Show Production I	
Select 13.0 - 14 additional credits from the following:		13.0-14
COM 260 [WI (p. 495)]	Fundamentals of Journalism	
COM 280	Public Relations Principles and Theory	
COM 350 [WI (p. 495)]	Message Design and Evaluation	
COM 361	International Public Relations	
DSMR 316	Media Merchandising II	
DSMR 317	Media Merchandising III	
DSMR 318	Music Merchandising	
DSMR 322	Fashion Show Production II	
FASH 467	Style and the Media	
MKTG 322	Advertising & Integrated Marketing Communications	
MKTG 356	Consumer Behavior	

Total Credits 23.0

* The pre-requisite for this course is COM 280.

Merchandising Technologies Concentration

Required Courses

DSMR 205	eFashion Promotion	3.0
DSMR 305	eTailing	3.0
Select a minimum of 5 from the following:		15.0
COM 300 [WI (p. 495)]	On-line Journalism *	
COM 335	Electronic Publishing	
CT 230	Web Development I	

CT 240	Web Development II **	
CT 385	Web Development III ***	
DIGM 105	Overview of Digital Media	
DIGM 350 [WI (p. 495)]	Digital Storytelling	
DIGM 451 [WI (p. 495)]	Explorations in New Media	
DSMR 312	Visual Merchandising II	
DSMR 316	Media Merchandising II	
DSMR 317	Media Merchandising III	

Total Credits 21.0

* The pre-requisite for this course is COM 260 [WI (p. 495)] .

** The pre-requisite for this course is CT 230.

*** The pre-requisite for this course is CT 240.

Design Management in Design & Merchandising Concentration

Required Courses

DSMR 205	eFashion Promotion	3.0
DSMR 305	eTailing	3.0
DSMR 313	International Fashion Merchandising	3.0
DSMR 434	Fashion Product Sourcing	3.0
Choose 11.0 -12.0 additional credits from the following:		11.0-12.0
BLAW 201	Business Law I	
COM 361	International Public Relations	
COM 362	International Negotiations	
INTB 200	International Business	
INTB 334	International Trade	
MGMT 364	Technology Management	
MKTG 347	New Product Development	
MKTG 357	Global Marketing	

Total Credits 23.0

Sample Plans of Study

Fall/Winter Co-op (Cycle A)

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FASH 201	Survey of the Fashion Industry	3.0
PHYS 121	Physical Science for Design I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
Term Credits		15.0
Term 2		Credits
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHYS 122	Physical Science for Design II	4.0
UNIV A101	The Drexel Experience	1.0
VSST 102	Design II	4.0
VSST 110	Introductory Drawing	3.0
Term Credits		15.0

Term 3		
CIVC 101	Introduction to Civic Engagement	1.0
DSMR 100	Computer Imaging I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
VSST 103	Design III	4.0
VSST 111	Figure Drawing I	3.0
Term Credits		18.0

Term 4		
ACCT 115	Financial Accounting Foundations	4.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
DSMR 231	Retail Principles	3.0
ECON 201	Principles of Microeconomics	4.0
Term Credits		14.0

Term 5		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
COOP 101	Career Management and Professional Development	0.0
DSMR 211	Computer Design for Design and Merchandising	3.0
DSMR 232	Retail Merchandise Planning	4.0
ECON 202	Principles of Macroeconomics	4.0
Term Credits		14.0

Term 6		
DSMR 201	Analysis of Product	3.0
DSMR 210	Presentation Techniques Design and Merchandising	3.0
DSMR 230	Textiles for Design and Merchandising	3.0
VSST 201	Multimedia: Performance	4.0
Term Credits		13.0

Term 7		
ARTH 300 [WI (p. 495)]	History of Modern Design	3.0
VSST 203	Multimedia: Materials	4.0
PHTO 110	Photography	3.0
Free Elective		3.0
Arts and Humanities Elective		3.0
Term Credits		16.0

Term 8		
ARTH 103	History of Art: Early to Late Modern	3.0
DSMR 310	Computer Integrated Merchandising Management	3.0
DSMR 333	Fashion Product Development	3.0
MKTG 301	Introduction to Marketing Management	4.0
Social Science Elective		3.0
Term Credits		16.0

Term 9		
DSMR 311	Visual Merchandising	4.0
DSMR 477 [WI (p. 495)]	Design and Merchandising Seminar	3.0
Art History (ARTH) Elective		3.0
Arts and Humanities Elective		3.0

Free Electives	3.0	
Term Credits		16.0

Term 10		
DSMR 496 [WI (p. 495)]	Senior Problem in Design and Merchandising	3.0
Art History (ARTH) Elective		3.0
Social Science Elective		3.0
Free Electives		7.0
Term Credits		16.0

Term 11		
VSST 202	Multimedia: Space	4.0
Social Science Elective		3.0
Free Electives		9.0
Term Credits		16.0

Term 12		
Free Electives		9.0
Arts and Humanities Elective		3.0
Term Credits		12.0

Total Credit: 181.0

Fall/Winter Co-op (Cycle A - London Option)

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FASH 201	Survey of the Fashion Industry	3.0
PHYS 121	Physical Science for Design I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
Term Credits		15.0

Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHYS 122	Physical Science for Design II	4.0
VSST 102	Design II	4.0
UNIV A101	The Drexel Experience	1.0
VSST 110	Introductory Drawing	3.0
Term Credits		15.0

Term 3		
CIVC 101	Introduction to Civic Engagement	1.0
DSMR 100	Computer Imaging I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
VSST 103	Design III	4.0
VSST 111	Figure Drawing I	3.0
Term Credits		18.0

Term 4		
ACCT 115	Financial Accounting Foundations	4.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
DSMR 210	Presentation Techniques Design and Merchandising	3.0
DSMR 231	Retail Principles	3.0

ECON 201	Principles of Microeconomics	4.0
Term Credits		17.0
Term 5		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
COOP 101	Career Management and Professional Development	0.0
DSMR 211	Computer Design for Design and Merchandising	3.0
ECON 202	Principles of Macroeconomics	4.0
Free Elective		4.0
Term Credits		14.0
Term 6		
DSMR 201	Analysis of Product	3.0
DSMR 230	Textiles for Design and Merchandising	3.0
DSMR 232	Retail Merchandise Planning	4.0
VSST 201	Multimedia: Performance	4.0
Term Credits		14.0
Term 7		
DSMR 477 [WI (p. 495)]	Design and Merchandising Seminar	3.0
PHTO 110	Photography	3.0
VSST 203	Multimedia: Materials	4.0
Arts and Humanities Elective		3.0
Art History (ARTH) Elective		3.0
Term Credits		16.0
Term 8		
DSMR 310	Computer Integrated Merchandising Management	3.0
DSMR 333	Fashion Product Development	3.0
MKTG 301	Introduction to Marketing Management	4.0
Social Science Elective		3.0
Term Credits		13.0
Term 9		
London Option (History of Modern Design 4.5, Fashion Product Promotion 4.5, and 9 credits electives)		18.0
Term Credits		18.0
Term 10		
ARTH 103	History of Art: Early to Late Modern	3.0
DSMR 496 [WI (p. 495)]	Senior Problem in Design and Merchandising	3.0
Free Electives		3.0
Social Science Elective		3.0
Term Credits		12.0
Term 11		
DSMR 311	Visual Merchandising	4.0
VSST 202	Multimedia: Space	4.0
Arts and Humanities Elective		3.0
Art History (ARTH) Elective		3.0
Term Credits		14.0
Term 12		
Free Electives		6.0
Art History (ARTH) Elective		3.0
Social Science Elective		3.0

Arts and Humanities Elective	3.0
Term Credits	15.0

Total Credit: 181.0

Spring/Summer (Co-op Cycle B)

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FASH 201	Survey of the Fashion Industry	3.0
PHYS 121	Physical Science for Design I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
Term Credits		15.0
Term 2		
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHYS 122	Physical Science for Design II	4.0
UNIV A101	The Drexel Experience	1.0
VSST 102	Design II	4.0
VSST 110	Introductory Drawing	3.0
Term Credits		15.0
Term 3		
CIVC 101	Introduction to Civic Engagement	1.0
DSMR 100	Computer Imaging I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
VSST 103	Design III	4.0
VSST 111	Figure Drawing I	3.0
Term Credits		18.0
Term 4		
ACCT 115	Financial Accounting Foundations	4.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
DSMR 231	Retail Principles	3.0
ECON 201	Principles of Microeconomics	4.0
Term Credits		14.0
Term 5		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
DSMR 232	Retail Merchandise Planning	4.0
ECON 202	Principles of Macroeconomics	4.0
Free Elective		3.0
Term Credits		14.0
Term 6		
DSMR 201	Analysis of Product	3.0
DSMR 210	Presentation Techniques Design and Merchandising	3.0
DSMR 211	Computer Design for Design and Merchandising (Or)	3.0
DSMR 230	Textiles for Design and Merchandising	3.0
VSST 201	Multimedia: Performance	4.0
Term Credits		13.0
Term 7		

ARTH 300 [WI (p. 495)]	History of Modern Design	3.0
COOP 101	Career Management and Professional Development	0.0
PHTO 110	Photography	3.0
VSST 203	Multimedia: Materials	4.0
Free Elective		3.0
Arts and Humanities Elective		3.0
Term Credits		16.0
Term 8		
ARTH 103	History of Art: Early to Late Modern	3.0
DSMR 310	Computer Integrated Merchandising Management	3.0
DSMR 333	Fashion Product Development	3.0
MKTG 301	Introduction to Marketing Management	4.0
Social Science Elective		3.0
Term Credits		16.0
Term 9		
DSMR 311	Visual Merchandising	4.0
DSMR 477 [WI (p. 495)]	Design and Merchandising Seminar	3.0
Art History (ARTH) Elective		3.0
Arts and Humanities Elective		3.0
Free Elective		3.0
Term Credits		16.0
Term 10		
DSMR 496 [WI (p. 495)]	Senior Problem in Design and Merchandising	3.0
Art History (ARTH) Elective		3.0
Social Science Elective		3.0
Free Electives		6.0
Term Credits		15.0
Term 11		
VSST 202	Multimedia: Space	4.0
Free Electives		8.0
Social Science Elective		3.0
Term Credits		15.0
Term 12		
Free Electives		11.0
Arts and Humanities Elective		3.0
Term Credits		14.0
Total Credit: 181.0		

Co-op/Career Opportunities

Opportunities

An education in Design & Merchandising prepares individuals for a wide variety of career paths. Graduates often pursue opportunities in retail operations and buying, fashion and home product development, fashion product promotion. More recently, graduates select careers in merchandising technologies, or design management. Each of these areas

is offered as a concentration, or the student may elect to choose a minor opening up an unlimited number of options.

Co-Op Experiences

Some past co-op employments of design and merchandising students include:

- Wholesale Co-op, Alexander McQueen, New York, NY
- Assistant Buyer, Urban Outfitters/Anthropologie, Philadelphia, PA
- Product Development Assistant, Charming Shoppes, Bensalem, PA
- Design and Merchandising Assistant, Jones New York, New York, NY
- Public Relations Assistant, QVC, West Chester, PA
- Assistant Fashion Coordinator, Special Events Department, Saks Fifth Avenue
- Fashion Showroom Co-op, BCBG Max Azria, New York, NY
- Public Relations Assistant, Neiman Marcus, King of Prussia, PA
- Design/Market Co-op, Charlotte Ronson, New York, NY
- Design Assistant, Calvin Klein, New York, NY
- Retail/Manufacturing/Merchandising Asst., Nicole Miller, Philadelphia PA

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Dual/Accelerated Degree Program

Only available to Design & Merchandising majors (4-year with co-op), this dual degree program combines study in the areas of fashion retail merchandising and product development with the MBA degree. The program is designed to allow students to complete both the bachelor's degree and the Master of Business Administration degree in five years.

Incoming freshmen selected for this program will generally have a minimum of 1350 on the SAT, a GPA of 3.5 or better, and rank in the top 10% of their high school graduating class. A strong candidate for this program will have taken significant AP coursework while in high school.

Degree Requirements

The degree requirements for each program are located on the following pages:

- BS in Design & Merchandising Requirements (<https://nextcatalog.drexel.edu/undergraduate/collegeofmediaartsanddesign/designandmerchandising/#degreerequirementsbtext>)
- MBA Requirements (<https://nextcatalog.drexel.edu/graduate/collegeofbusiness/businessadministration/#degreerequirementstext>)

Additional requirements for the dual degree program

- A cumulative GPA of at least 3.2 is required throughout the program.
- Students must take the GMAT examination and achieve a minimum score of 570 prior to the end of the tenth term in order to continue in the program. It is recommended that students take the GMAT examination late in the student's third year.
- Students must submit an acceptable plan of study at least three terms before anticipated start of graduate part of the program.

Students should visit the Westphal College of Media Arts and Design (<http://www.drexel.edu/westphal>) for more information.

Fashion, Product Design & Merchandising Faculty

Kristen Ainscoe, BS (*Drexel University*). Assistant Teaching Professor. Visual merchandiser; merchandise management.

Catherine Byers, MA (*American University*). Assistant Teaching Professor. Journalism; marketing and communications.

Nick Cassway, BFA (*Tyler School of Art*). Assistant Teaching Professor. Curating; experimental portraiture; computer design.

Anne C. Cecil, MA (*University of the Arts*) Program Director, *Design & Merchandising*. Teaching Professor. Web designer, product designer, merchandising and artist.

Renee Weiss Chase, MS (*Drexel University*). Professor. Fashion designer; computer-aided design systems for the fashion curriculum.

Anita Dennis, AST (*Art Institute of Philadelphia*) Fashion Laboratory Technician. Assistant Teaching Professor. Fashion designer and technician; construction skills.

Genevieve Dion, MFA (*University of the Arts*). Assistant Professor. Industrial designer, wearable artist, new materials technology research.

Michael Glaser, MFA (*Ohio State University*) Program Director for *Product Design*. Assistant Professor. Quantifying the designer's intuition; the interplay between digital and physical forms; human desire to shape our surroundings.

Cynthia Golembuski, MS (*Drexel University*) Associate Program Director, *Fashion Design*. Assistant Teaching Professor. Fashion designer, illustrator, computer aided design.

Roberta Hochberger Gruber, MS (*Drexel University*) Head of the *Fashion and Product Design & Merchandising Department*. Associate Professor. Fashion designer and illustrator; wearable artist, merchandiser, special events.

Joseph H. Hancock, II, PhD (*Ohio State University*). Associate Professor. Apparel merchandising, textiles and clothing, culture and marketing strategies.

Lisa L. Hayes, BFA (*Syracuse University*) Program Director, *Fashion Design*. Associate Professor. Fashion designer, product designer, pattern design.

Jan Marshall, BA (*Long Island University*). Assistant Teaching Professor. Fashion designer, knitwear, product development, fashion analysis.

Kathi Martin, MSIS (*Drexel University*) Associate Director of the *Graduate Program in Fashion Design*. Associate Professor. Fashion and textile designer; textile artist; computer-aided design, best practices online databases and graphic interfaces for fashion and historic costume, virtual characters for fashion design.

Alphonso McClendon, MS (*Drexel University*). Assistant Professor. Fashion designer, textile designer, computer aided design.

Beth Phillips, MS (*Georgetown University*). Associate Teaching Professor. Business and international marketing, linguist, analysis of products.

Juanita Phillips, BS (*Drexel University*). Assistant Teaching Professor. Fashion designer and educator.

Clare Sauro, MA (*Fashion Institute of Technology*) Curator of the *Drexel Historic Costume Collection*. Assistant Teaching Professor. Museum studies: costume and textiles.

Entertainment and Arts Management

Major: *Entertainment and Arts Management*

Degree Awarded: *Bachelor of Science (BS)*

Calendar Type: *Quarter*

Total Credit Hours: *185.0 - 187.0*

Classification of Instructional Program (CIP) code: *51.1001*

Standard Occupational Classification (SOC) code: *13-1011*

About the Program

Students in Drexel's Entertainment and Arts Management major choose an area of concentration in media management, performing arts management, or visual arts management. The curriculum is designed to prepare students to lead and manage in both non-profit and for-profit areas of the field. Concentrations are available in: Visual Arts; Performing Arts; Dance; Theatre; Digital Media; Cinema and Television; and Sports Entertainment. Coursework in the Entertainment and Arts Management program includes general education, core requirements and a minor in business as well as specialized coursework within the student's chosen area of concentration.

Unlike other undergraduate programs in this field, students are not required to choose a nonprofit or for-profit focus. This allows Drexel students increased flexibility when choosing their career paths, and a distinct professional advantage in today's ever-changing arts and entertainment industries.

BS/MS Option

Students who complete the Entertainment and Arts Management program may also choose to pursue a graduate degree at Drexel in arts administration. Students who graduate with a 3.5 GPA in the last two years of the program who apply to the MS in Arts Administration (<http://catalog.drexel.edu/graduate/collegeofmediaartsanddesign/artsadministration>) are automatically accepted into the MS program.

Dual Degree MBA Option

Only available to students majoring in entertainment and arts management (4-year with co-op), the BS Entertainment and Arts Management/MBA dual degree program combines study in the management of the arts and entertainment industries along with the MBA degree. The program is designed to allow students to complete both the bachelor's degree and the MBA in five years.

Applying to the Dual Degree MBA Option

Freshman applicants to the Entertainment and Arts Management program with a combined Math and Critical Reading SAT score of 1300 and a 3.5 GPA may apply for the BS/MBA program at the time of their initial application to Drexel University. Students who are accepted into the accelerated program must maintain a 3.2 GPA as an EAM undergraduate, and must submit 2 letters of recommendation and meet minimum GMAT requirements at the time of the application to the MBA program.

For more information about this major, visit the College's Entertainment and Arts Management (<http://www.drexel.edu/westphal/academics/undergraduate/eam>) page.

Degree Requirements

Coursework in the EAM program includes general education and core requirements as well as specialized coursework within the student's chosen area of concentration and, if applicable, within a specific arts or media discipline. For instance, within the media management concentration, students choose coursework in one of two disciplines: film, video, and screenwriting or digital media. In the performing arts management concentration, students choose coursework in a dance, performing arts, or theatre discipline.

The core requirements provide an overview of the student's future career field and its required key skills and abilities. The core requirements build a foundation for further advanced and specialized courses, taught in the student's area of concentration. At the end of their freshman year, students select one of the following concentrations:

- **(A) Visual Arts Management Concentration**
- **(B) Performing Arts Management**
 - a. Dance Concentration
 - b. Performing Arts Concentration
 - c. Theatre Concentration
- **(C) Media Management**
 - a. Digital Media Concentration
 - b. Cinema and Television Concentration
- **(D) Sports Entertainment Concentration**

General Education Requirements

Written Analysis and Communication Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Mathematics and Natural Sciences Requirements

MATH 101	Introduction to Analysis I	4.0
MATH 102	Introduction to Analysis II	4.0

Select one of the following sequences: 6.0-8.0

Biology		
BIO 100	Applied Cells, Genetics & Physiology	
BIO 101	Applied Biological Diversity, Ecology & Evolution	
Physics		
PHYS 121	Physical Science for Design I	
PHYS 122	Physical Science for Design II	

Arts/Humanities Requirements

COM 230	Techniques of Speaking	3.0
Two Arts/Humanities electives		6.0

Social Science Requirements

Three Social Science electives		9.0
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University Seminar Requirements

UNIV A101	The Drexel Experience	2.0
CIVC 101	Introduction to Civic Engagement	1.0

COOP 101	Career Management and Professional Development	0.0
Free electives *		26.0-21.0

Entertainment and Arts Management Core Requirements

ACCT 115	Financial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
DSMR 100	Computer Imaging I	3.0
EAM 130	Overview of Entertainment and Arts Management	3.0
EAM 211	Strategic Management for Entertainment and Arts Management	3.0
EAM 261	Copyrights and Trademarks	3.0
EAM 361	Law for Entertainment and Arts Management Managers	3.0
EAM 391 [WI (p. 501)]	Promotion, Press and Publicity	3.0
EAM 461	Entertainment Publishing	3.0
EAM 491	Entertainment and Arts Management Senior Project **	3.0
ECON 201	Principles of Microeconomics	4.0
HRMT 323	Principles of Human Resource Administration	4.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 501)]	Organizational Behavior	4.0
Select one of the following:		4.0
ACCT 116	Managerial Accounting Foundations	
BUSN 301	Accounting and Finance for Nonfinancial Professionals	
MKTG 356	Consumer Behavior	
Select two of the following: ***		8.0
ECON 202	Principles of Macroeconomics	
FIN 301	Introduction to Finance	
MIS 200	Management Information Systems	
OPM 200	Operations Management	
STAT 201	Introduction to Business Statistics	
STAT 202	Business Statistics II	

Concentration Requirements * 55.0-60.0

Total Credits 185.0-187.0

* Minimum number of free electives depends on chosen concentration.

** EAM 491 is a 1.0 credit course, taken 3 times during the senior year, for a total of 3.0 credits.

*** BS/MBA students should take STAT 201 and FIN 301. Students who take STAT 201 and FIN 301 should not take BUSN 301.

Concentration Requirements

A. Visual Arts Management Concentration

ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
EAM 270	Audience Development for Arts	3.0
EAM 301	Gallery and Collection Management	3.0
EAM 302	Exhibition Design	3.0
EAM 312	Introduction to Fund Development for the Arts	3.0

EAM 350	Arts, Culture and Society	3.0
EAM 401	Writing for Arts Managers	3.0
EAM 471	Fine Arts Market Development	3.0
EAM 472	Trends in Visual Arts	3.0

Visual Arts students select 24 additional credits from the following: 24.0

ARTH 300 [WI (p. 501)]	History of Modern Design	
INTR 200	History of Modern Architecture and Interiors	
PHTO 110	Photography	
PHTO 115	Photographic Principles	
PHTO 210	Intermediate Photography	
PHTO 275 [WI (p. 501)]	History of Photography I	
PHTO 276	History of Photography II	
VSST 101	Design I	
VSST 102	Design II	
VSST 103	Design III	
VSST 110	Introductory Drawing	
VSST 111	Figure Drawing I	
VSST 112	Figure Drawing II	
VSST 301	Painting I	
VSST 302	Painting 2	
VSST 303	Painting 3	

Total Credits 57.0

B. Performing Arts Management

1. Dance Concentration

DANC 140	Ballet Technique I	2.0
DANC 150	Modern Dance Technique I	2.0
DANC 160	Jazz Dance Technique I	2.0
or DANC 170	Hip-Hop Dance Technique I	
DANC 201 [WI (p. 501)]	Dance Appreciation	3.0
DANC 210	Introduction to Dance	3.0
DANC 240	Dance Composition I	3.0
DANC 325 [WI (p. 501)]	Twentieth Century Dance	3.0
DANC 355	Rhythmic Study for Dance	3.0
EAM 270	Audience Development for Arts	3.0
EAM 312	Introduction to Fund Development for the Arts	3.0
EAM 313	Volunteer and Board Management	3.0
EAM 321	Box Office and Venue Management	3.0
EAM 322	Performing Arts Touring and Promotion	3.0
EAM 340	Artist Representation and Management	3.0
EAM 350	Arts, Culture and Society	3.0
EAM 401	Writing for Arts Managers	3.0
MUSC 130	Introduction to Music	3.0
THTR 240	Theatre Production I	3.0
DANC Electives		6.0
Six terms of Dance ensembles (DANC 131 -132)		3.0

Total Credits 60.0

2. Performing Arts Concentration

DANC 201 [WI (p. 501)]	Dance Appreciation	3.0
DANC 210	Introduction to Dance	3.0
DANC 325 [WI (p. 501)]	Twentieth Century Dance	3.0
EAM 270	Audience Development for Arts	3.0
EAM 312	Introduction to Fund Development for the Arts	3.0
EAM 313	Volunteer and Board Management	3.0
EAM 321	Box Office and Venue Management	3.0
EAM 322	Performing Arts Touring and Promotion	3.0
EAM 340	Artist Representation and Management	3.0
EAM 350	Arts, Culture and Society	3.0
EAM 401	Writing for Arts Managers	3.0
MUSC 130	Introduction to Music	3.0
MUSC 331	World Musics	3.0
MUSC 333	Afro-American Music USA	3.0
MUSC 338 [WI (p. 501)]	American Popular Music	3.0
THTR 115	Theatrical Experience	3.0
THTR 210	Acting: Fundamentals	3.0
THTR 240	Theatre Production I	3.0
THTR Theatre Elective		3.0
Six terms of Performing Arts ensembles (3 classes must be taken for 1 credit each. One must be THTR 130)		3.0

Total Credits 60.0

3. Theatre Concentration

EAM 270	Audience Development for Arts	3.0
EAM 312	Introduction to Fund Development for the Arts	3.0
EAM 313	Volunteer and Board Management	3.0
EAM 321	Box Office and Venue Management	3.0
EAM 322	Performing Arts Touring and Promotion	3.0
EAM 340	Artist Representation and Management	3.0
EAM 350	Arts, Culture and Society	3.0
EAM 401	Writing for Arts Managers	3.0
THTR 121 [WI (p. 501)]	Dramatic Analysis	3.0
THTR 210	Acting: Fundamentals	3.0
THTR 211	Acting: Scene Study	2.0
THTR 221 [WI (p. 501)]	Theatre History I	3.0
THTR 222 [WI (p. 501)]	Theatre History II	3.0
THTR 240	Theatre Production I	3.0
THTR 260	Production Design	3.0
THTR 320	Play Direction	3.0
Two Theatre (THTR) electives		6.0
Six terms of Theatre Practicum Courses *		4.0

Total Credits 57.0

* THTR 130, THTR 131, THTR 132

C. Media Management

1. Digital Media Concentration

ANIM 141	Computer Graphics Imagery II	3.0
ANIM 211	Animation I	3.0
ANIM 212	Animation II	3.0
COM 111	Principles of Communication	3.0
COM 150	Mass Media and Society	3.0
COM 240	New Technologies In Communication	3.0
COM 270 [WI (p. 501)]	Business Communication	3.0
COM 335	Electronic Publishing	3.0
DIGM 100	Digital Design Tools	3.0
DIGM 110	Digital Spatial Visualization	3.0
DIGM 252	Multimedia Timeline Design	3.0
EAM 340	Artist Representation and Management	3.0
EAM 365	Media and Entertainment Business	3.0
MKTG 322	Advertising & Integrated Marketing Communications	4.0
VSST 110	Introductory Drawing	3.0
WBDV 240	Web Authoring I	3.0
WBDV 241	Vector Authoring I	3.0
One Digital Media (ANIM, GMAP, WBDV) elective		3.0
Digital Media track students also select one course from the following:		3.0
ANIM 219	Digital Compositing	
DIGM 350 [WI (p. 501)]	Digital Storytelling	
WBDV 242	Dynamic Vector Graphics	
DIGM 451 [WI (p. 501)]	Explorations in New Media	

Total Credits **58.0**

2. Cinema and Television Concentration

COM 111	Principles of Communication	3.0
COM 150	Mass Media and Society	3.0
COM 240	New Technologies In Communication	3.0
COM 270 [WI (p. 501)]	Business Communication	3.0
COM 335	Electronic Publishing	3.0
EAM 340	Artist Representation and Management	3.0
EAM 365	Media and Entertainment Business	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 115	Basic Editing	3.0
FMVD 120	Basic Sound	3.0
MKTG 322	Advertising & Integrated Marketing Communications	4.0
SCRP 270 [WI (p. 501)]	Screenwriting I	3.0
TVIE 285	Media Law and Ethics	3.0
TVIE 290	Introduction to Money and the Media	3.0
TVPR 212	TV Commercials and Promos	3.0
Select three from the following:		9.0
FMVD 210	Documentary Video Production	
FMVD 215	Narrative Video Production	

FMVD 220	Experimental Video Production	
FMVD 235	Intermediate Lighting	
FMVD 237	Intermediate Editing	
FMVD 286	Producing for Features	
FMVD 305	Special Effects Make-up	
FMVD 365	Special Topics in Production	
SCRP 241	Writing TV Comedy	
SCRP 242	Writing TV Drama	
SCRP 275 [WI (p. 501)]	Screenwriting II	
SCRP 280 [WI (p. 501)]	Writing the Short Film	
SCRP 310	Literature for Screenwriters	
SCRP 370	Screenplay Story Development	
SCRP 380	Screenwriting Workshop I	
SCRP 381	Screenwriting Workshop II	
TVIE 280	Research, Sales and Programming	
TVPR 100	TV Studio: Basic Operations	
TVPR 200	TV Studio: Live Directing	
TVPR 230	Scripted TV Production	
TVPR 232	TV Field: Industrials	
TVPR 236	Reality TV Production	
TVPR 240	Producing for Television	

Total Credits **55.0**

D. Sports Entertainment

COM 111	Principles of Communication	3.0
COM 150	Mass Media and Society	3.0
COM 240	New Technologies In Communication	3.0
COM 270 [WI (p. 501)]	Business Communication	3.0
COM 335	Electronic Publishing	3.0
EAM 340	Artist Representation and Management	3.0
EAM 365	Media and Entertainment Business	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 115	Basic Editing	3.0
FMVD 120	Basic Sound	3.0
SMT 110	The Business of Sport	3.0
SMT 201	Sports Marketing, Promotion, and Public Relations	3.0
SMT 205	Sports Information	3.0
SMT 215	Sports Ticket Sales & Operations	3.0
TVPR 100	TV Studio: Basic Operations	3.0
TVPR 240	Producing for Television	3.0
TVPR 340	Remote TV Production	3.0

Sport Entertainment Concentration students also select any three of the following courses:

SMT 200	Introduction to Sport Facility and Event Management	
SMT 225	Sport Finance	
SMT 230	Sports and the Law	
SMT 240	Olympic Games	
SMT 260	Sports Agents & Labor Relations	
SMT 305	Fundraising in Sports	

SMT 307	Corporate Sponsorship in Sports	
SMT 309	Capital Campaigns in Athletics	
SMT 310	Sports Contracts	
SMT 315	Sports Publications & Graphics	
SMT 320	Sport Economics	
SMT 337	Risk Management in Sports	
SMT 345	Fan Experience Management	
SMT 347	Sport Tourism	
TVPR 200	TV Studio: Live Directing	
TVST 260	History of Television	
Total Credits		60.0

Recommended Plans of Study

At the end of their freshman year, students select one of the following concentrations. Each concentration has its own unique Plan of Study:

(A) Visual Arts Management Concentration

Term 1		Credits
EAM 130	Overview of Entertainment and Arts Management	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV A101	The Drexel Experience	1.0
Term Credits		15.0
Term 2		
ACCT 115	Financial Accounting Foundations	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
UNIV A101	The Drexel Experience	1.0
Free elective		3.0
Term Credits		15.0
Term 3		
CIVC 101	Introduction to Civic Engagement	1.0
EAM 211	Strategic Management for Entertainment and Arts Management	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Social science elective		3.0
Arts and Humanities elective		3.0
Free elective		3.0
Term Credits		16.0
Term 4		
BLAW 201	Business Law I	4.0
COOP 101	Career Management and Professional Development	0.0
EAM 391 [WI (p. 501)]	Promotion, Press and Publicity	3.0
VSCM 100	Computer Imaging I	3.0
PHYS 121 or BIO 100	Physical Science for Design I Applied Cells, Genetics Physiology	4.0

Social science elective		3.0
Term Credits		17.0
Term 5		
EAM 261	Copyrights and Trademarks	3.0
EAM 270	Audience Development for Arts	3.0
EAM 312	Introduction to Fund Development for the Arts	3.0
PHYS 122 or BIO 101	Physical Science for Design II Applied Biological Diversity, Ecology Evolution	4.0
Visual Arts Track elective *		3.0
Term Credits		16.0
Term 6		
COM 230	Techniques of Speaking	3.0
EAM 313	Volunteer and Board Management	3.0
EAM 361	Law for Entertainment and Arts Management Managers	3.0
Social science elective		3.0
Visual Arts Track elective *		3.0
Term Credits		15.0
Term 7		
ARTH 101	History of Art I: Ancient to Medieval	3.0
EAM 301	Gallery and Collection Management	3.0
EAM 401	Writing for Arts Managers	3.0
Visual Arts Track elective *		3.0
Business elective *		4.0
Term Credits		16.0
Term 8		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
EAM 302	Exhibition Design	3.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 501)]	Organizational Behavior	4.0
Visual Arts Track elective *		3.0
Term Credits		17.0
Term 9		
EAM 350	Arts, Culture and Society	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
Visual Arts Track elective *		3.0
Arts and Humanities elective		3.0
Business elective *		4.0
Term Credits		16.0
Term 10		
EAM 471	Fine Arts Market Development	3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0
HRMT 323	Principles of Human Resource Administration	4.0
Free elective		3.0
Visual Arts Track elective *		3.0
Term Credits		14.0
Term 11		
EAM 461	Entertainment Publishing	3.0

EAM 472	Trends in Visual Arts	3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0
	Visual Arts Track elective *	3.0
	Free electives	6.0
Term Credits		16.0
Term 12		
EAM 491	Entertainment and Arts Management Senior Project	1.0
	Visual Arts Track elective *	3.0
	Free electives	6.0
	Business elective *	4.0
Term Credits		14.0
Total Credit: 187.0		

(B) Performing Arts Management

(1.) Dance Concentration

Term 1		Credits
EAM 130	Overview of Entertainment and Arts Management	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV A101	The Drexel Experience	1.0
Term Credits		15.0
Term 2		
ACCT 115	Financial Accounting Foundations	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
UNIV A101	The Drexel Experience	1.0
	Free elective	3.0
Term Credits		15.0
Term 3		
CIVC 101	Introduction to Civic Engagement	1.0
EAM 211	Strategic Management for Entertainment and Arts Management	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
	Free elective	3.0
	Arts and Humanities elective	3.0
	Social science elective	3.0
Term Credits		16.0
Term 4		
BLAW 201	Business Law I	4.0
COOP 101	Career Management and Professional Development	0.0
DSMR 100	Computer Imaging I	3.0
EAM 391 [WI (p. 501)]	Promotion, Press and Publicity	3.0
PHYS 121 or BIO 100	Physical Science for Design I Applied Cells, Genetics Physiology	4.0

	Social science elective	3.0
Term Credits		17.0
Term 5		
EAM 261	Copyrights and Trademarks	3.0
EAM 270	Audience Development for Arts	3.0
EAM 312	Introduction to Fund Development for the Arts	3.0
THTR 240	Theatre Production I	3.0
PHYS 122 or BIO 101	Physical Science for Design II Applied Biological Diversity, Ecology Evolution	4.0
Term Credits		16.0
Term 6		
COM 230	Techniques of Speaking	3.0
DANC 210	Introduction to Dance	3.0
EAM 313	Volunteer and Board Management	3.0
EAM 361	Law for Entertainment and Arts Management Managers	3.0
	Required ensemble	0.0
	Social science elective	3.0
Term Credits		15.0
Term 7		
DANC 140	Ballet Technique I	2.0
DANC 150	Modern Dance Technique I	2.0
EAM 401	Writing for Arts Managers	3.0
MUSC 130	Introduction to Music	3.0
DANC 170 or 160	Hip-Hop Dance Technique I Jazz Dance Technique I	2.0
	Required ensemble	1.0
	Business elective *	4.0
Term Credits		17.0
Term 8		
DANC 355	Rhythmic Study for Dance	3.0
EAM 322	Performing Arts Touring and Promotion	3.0
MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 501)]	Organizational Behavior	4.0
	Required ensemble	1.0
Term Credits		15.0
Term 9		
DANC 201 [WI (p. 501)]	Dance Appreciation	3.0
EAM 321	Box Office and Venue Management	3.0
EAM 340	Artist Representation and Management	3.0
EAM 350	Arts, Culture and Society	3.0
	Required ensemble	1.0
	Business elective *	4.0
Term Credits		17.0
Term 10		
DANC 325 [WI (p. 501)]	Twentieth Century Dance	3.0

EAM 491	Entertainment and Arts Management Senior Project	1.0	COOP 101	Career Management and Professional Development	0.0
HRMT 323	Principles of Human Resource Administration	4.0	DSMR 100	Computer Imaging I	3.0
Free elective		3.0	EAM 391 [WI (p. 501)]	Promotion, Press and Publicity	3.0
Dance (DANC) elective		3.0	THTR 130	Introduction to Theater Production Practicum	1.0
	Term Credits	14.0	THTR 240	Theatre Production I	3.0
Term 11			PHYS 121 or BIO 100	Physical Science for Design I Applied Cells, Genetics Physiology	4.0
DANC 240	Dance Composition I	3.0		Term Credits	18.0
EAM 461	Entertainment Publishing	3.0	Term 5		
EAM 491	Entertainment and Arts Management Senior Project	1.0	EAM 261	Copyrights and Trademarks	3.0
Free electives		9.0	EAM 270	Audience Development for Arts	3.0
Ensemble		0.0	EAM 312	Introduction to Fund Development for the Arts	3.0
	Term Credits	16.0	PHYS 122 or BIO 101	Physical Science for Design II Applied Biological Diversity, Ecology Evolution	4.0
Term 12			Social science elective		3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0		Term Credits	16.0
Ensemble		0.0	Term 6		
Free electives		6.0	COM 230	Techniques of Speaking	3.0
Business elective *		4.0	DANC 201 [WI (p. 501)]	Dance Appreciation	3.0
Dance (DANC) elective		3.0	EAM 313	Volunteer and Board Management	3.0
	Term Credits	14.0	EAM 361	Law for Entertainment and Arts Management Managers	3.0
Total Credit: 187.0			Required ensemble		0.0

(2.) Performing Arts Concentration

Term 1		Credits	Arts and Humanities elective	3.0
EAM 130	Overview of Entertainment and Arts Management	3.0	Social science elective	3.0
ECON 201	Principles of Microeconomics	4.0		Term Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0		18.0
MATH 101	Introduction to Analysis I	4.0	Term 7	
UNIV A101	The Drexel Experience	1.0	EAM 401	Writing for Arts Managers
	Term Credits	15.0	MUSC 130	Introduction to Music
Term 2			THTR 115	Theatrical Experience
ACCT 115	Financial Accounting Foundations	4.0	THTR 210	Acting: Fundamentals
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	Business elective *	4.0
MATH 102	Introduction to Analysis II	4.0	Required ensemble	1.0
UNIV A101	The Drexel Experience	1.0		Term Credits
Free elective		3.0		17.0
	Term Credits	15.0	Term 8	
Term 3			EAM 322	Performing Arts Touring and Promotion
CIVC 101	Introduction to Civic Engagement	1.0	MKTG 301	Introduction to Marketing Management
EAM 211	Strategic Management for Entertainment and Arts Management	3.0	MUSC 331	World Musics
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0	ORGB 300 [WI (p. 501)]	Organizational Behavior
Free elective		3.0	Required ensemble	1.0
Arts and Humanities elective		3.0		Term Credits
Social science elective		3.0		15.0
	Term Credits	16.0	Term 9	
Term 4			DANC 210	Introduction to Dance
BLAW 201	Business Law I	4.0	EAM 321	Box Office and Venue Management
			EAM 340	Artist Representation and Management
			EAM 350	Arts, Culture and Society
			MUSC 333	Afro-American Music USA

Required ensemble	0.0
Term Credits	15.0
Term 10	
DANC 325 [WI (p. 501)] Twentieth Century Dance	3.0
EAM 491 Entertainment and Arts Management Senior Project	1.0
HRMT 323 Principles of Human Resource Administration	4.0
Free elective	3.0
Ensemble	0.0
Business elective *	4.0
Term Credits	15.0
Term 11	
EAM 461 Entertainment Publishing	3.0
EAM 491 Entertainment and Arts Management Senior Project	1.0
Free electives	6.0
Theatre elective *	3.0
Ensemble	0.0
Term Credits	13.0
Term 12	
EAM 491 Entertainment and Arts Management Senior Project	1.0
MUSC 338 [WI (p. 501)] American Popular Music	3.0
Free electives	6.0
Business elective *	4.0
Term Credits	14.0

Total Credit: 187.0

(3.) Theatre Concentration

	Credits
Term 1	
EAM 130 Overview of Entertainment and Arts Management	3.0
ECON 201 Principles of Microeconomics	4.0
ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101 Introduction to Analysis I	4.0
UNIV A101 The Drexel Experience	1.0
Term Credits	15.0
Term 2	
ACCT 115 Financial Accounting Foundations	4.0
ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102 Introduction to Analysis II	4.0
UNIV A101 The Drexel Experience	1.0
Free elective	3.0
Term Credits	15.0
Term 3	
CIVC 101 Introduction to Civic Engagement	1.0
EAM 211 Strategic Management for Entertainment and Arts Management	3.0

ENGL 103 Composition and Rhetoric III: Themes and Genres	3.0
Free elective	3.0
Social science elective	3.0
Arts and Humanities elective	3.0
Term Credits	16.0
Term 4	
BLAW 201 Business Law I	4.0
COOP 101 Career Management and Professional Development	0.0
DSMR 100 Computer Imaging I	3.0
EAM 391 [WI (p. 501)] Promotion, Press and Publicity	3.0
THTR 130 Introduction to Theater Production Practicum	1.0
THTR 240 Theatre Production I	3.0
PHYS 121 Physical Science for Design I or BIO 100 Applied Cells, Genetics Physiology	4.0
Term Credits	18.0
Term 5	
EAM 261 Copyrights and Trademarks	3.0
EAM 270 Audience Development for Arts	3.0
EAM 312 Introduction to Fund Development for the Arts	3.0
THTR 221 [WI (p. 501)] Theatre History I	3.0
PHYS 122 Physical Science for Design II or BIO 101 Applied Biological Diversity, Ecology Evolution	4.0
Term Credits	16.0
Term 6	
COM 230 Techniques of Speaking	3.0
EAM 313 Volunteer and Board Management	3.0
EAM 361 Law for Entertainment and Arts Management Managers	3.0
THTR 121 [WI (p. 501)] Dramatic Analysis	3.0
Required ensemble	0.0
Social science elective	3.0
Term Credits	15.0
Term 7	
EAM 401 Writing for Arts Managers	3.0
THTR 210 Acting: Fundamentals	3.0
Arts and Humanities elective	3.0
Business elective *	4.0
Theatre elective *	3.0
Required ensemble	1.0
Term Credits	17.0
Term 8	
EAM 322 Performing Arts Touring and Promotion	3.0
MKTG 301 Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 501)] Organizational Behavior	4.0

THTR 222 [WI (p. 501)]	Theatre History II	3.0
Required ensemble		1.0

Term Credits 15.0

Term 9

EAM 321	Box Office and Venue Management	3.0
EAM 340	Artist Representation and Management	3.0
EAM 350	Arts, Culture and Society	3.0
THTR 211	Acting: Scene Study	2.0
Required ensemble		0.0
Business elective*		4.0

Term Credits 15.0

Term 10

EAM 491	Entertainment and Arts Management Senior Project	1.0
HRMT 323	Principles of Human Resource Administration	4.0
THTR 320	Play Direction	3.0
Arts and Humanities elective		3.0
Ensemble		0.0
Free elective		3.0

Term Credits 14.0

Term 11

EAM 461	Entertainment Publishing	3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0
THTR 260	Production Design	3.0
Free elective		9.0
Ensemble		0.0

Term Credits 16.0

Term 12

EAM 491	Entertainment and Arts Management Senior Project	1.0
Theatre elective*		3.0
Free electives		6.0
Business elective*		4.0

Term Credits 14.0

Total Credit: 186.0

(C) Media Management**(1.) Digital Media Concentration****Term 1**

		Credits
EAM 130	Overview of Entertainment and Arts Management	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV A101	The Drexel Experience	1.0

Term Credits 15.0

Term 2

ACCT 115	Financial Accounting Foundations	4.0
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ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
UNIV A101	The Drexel Experience	1.0
Free elective		3.0

Term Credits 15.0

Term 3

CIVC 101	Introduction to Civic Engagement	1.0
EAM 211	Strategic Management for Entertainment and Arts Management	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Arts and Humanities elective		3.0
Free elective		3.0
Social science elective		3.0

Term Credits 16.0

Term 4

BLAW 201	Business Law I	4.0
COOP 101	Career Management and Professional Development	0.0
DIGM 100	Digital Design Tools	3.0
DSMR 100	Computer Imaging I	3.0
VSST 110	Introductory Drawing	3.0
PHYS 121 or BIO 100	Physical Science for Design I Applied Cells, Genetics Physiology	4.0

Term Credits 17.0

Term 5

COM 111	Principles of Communication	3.0
DIGM 110	Digital Spatial Visualization	3.0
EAM 261	Copyrights and Trademarks	3.0
EAM 391 [WI (p. 501)]	Promotion, Press and Publicity	3.0
PHYS 122 or BIO 101	Physical Science for Design II Applied Biological Diversity, Ecology Evolution	4.0

Term Credits 16.0

Term 6

DIGM 252	Multimedia Timeline Design	3.0
EAM 361	Law for Entertainment and Arts Management Managers	3.0
EAM 365	Media and Entertainment Business	3.0
COM 230	Techniques of Speaking	3.0
COM 150	Mass Media and Society	3.0

Term Credits 15.0

Term 7

COM 240	New Technologies In Communication	3.0
WBDV 240	Web Authoring I	3.0
Business elective (See degree requirements for list)		4.0
Arts and Humanities elective		3.0
Social science elective		3.0

Term Credits 16.0

Term 8

MKTG 301	Introduction to Marketing Management	4.0
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ORGB 300 [WI (p. 501)]	Organizational Behavior	4.0	UNIV A101	The Drexel Experience	1.0
WBDV 241	Vector Authoring I	3.0	Free elective		3.0
Free electives		6.0			
Term Credits		17.0	Term Credits		15.0
Term 9					
EAM 340	Artist Representation and Management	3.0	Term 3		
MKTG 322	Advertising Integrated Marketing Communications	4.0	CIVC 101	Introduction to Civic Engagement	1.0
Digital Media Track elective *		3.0	EAM 211	Strategic Management for Entertainment and Arts Management	3.0
Business elective *		4.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Term Credits		14.0	Arts and Humanities elective		3.0
Term 10					
ANIM 141	Computer Graphics Imagery II	3.0	Free elective		3.0
COM 270 [WI (p. 501)]	Business Communication	3.0	Social science elective		3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0	Term Credits		16.0
HRMT 323	Principles of Human Resource Administration	4.0	Term 4		
Free elective		3.0	BLAW 201	Business Law I	4.0
Term Credits		14.0	COOP 101	Career Management and Professional Development	0.0
Term 11					
ANIM 211	Animation I	3.0	DSMR 100	Computer Imaging I	3.0
EAM 461	Entertainment Publishing	3.0	EAM 391 [WI (p. 501)]	Promotion, Press and Publicity	3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0	PHYS 121 or BIO 100	Physical Science for Design I Applied Cells, Genetics Physiology	4.0
Free electives		9.0	Term Credits		14.0
Term Credits		16.0	Term 5		
Term 12					
ANIM 212	Animation II	3.0	COM 111	Principles of Communication	3.0
COM 335	Electronic Publishing	3.0	EAM 261	Copyrights and Trademarks	3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0	FMVD 110	Basic Shooting and Lighting	3.0
Business elective *		4.0	SCRP 270 [WI (p. 501)]	Screenwriting I	3.0
Social science elective		3.0	PHYS 122 or BIO 101	Physical Science for Design II Applied Biological Diversity, Ecology Evolution	4.0
Term Credits		14.0	Term Credits		16.0
Total Credit: 185.0					

(2.) Cinema and Television Concentration

Term 1		Credits	Term 6		
EAM 130	Overview of Entertainment and Arts Management	3.0	COM 150	Mass Media and Society	3.0
ECON 201	Principles of Microeconomics	4.0	COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	EAM 361	Law for Entertainment and Arts Management Managers	3.0
MATH 101	Introduction to Analysis I	4.0	EAM 365	Media and Entertainment Business	3.0
UNIV A101	The Drexel Experience	1.0	FMVD 115	Basic Editing	3.0
Term Credits		15.0	TVIE 290	Introduction to Money and the Media	3.0
Term 2					
ACCT 115	Financial Accounting Foundations	4.0	Term Credits		18.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0	Term 7		
MATH 102	Introduction to Analysis II	4.0	COM 240	New Technologies In Communication	3.0
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TVIE 285	Media Law and Ethics	3.0
Free elective		3.0
Arts and Humanities elective		3.0

Term Credits	17.0
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Term 9

EAM 340	Artist Representation and Management	3.0
MKTG 322	Advertising Integrated Marketing Communications	4.0
Business elective *		4.0
Cinema and Television elective *		3.0

Term Credits	14.0
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Term 10

COM 270 [WI (p. 501)]	Business Communication	3.0
COM 335	Electronic Publishing	3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0
HRMT 323	Principles of Human Resource Administration	4.0
TVPR 212	TV Commercials and Promos	3.0

Term Credits	14.0
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Term 11

EAM 461	Entertainment Publishing	3.0
EAM 491	Entertainment and Arts Management Senior Project	1.0
Cinema and Television elective *		3.0
Social science elective		3.0
Free electives		6.0

Term Credits	16.0
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Term 12

EAM 491	Entertainment and Arts Management Senior Project	1.0
Social science elective		3.0
Business elective *		4.0
Free electives		6.0

Term Credits	14.0
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Total Credit: 185.0**(D.) Sports Entertainment Concentration**

Term 1		Credits
EAM 130	Overview of Entertainment and Arts Management	3.0
ECON 201	Principles of Microeconomics	4.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV A101	The Drexel Experience	1.0
Term Credits		15.0

Term 2

ACCT 115	Financial Accounting Foundations	4.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MATH 102	Introduction to Analysis II	4.0
UNIV A101	The Drexel Experience	1.0

Free elective		3.0
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Term Credits	15.0
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Term 3

CIVC 101	Introduction to Civic Engagement	1.0
EAM 211	Strategic Management for Entertainment and Arts Management	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Free elective		3.0
Social science elective		3.0
Arts and Humanities elective		3.0

Term Credits	16.0
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Term 4

BIO 100	Applied Cells, Genetics Physiology	3.0
BLAW 201	Business Law I	4.0
COOP 101	Career Management and Professional Development	0.0
DSMR 100	Computer Imaging I	3.0
PHYS 121	Physical Science for Design I	4.0
SMT 110	The Business of Sport	3.0
TVPR 100	TV Studio: Basic Operations	3.0

Term Credits	20.0
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Term 5

BIO 101	Applied Biological Diversity, Ecology Evolution	3.0
COM 111	Principles of Communication	3.0
EAM 261	Copyrights and Trademarks	3.0
EAM 391 [WI (p. 501)]	Promotion, Press and Publicity	3.0
FMVD 110	Basic Shooting and Lighting	3.0
PHYS 122	Physical Science for Design II	4.0

Term Credits	19.0
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Term 6

COM 150	Mass Media and Society	3.0
COM 230	Techniques of Speaking	3.0
EAM 361	Law for Entertainment and Arts Management Managers	3.0
EAM 365	Media and Entertainment Business	3.0
FMVD 115	Basic Editing	3.0
SMT 215	Sports Ticket Sales Operations	3.0

Term Credits	18.0
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Term 7

COM 240	New Technologies In Communication	3.0
FMVD 120	Basic Sound	3.0
SMT 201	Sports Marketing, Promotion, and Public Relations	3.0
SMT 205	Sports Information	3.0
TVPR 240	Producing for Television	3.0

Term Credits	15.0
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Term 8

MKTG 301	Introduction to Marketing Management	4.0
ORGB 300 [WI (p. 501)]	Organizational Behavior	4.0
TVPR 340	Remote TV Production	3.0
Arts and Humanities elective		3.0

Sports Entertainment elective	3.0
Term Credits	17.0
Term 9	
EAM 340 Artist Representation and Management	3.0
Business elective	4.0
Sports Entertainment elective	3.0
Free electives	6.0
Term Credits	16.0
Term 10	
COM 270 [WI Business Communication (p. 501)]	3.0
COM 335 Electronic Publishing	3.0
EAM 491 Entertainment and Arts Management Senior Project	1.0
HRMT 323 Principles of Human Resource Administration	4.0
Business elective	4.0
Term Credits	15.0
Term 11	
EAM 461 Entertainment Publishing	3.0
EAM 491 Entertainment and Arts Management Senior Project	1.0
Free electives	6.0
Sports Entertainment elective	3.0
Social science elective	3.0
Term Credits	16.0
Term 12	
EAM 491 Entertainment and Arts Management Senior Project	1.0
Social science elective	3.0
Free electives	6.0
Business elective	3.0
Term Credits	13.0
Total Credit: 195.0	

* See degree requirements (p. 502).

Co-op/Career Opportunities

A major entertainment and arts management prepares students for a variety of careers in both for-profit and nonprofit organizations; from creative, hands-on positions to administrative and management roles.

The career possibilities in this field are extensive and include the following positions:

- Artistic or creative director
- Concert and live events manager
- Gallery owner
- Grant writer
- Marketing coordinator
- Production and development executive
- Promoter
- Publicist
- Talent agent

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

About the Accelerated Degree Program (BS/MBA)

Only available to students majoring in entertainment and arts management (4-year with co-op), this dual degree program combines study in the management of the arts and entertainment industries along with the MBA degree. The program is designed to allow students to complete both the bachelor's degree and the Master of Business Administration degree in five years.

Incoming freshmen selected for this program will generally have a minimum of 1350 on the SAT, a GPA of 3.5 or better, and rank in the top 10% of their high school graduating class. A strong candidate for this program will have taken significant AP coursework while in high school.

Degree requirements

BS in Entertainment and Arts Management (<http://www.drexel.edu/catalog/degree/eam.htm>)

MBA Requirements (<http://catalog.drexel.edu/graduate/collegeofbusiness/businessadministration>)

BS/MBA students may be waived from three MBA Enterprise Management courses, assuming a grade of B or better is earned in specified undergraduate courses. Students can review the Waiver Policies for the Statement of Curriculum Standing (<http://www.lebow.drexel.edu/PDF/Docs/Grad/CurriculumStanding.pdf>) on the LeBow College's web site for additional information. Students who complete MIS 200 in their undergraduate program will, in addition, be waived from a fourth MBA course (MIS 611).

The above conditions hold only for fully accepted BS/MBA students as identified by Enrollment Management.

Additional requirements for the dual degree program

- A cumulative GPA of at least 3.2 is required throughout the program.
- Students must take the GMAT examination and achieve a minimum score of 570 prior to the end of the tenth term in order to continue in the program. It is recommended that students take the GMAT examination late in the student's third year.
- Students must submit an acceptable plan of study at least three terms before anticipated start of graduate part of the program.

Students should visit the Westphal College of Media Arts and Design (<http://www.drexel.edu/undergrad/academics/colleges-schools/westphal>) for more information.

College of Media Arts and Design Facilities

The college offers many state-of-the-art facilities and resources to its students including:

- Robert and Penny Fox Historic Costume Collection (<http://www.drexel.edu/westphal/resources/FHCC>)
- Design and Imaging Studios (<http://drexel.edu/westphal/resources/technology>)

- DUTV (<http://www.dutv.org>), (Paul F. Harron Studios) student-run cable television station
- Leonard Pearlstein Gallery (<http://www.drexel.edu/westphal/resources/LeonardPearlsteinGallery>)
- MAD Dragon Records Label (<http://maddragonrecords.com>)
- Mandell Theater (<http://drexel.edu/westphal/resources/MandellTheater>)
- Rudman Institute for Entertainment Industry Studies (<http://www.drexel.edu/westphal/resources/Rudman>)
- WKDU (<http://www.wkdu.org>), Drexel's student-run radio station

Arts & Entertainment Enterprise Faculty

Xela Batchelder, PhD (*Ohio State University*). Assistant Professor. Entertainment and arts management; theater management, touring, presenting and booking.

Jean Brody, DFA (*Yale School of Drama*) Program Director, Online MS in Arts Administration. Associate Teaching Professor. Arts administration.

Lawrence Epstein, MBA (*Cornell University*) Interim Department Head, Arts & Entertainment Enterprise. Associate Teaching Professor.

Julie Goodman Hawkins, MFA (*Temple University*) Program Director, MS in Arts Administration. Assistant Professor. Cultural policy, political activism in the arts, changes in economic and social policy, arts sector changes.

James L. Klein, BA (*Oberlin College*). Associate Professor. Music technologist, sound and recording engineer, songwriter for film, TV and radio music.

Michelle Manghise, BS (*St. John's University*). Assistant Teaching Professor. 25-year veteran of music industry; music publishing, copyright, artist management, entrepreneurship, entertainment marketing.

Brian Moore, MS, MFA (*Drexel University; Louisiana State University*) Program Director, BS in Entertainment and Arts Management. Assistant Teaching Professor. Nonprofit organizations: fund development; strategic planning; communications and marketing; and executive management.

John Seay, BMus (*James Madison University*). Associate Professor. Sound and recording engineer, music technologist, music producer and studio technician.

Cyrille Taillandier Associate Teaching Professor. Recording engineer, music producer and digital editor.

Neville Vakharia, MS (*Drexel University*) Research Director. Assistant Professor. Technology in the arts, strategic planning and evaluation, management and leadership, innovation and entrepreneurship.

Darren Walters, BA (*University of Delaware*). Associate Teaching Professor. General Manager of Mad Dragon Records and co-owner and President of Jade Tree, an independent record label.

Andrew Zitcer, MCP (*University of Pennsylvania*). Assistant Teaching Professor. Arts and community development, community based organizations, governance modes, organizational planning, narrative and social theory.

Fashion Design

Major: Fashion Design

Degree Awarded: Bachelor of Science

Calendar Type: Quarter

Total Credit Hours: 183.0

Classification of Instructional Programs (CIP) code: 50.0407

Standard Occupational Classification (SOC) code: 27-1022

About the Program

The Fashion Design Program at Drexel University's Antoinette Westphal College (<http://www.drexel.edu/westphal/undergraduate/FASH>) of Media Arts & Design educates and trains visionary designers to use an integrated approach toward the creation of contemporary fashion within the context of an expanding, yet converging global economy and society. The fusion of art, design, science and technology serves as a springboard for the production of unique apparel for the 21st century, and represents a trans-disciplinary approach that requires flexibility and focus. Over the past two decades, Drexel's Fashion Design program has developed a stellar, international reputation and is ranked in the top five nationally and 16th worldwide. That is due in part, to a passionate and experienced faculty, novel approaches to pedagogy, and participation in national and international competitions. Faculty and alumni connections to industry leaders strongly augment and catalyze the program, the strength of which is closely linked to the philosophy that each student has a distinct vision and a unique aesthetic that must be cultivated on an individual basis.

Within the beautiful new studios and specialized labs in the URBN Center, students learn to master skills and push the boundaries using those skills. Students can engage in collaborative University wide research through the use of the exCITe Center (<http://drexel.edu/excite>) located next door and the Hybrid Making Lab (http://www.drexel.edu/westphal/resources/making_spaces/HybridMakingLab) located on the URBN Center's first floor. They acquire detailed knowledge about industrial productions, advanced technologies in design, collaborative design, materials and processes, and the marketing and merchandising of clothing. Accordingly, our future fashion designers, both undergraduates and graduates alike, develop an intuitive and practical understanding of design through a fine arts foundation, while studying the psychological, social and historical contexts of fashion through the world-renowned Robert and Penny Fox Historic Costume Collection (<http://www.drexel.edu/westphal/resources/FHCC>) (FHCC). Importantly, the students are provided with commercial studio/ atelier training that goes hand-in-hand with classroom instruction through the University's cooperative education program (<http://www.drexel.edu/westphal/forStudents/co-op>). Cooperative education offers invaluable opportunities for students to observe and participate in the fashion industry at the ground level. Critiques by visiting professionals are included in all upper level courses and provide valuable "real world" input, as well as future career connections. A large percentage of students spend a term studying abroad (<http://www.drexel.edu/studyabroad>) in the world's great fashion capitals, including London (https://studyabroad.drexel.edu/index.cfm?FuseAction=Programs.ViewProgram&Program_ID=10070&Type=O&sType=O), England and Florence, Italy. Upon graduation, students show their collections (<http://www.drexel.edu/westphal/creative/fash>) in the annual fashion show.

For more information about this major, visit the College's Fashion Design (<http://www.drexel.edu/westphal/academics/undergraduate/fashion>) page.

Degree Requirements

General education requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
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ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
PHYS 121	Physical Science for Design I	4.0
PHYS 122	Physical Science for Design II	4.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV A101	The Drexel Experience	2.0
Arts and humanities electives		9.0
Social science electives		9.0
Free electives		24.0
Visual studies requirements		
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
VSST 101	Design I	4.0
VSST 102	Design II	4.0
VSST 103	Design III	4.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0
VSST 204	Materials Exploration	4.0
VSST 301	Painting I	4.0
Select one of the following Multimedia courses:		4.0
VSST 201	Multimedia: Performance	
VSST 202	Multimedia: Space	
VSST 203	Multimedia: Materials	
Fashion design requirements		
ARTH 335 [WI (p. 513)]	History of Costume I: Preclassical to Directoire	3.0
ARTH 336 [WI (p. 513)]	History of Costume II: Directoire to World War I	3.0
FASH 201	Survey of the Fashion Industry	3.0
FASH 210	Presentation Techniques in Fashion	3.0
FASH 211	Fashion Drawing I	3.0
FASH 212	Fashion Drawing II	3.0
FASH 220	Textile Design	3.0
FASH 230	Textiles for Fashion Design	3.0
FASH 241	Construction Skills	4.0
FASH 251	Fashion Design I	4.0
FASH 252	Fashion Design II	4.0
FASH 313	Fashion Drawing for Industry	3.0
FASH 314	Fashion Presentation Drawing	3.0
FASH 315	Computer Aided Design for Patternmaking	3.0
or FASH 316	Computer Aided Design for Fashion Design	
FASH 341	Flat Pattern Design	4.0
FASH 342	Draping Design	4.0
FASH 343	Tailoring and Design	4.0
FASH 351	Fashion Design III	4.0
FASH 352	Fashion Design IV	4.0
FASH 464	Professional Portfolio	3.0
FASH 491	Senior Problem in Fashion Design I	4.0
FASH 492	Senior Problem in Fashion Design II	3.0

VSST 112	Figure Drawing II	3.0
Total Credits		183.0

Sample Plans of Study

Standard Plan

(See below for Study Abroad plan of study)

Term 1		Credits
FASH 201	Survey of the Fashion Industry	3.0
PHYS 121	Physical Science for Design I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
VSST 110	Introductory Drawing	3.0
Term Credits		15.0
Term 2		
FASH 241	Construction Skills	4.0
PHYS 122	Physical Science for Design II	4.0
UNIV A101	The Drexel Experience	1.0
VSST 102	Design II	4.0
VSST 111	Figure Drawing I	3.0
Term Credits		16.0
Term 3		
CIVC 101	Introduction to Civic Engagement	1.0
FASH 341	Flat Pattern Design	4.0
MATH 119	Mathematical Foundations for Design	4.0
VSST 103	Design III	4.0
VSST 112	Figure Drawing II	3.0
Term Credits		16.0
Term 4		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FASH 210	Presentation Techniques in Fashion	3.0
FASH 211	Fashion Drawing I	3.0
FASH 342	Draping Design	4.0
VSST 204	Materials Exploration	4.0
Term Credits		17.0
Term 5		
ARTH 101	History of Art I: Ancient to Medieval	3.0
COOP 101	Career Management and Professional Development	0.0
FASH 212	Fashion Drawing II	3.0
FASH 220	Textile Design	3.0
FASH 230	Textiles for Fashion Design	3.0
FASH 251	Fashion Design I	4.0
Term Credits		16.0
Term 6		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FASH 252	Fashion Design II	4.0
FASH 313	Fashion Drawing for Industry	3.0

Free elective	3.0	UNIV A101	The Drexel Experience	1.0
Term Credits	16.0	VSST 101	Design I	4.0
Term 7		VSST 110	Introductory Drawing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres		Term Credits	15.0
VSST 301	Painting I		Term 2	
Select one of the following:	4.0	FASH 241	Construction Skills	4.0
VSST 201	Multimedia: Performance	PHYS 122	Physical Science for Design II	4.0
VSST 203	Multimedia: Materials	UNIV A101	The Drexel Experience	1.0
VSST 202	Multimedia: Space	VSST 102	Design II	4.0
Social science elective	3.0	VSST 111	Figure Drawing I	3.0
Term Credits	14.0		Term Credits	16.0
Term 8		Term 3		
ARTH 103	History of Art: Early to Late Modern	CIVC 101	Introduction to Civic Engagement	1.0
ARTH 335 [WI (p. 513)]	History of Costume I: Preclassical to Directoire	FASH 341	Flat Pattern Design	4.0
FASH 343	Tailoring and Design	MATH 119	Mathematical Foundations for Design	4.0
Arts and Humanities elective	3.0	VSST 103	Design III	4.0
FASH 315	Computer Aided Design for Patternmaking (or elective)	VSST 112	Figure Drawing II	3.0
Term Credits	16.0		Term Credits	16.0
Term 9		Term 4		
ARTH 336 [WI (p. 513)]	History of Costume II: Directoire to World War I	COOP 101	Career Management and Professional Development	0.0
FASH 314	Fashion Presentation Drawing	ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FASH 351	Fashion Design III	FASH 211	Fashion Drawing I	3.0
Arts and Humanities elective	3.0	FASH 220	Textile Design	3.0
Term Credits	13.0	FASH 342	Draping Design	4.0
Term 10		VSST 204	Materials Exploration	4.0
FASH 352	Fashion Design IV		Term Credits	17.0
FASH 464	Professional Portfolio	Term 5		
Free elective	3.0	Free electives	12.0	
Arts and Humanities elective	3.0	Term Credits	12.0	
Social science elective	3.0	Term 6		
Term Credits	16.0	ARTH 102	History of Art II: High Renaissance to Modern	3.0
Term 11		FASH 210	Presentation Techniques in Fashion	3.0
FASH 491	Senior Problem in Fashion Design I	FASH 212	Fashion Drawing II	3.0
FASH 316	Computer Aided Design for Fashion Design (or elective)	FASH 230	Textiles for Fashion Design	3.0
Free elective	3.0	FASH 251	Fashion Design I	4.0
Social science elective	3.0		Term Credits	16.0
Term Credits	13.0	Term 7		
Term 12		ARTH 101	History of Art I: Ancient to Medieval	3.0
FASH 492	Senior Problem in Fashion Design II	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
Free electives	12.0	FASH 252	Fashion Design II	4.0
Term Credits	15.0	FASH 313	Fashion Drawing for Industry	3.0
Total Credit: 183.0		Free elective	3.0	
			Term Credits	16.0
		Term 8		
		ARTH 103	History of Art: Early to Late Modern	3.0
		ARTH 335 [WI (p. 513)]	History of Costume I: Preclassical to Directoire	3.0
		FASH 343	Tailoring and Design	4.0
		Select one of the following:	4.0	

Study Abroad

Term 1	Credits	
FASH 201	Survey of the Fashion Industry	3.0
PHYS 121	Physical Science for Design I	4.0

FASH 201	Survey of the Fashion Industry	3.0
PHYS 121	Physical Science for Design I	4.0

VSST 201	Multimedia: Performance	
VSST 203	Multimedia: Materials	
VSST 202	Multimedia: Space	
FASH 315	Computer Aided Design for Patternmaking (or elective)	3.0
Term Credits		17.0
Term 9		
ARTH 336 [WI (p. 513)]	History of Costume II: Directoire to World War I	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FASH 314	Fashion Presentation Drawing	3.0
FASH 351	Fashion Design III	4.0
Social science elective		3.0
Term Credits		16.0
Term 10		
FASH 352	Fashion Design IV	4.0
FASH 464	Professional Portfolio	3.0
Social science elective		3.0
Arts and Humanities elective		3.0
Free elective		3.0
Term Credits		16.0
Term 11		
FASH 491	Senior Problem in Fashion Design I	4.0
VSST 301	Painting I	4.0
FASH 316	Computer Aided Design for Fashion Design (or elective)	3.0
Arts and Humanities elective		3.0
Term Credits		14.0
Term 12		
FASH 492	Senior Problem in Fashion Design II	3.0
Arts and Humanities elective		3.0
Social science elective		3.0
Free elective		3.0
Term Credits		12.0
Total Credit: 183.0		

Co-op/Career Opportunities

Drexel Co-op is a renowned collegiate program. Students spend a minimum of 6 months either in the US (<http://www.drexel.edu/westphal/forStudents/co-op>) or abroad (<http://www.drexel.edu/scdc/co-op/international>) where they can apply their skills in the challenging and exciting fashion industry. Areas of opportunity include garment design, concept design, product development, production, textile design, costume design, technical design, CAD, publishing, curatorial work, promotion and marketing. During the cooperative education program students apply their industry knowledge and gain experience in the diverse, fast paced global world of fashion. Students forge long lasting relationships with alumni and other industry professionals.

Co-op Experiences

Some past co-op employers of fashion design students include:

- A Wish Come True, Greater Philadelphia Area
- Abercrombie & Fitch, Ohio
- Althea Harper, New York
- Amsale, New York
- BCBG Max Azria, California
- Bioko Biodiversity Protection Program, Equatorial Guinea
- Blazina International, Philadelphia
- Calvin Klein, New York
- Carole Hochman Design Group, New York
- Charlotte Ronson, New York
- Dennis Basso/Stallion Inc., New York
- Derek Lam, New York
- Destination Maternity Corporation, Philadelphia, PA
- Elie Tahari, New York
- Jordache Enterprises, New York
- Lilly Pulitzer, Greater Philadelphia Area
- Michael Kors, New York
- Milly LLC, New York
- Nanette Lepore, New York
- Priscilla Costa, Greater Philadelphia Area
- Shehu, Philadelphia, PA
- Shima Seiki USA, Inc., South New Jersey
- Urban Outfitters, Philadelphia, PA

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Facilities

Drexel University's Antoinette Westphal College of Media Arts & Design is located in the new URBN Center at 3501 Market Street in Philadelphia. The URBN Center is a 140,000 square foot state-of-the-art facility where the Fashion Design studios are located on the 3rd floor.

Classes are held in fully equipped studios for design and construction, pattern drafting, CAD design, and textile design including a dedicated senior and graduate design studio. Other studios on the 3rd floor include a specialty equipment lab, computer lab, knitwear studio, a fabric dyeing and research lab, fashion drawing studio, and the Charles Evans Library. The Robert and Penny Fox Historic Costume Collection (<http://www.drexel.edu/westphal/resources/FHCC>) (FHCC), currently estimated to hold more than 12,000 objects, is located on the first floor and is an invaluable library, archive and educational tool for our students as well as scholars, historians, artists and designers in the national and international community. Also located on the first floor is the Hybrid Making Lab (http://www.drexel.edu/westphal/resources/making_spaces/HybridMakingLab). This lab provides collaborative design and research opportunities both within Westphal College and University wide. The exCite Center (<http://drexel.edu/excite>) (Expressive and Creative Interaction Technologies), located next door at 3401 Market Street, welcomes students and faculty from across the University as well as the community.

The open environment of the URBN Center provides opportunity for collaboration with all of the programs at the Westphal College. Design & Merchandising is on the first floor, opposite the main lobby where work from all of the College's students is regularly displayed. Digital Media, Animation & Visual Effects, Game Art & Production, Web Development & Interaction Design, Product Design, Graphic Design,

Interiors, and Architecture's studios and labs are also located in the URBN Center. The Center encourages anyone interested to schedule a visit (<http://www.drexel.edu/westphal/contact>) to experience the creativity, technology, innovation and resulting excitement.

Fashion, Product Design & Merchandising Faculty

Kristen Ainscoe, BS (*Drexel University*). Assistant Teaching Professor. Visual merchandiser; merchandise management.

Catherine Byers, MA (*American University*). Assistant Teaching Professor. Journalism; marketing and communications.

Nick Cassway, BFA (*Tyler School of Art*). Assistant Teaching Professor. Curating; experimental portraiture; computer design.

Anne C. Cecil, MA (*University of the Arts*) Program Director, Design & Merchandising. Teaching Professor. Web designer, product designer, merchandising and artist.

Renee Weiss Chase, MS (*Drexel University*). Professor. Fashion designer; computer-aided design systems for the fashion curriculum.

Anita Dennis, AST (*Art Institute of Philadelphia*) Fashion Laboratory Technician. Assistant Teaching Professor. Fashion designer and technician; construction skills.

Genevieve Dion, MFA (*University of the Arts*). Assistant Professor. Industrial designer, wearable artist, new materials technology research.

Michael Glaser, MFA (*Ohio State University*) Program Director for Product Design. Assistant Professor. Quantifying the designer's intuition; the interplay between digital and physical forms; human desire to shape our surroundings.

Cynthia Golebuski, MS (*Drexel University*) Associate Program Director, Fashion Design. Assistant Teaching Professor. Fashion designer, illustrator, computer aided design.

Roberta Hochberger Gruber, MS (*Drexel University*) Head of the Fashion and Product Design & Merchandising Department. Associate Professor. Fashion designer and illustrator; wearable artist, merchandiser, special events.

Joseph H. Hancock, II, PhD (*Ohio State University*). Associate Professor. Apparel merchandising, textiles and clothing, culture and marketing strategies.

Lisa L. Hayes, BFA (*Syracuse University*) Program Director, Fashion Design. Associate Professor. Fashion designer, product designer, pattern design.

Jan Marshall, BA (*Long Island University*). Assistant Teaching Professor. Fashion designer, knitwear, product development, fashion analysis.

Kathi Martin, MSIS (*Drexel University*) Associate Director of the Graduate Program in Fashion Design. Associate Professor. Fashion and textile designer; textile artist; computer-aided design, best practices online databases and graphic interfaces for fashion and historic costume, virtual characters for fashion design.

Alphonso McClendon, MS (*Drexel University*). Assistant Professor. Fashion designer, textile designer, computer aided design.

Beth Phillips, MS (*Georgetown University*). Associate Teaching Professor. Business and international marketing, linguist, analysis of products.

Juanita Phillips, BS (*Drexel University*). Assistant Teaching Professor. Fashion designer and educator.

Clare Sauro, MA (*Fashion Institute of Technology*) Curator of the Drexel Historic Costume Collection. Assistant Teaching Professor. Museum studies: costume and textiles.

Film & Video

Major: Film & Video

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 186.0

Classification of Instructional Program (CIP) code: 50.0602

Standard Occupational Classification (SOC) code: 27-2012; 27-4031; 27-4032

About the Program

The film and video major offers a balance of technical craft and artistic vision that prepares students to pursue professional careers in the film industry. The program is hands-on with ample production opportunities from the first year of study supported by a strong emphasis in the liberal arts and foundations of design. There is also substantial coursework in screenwriting and film studies.

This highly competitive program, with only sixty-four freshmen accepted annually, features smaller classes that foster student-faculty interaction and mentoring, as well as ample access to excellent equipment. The unique Drexel co-op and Los Angeles Summer Program enhance education by providing students with professional employment experience.

The Film and Video program also offers minors in Film Studies and Video Production.

Additional Information

For more information about this program, contact the program director:

Karin Kelly

Film & Video

Department of Cinema and Television

Antoinette Westphal College of Media Arts and Design

kpk23@drexel.edu ()

For more details, visit the College's Film and Video (<http://www.drexel.edu/westphal/academics/undergraduate/film>) page.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
UNIV A101	The Drexel Experience	2.0

Arts and humanities electives	9.0
English elective	3.0
History elective	3.0
Natural Science electives	8.0
Philosophy elective	3.0
Social science electives	9.0
Electives	24.0
Co-operative education (two terms)	0.0

AWCOMAD Requirements

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
DIGM 100	Digital Design Tools	3.0
PHTO 110	Photography	3.0
VSST 108	Design I for Media	3.0
VSST 109	Design II for Media	3.0
WBDV 240	Web Authoring I	3.0

Film and Video Core Courses

FMST 101	Film History I: Emergence	3.0
FMST 102	Film History II: New Waves	3.0
FMST 103	Film History III: Trends	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 115	Basic Editing	3.0
FMVD 120	Basic Sound	3.0
FMVD 200	Acting for the Screen	3.0
FMVD 202	Directing for the Screen	3.0
FMVD 210	Documentary Video Production	3.0
FMVD 215	Narrative Video Production	3.0
FMVD 218	Intermediate Cinematography	3.0
FMVD 220	Experimental Video Production	3.0
FMST 250	The Documentary Tradition	3.0
FMVD 235	Intermediate Lighting	3.0
FMVD 237	Intermediate Editing	3.0
FMVD 286	Producing for Features	3.0
FMST 304	Film Voice and Style	3.0
FMVD 322	Production Workshop I	3.0
FMVD 323	Production Workshop II	3.0
FMVD 495	Senior Project in Film and Video (3 semesters at 3.0 credits)	9.0
SCRP 270 [WI (p. 517)]	Screenwriting I	3.0
SCRP 280 [WI (p. 517)]	Writing the Short Film	3.0
SCRP 370	Screenplay Story Development	3.0
TVPR 100	TV Studio: Basic Operations	3.0

Three Advanced Production Choice Courses 9.0

Includes TVPR-TV Studio 200 level course and any non-required TVPR or FMVD course at 300 level or above. Also includes SCRCP courses at 300 level or above. Does not include FMVD 399 or FMVD 490.

Film Studies or Television Studies Course 3.0

Select any Film Studies (FMST) or Television Studies (TVST) course not already listed as required.

Total Credits 186.0

Sample Plans of Study**Co-op Cycle A**

(See below this plan for Co-op Cycle B)

Term 1		Credits
DIGM 100	Digital Design Tools	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FMST 101	Film History I: Emergence	3.0
FMVD 110	Basic Shooting and Lighting	3.0
UNIV A101	The Drexel Experience	1.0
VSST 108	Design I for Media	3.0

Term Credits 16.0

Term 2		Credits
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FMST 102	Film History II: New Waves	3.0
FMVD 120	Basic Sound	3.0
SCRP 270 [WI (p. 517)]	Screenwriting I	3.0
UNIV A101	The Drexel Experience	1.0
VSST 109	Design II for Media	3.0

Term Credits 16.0

Term 3		Credits
ARTH 102	History of Art II: High Renaissance to Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
FMVD 115	Basic Editing	3.0
MATH 119	Mathematical Foundations for Design	4.0
TVPR 100	TV Studio: Basic Operations	3.0

Term Credits 17.0

Term 4		Credits
ARTH 103	History of Art: Early to Late Modern	3.0
FMVD 218	Intermediate Cinematography	3.0
FMST 250	The Documentary Tradition	3.0
FMVD 286	Producing for Features	3.0
WBDV 240	Web Authoring I	3.0
Arts and Humanities elective		3.0

Term Credits 18.0

Term 5		Credits
COOP 101	Career Management and Professional Development	0.0
FMVD 202	Directing for the Screen	3.0
PHTO 110	Photography	3.0
Arts and humanities elective		3.0
Natural science elective		4.0
Social science elective		3.0

Term Credits 16.0

Term 6

FMST 103	Film History III: Trends	3.0
FMVD 200	Acting for the Screen	3.0
FMVD 215	Narrative Video Production	3.0
SCRP 280 [WI (p. 517)]	Writing the Short Film	3.0
Natural science elective		4.0

Term Credits 16.0

Term 7

FMVD 210	Documentary Video Production	3.0
FMVD 235	Intermediate Lighting	3.0
FMVD 237	Intermediate Editing	3.0
Arts and humanities elective		3.0
Social science elective		3.0

Term Credits 15.0

Term 8

FMST 304	Film Voice and Style	3.0
FMVD 220	Experimental Video Production	3.0
FMVD 322	Production Workshop I	3.0
SCRP 370	Screenplay Story Development	3.0
Advanced Production elective *		3.0

Term Credits 15.0

Term 9

FMVD 323	Production Workshop II	3.0
Film Studies/Television Studies elective *		3.0
Arts and humanities elective		3.0
Social science elective		3.0
Free elective		3.0

Term Credits 15.0

Term 10

FMVD 495	Senior Project in Film and Video	3.0
Advanced Production elective *		3.0
Arts and humanities elective		3.0
Free electives		6.0

Term Credits 15.0

Term 11

FMVD 495	Senior Project in Film and Video	3.0
Advanced Production elective *		3.0
Arts and humanities elective		3.0
Free electives		6.0

Term Credits 15.0

Term 12

FMVD 495	Senior Project in Film and Video	3.0
Free electives		9.0

Term Credits 12.0

Total Credit: 186.0

Co-op Cycle B**Term 1**

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FMST 101	Film History I: Emergence	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 120	Basic Sound	3.0
VSST 108	Design I for Media	3.0
UNIV A101	The Drexel Experience	1.0

Term Credits 16.0

Term 2

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FMST 102	Film History II: New Waves	3.0
SCRP 270 [WI (p. 517)]	Screenwriting I	3.0
TVPR 100	TV Studio: Basic Operations	3.0
VSST 109	Design II for Media	3.0
UNIV A101	The Drexel Experience	1.0

Term Credits 16.0

Term 3

ARTH 102	History of Art II: High Renaissance to Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
DIGM 100	Digital Design Tools	3.0
FMVD 115	Basic Editing	3.0
MATH 119	Mathematical Foundations for Design	4.0

Term Credits 17.0

Term 4

ARTH 103	History of Art: Early to Late Modern	3.0
FMST 250	The Documentary Tradition	3.0
FMVD 215	Narrative Video Production	3.0
FMVD 286	Producing for Features	3.0
Arts and humanities elective		3.0

Term Credits 15.0

Term 5

FMVD 210	Documentary Video Production	3.0
FMVD 237	Intermediate Editing	3.0
PHTO 110	Photography	3.0
SCRP 280 [WI (p. 517)]	Writing the Short Film	3.0
Natural science elective		4.0

Term Credits 16.0

Term 6

FMST 103	Film History III: Trends	3.0
FMVD 218	Intermediate Cinematography	3.0
WBDV 240	Web Authoring I	3.0
Arts and humanities elective		3.0
Natural science elective		4.0

Term Credits 16.0

Term 7

COOP 101	Career Management and Professional Development	0.0
FMVD 200	Acting for the Screen	3.0
FMVD 235	Intermediate Lighting	3.0
	Arts and humanities elective	3.0
	Social science electives	6.0
	Free elective	3.0
Term Credits		18.0

Term 8

FMST 304	Film Voice and Style	3.0
FMVD 220	Experimental Video Production	3.0
FMVD 322	Production Workshop I	3.0
SCRP 370	Screenplay Story Development	3.0
	Social science elective	3.0
Term Credits		15.0

Term 9

FMVD 323	Production Workshop II	3.0
	Film Studies/Television Studies elective *	3.0
	Advanced Production elective *	3.0
	Arts and humanities elective	3.0
	Social science elective	3.0
Term Credits		15.0

Term 10

FMVD 495	Senior Project in Film and Video	3.0
	Advanced Production elective *	3.0
	Arts and humanities elective	3.0
	Free electives	6.0
Term Credits		15.0

Term 11

FMVD 495	Senior Project in Film and Video	3.0
	Advanced Production elective *	3.0
	Arts and humanities elective	3.0
	Free electives	6.0
Term Credits		15.0

Term 12

FMVD 495	Senior Project in Film and Video	3.0
	Free electives	9.0
Term Credits		12.0

Total Credit: 186.0

* See degree requirements (p. 517).

Co-Op/Career Opportunities

Opportunities

Students who study film and video can move on to careers as film or video directors, producers, video or film editors, directors of photography (film), camerawork, as well as grips and special effects coordinators.

Co-Op Experiences

Some past co-op employers of film and video students include:

- USA Network, New York
- Comcast, Philadelphia
- Bad Robot, Los Angeles
- ICM, Los Angeles
- Focus Features, New York
- Law & Order, New York
- NFL Films, Mount Laurel, New Jersey
- Tribeca Film Center, New York
- National Geographic Television, Washington DC
- NBC, New York
- Paramount Studios, Los Angeles
- MTV, New York

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Facilities

Film and Video facilities include a shooting studio with green screen; two screening rooms; a fully equipped HD television studio; post-production labs for editing, color correction and audio recording & mixing; specially outfitted multimedia rooms; state of the art film production equipment including cameras, steadicams, lighting and audio equipment.

Additionally, the college operates DUTV (<http://www.dutv.org>), a HD cable television station reaching over 350,000 households.

Minor in Film Studies

The Minor in Film Studies comprises courses that cover the major artistic and institutional developments in cinema from its late-nineteenth-century origins to the present. As these courses cover a variety of critical topics that are essential to any film studies curriculum - such as the study of major genres and auteurs, the technologies and techniques contributing to the development of the medium, as well as the historical circumstances that influenced the cinema's evolution since its inception - they will establish a sound critical foundation for students to choose and to flourish in the subsequent courses required for the minor.

The Minor in Film Studies is open to all University students.

Required Courses:

FMST 101	Film History I: Emergence	3.0
FMST 102	Film History II: New Waves	3.0
FMST 103	Film History III: Trends	3.0

Select five of the following: 15.0

FMST 250	The Documentary Tradition
FMST 255	Hitchcock
FMST 260	The Western
FMST 262	Film Comedy
FMST 263	Rock - N - Roll Cinema
FMST 265	Special Topics in Cinema Studies
FMST 266	The Cinematographer's Art
FMST 270	Controversial Films
FMST 275	Breakthroughs of Contemporary Film Directors
FMST 276	Great Years in Cinema: 1999
FMST 290	Hollywoodland I
FMST 291	Hollywoodland II

FMST 340	French New Wave	
FMST 345	Italian Neo Realism	
FMST 352	The Horror Film	
FMST 355	Contemporary Cinema	
Total credits		24.0

Minor in Video Production

The Minor in Video Production provides a thorough foundation in filmmaking craft. Once core required courses are completed, students have the opportunity to apply newly acquired skills in their choice of several advanced film production courses or to explore television studio production.

The Minor in Video Production is open to all University students.

Required Courses

FMVD 110	Basic Shooting and Lighting	3.0
FMVD 115	Basic Editing	3.0
FMVD 120	Basic Sound	3.0
SCRP 270 [WI (p. 517)]	Screenwriting I	3.0
Four of the following courses:		12.0
FMVD 210	Documentary Video Production	
FMVD 215	Narrative Video Production	
FMVD 220	Experimental Video Production	
FMVD 235	Intermediate Lighting	
FMVD 305	Special Effects Make-up	
FMVD 365	Special Topics in Production	
SCRP 280 [WI (p. 517)]	Writing the Short Film	
TVPR 100	TV Studio: Basic Operations	
TVPR 200	TV Studio: Live Directing	
Total Credits		24.0

Cinema and Television Faculty

Ian N. Abrams, BA (*Duke University*) Program Director, *Screenwriting and Playwriting Program*. Associate Professor. Movies, film, TV, screenwriting, Hollywood.

Ted Artz, BFA (*Tyler School of Art, Temple University*). Associate Professor. Digital media.

John Avarese, BS (*Drexel University*). Assistant Teaching Professor. Composer, film and video scores, mixing and sound design.

David Culver, AS (*Graham Junior College*) Manager of the *Paul F. Harron Studios/DUTV*. Associate Teaching Professor. Film and video.

David Deneen, BFA (*Philadelphia College of Art*). Associate Teaching Professor. Film & video.

Paul Diefenbach, PhD (*University of Pennsylvania*) Associate Program Director, *Game Art & Production*. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA (*Pennsylvania State University*). Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

Troy Finamore, MS (*Drexel University*) Associate Program Director, *Interactive Digital Media*. Assistant Teaching Professor. Advertising, design and interactivity.

Bruce Graham, BA (*Indiana University of Pennsylvania*). Associate Teaching Professor. Playwright.

Gerard M. Hooper, MFA (*Temple University*). Associate Teaching Professor. Film and video; European and non-western cinema.

D. B. Jones, PhD (*Stanford University*) Dean, *Pennoni Honors College*. Professor. Film and video; cinema studies.

Nick Jushchyshyn, MFA (*Academy of Art University*) Associate Program Director, *Animation and Visual Effects*. Visual effects, digital media and animation.

Matt Kauffhold, MA (*University of North Carolina*). Associate Teaching Professor. Screenwriting.

Karin P. Kelly, MFA (*New York University*) Program Director, *Film and Video*. Associate Professor. Film and video; filmmaker and author.

Yvonne D. Leach, MFA (*Temple University*) Department Head, *Cinema and Television Studies*. Associate Professor. Television studies.

David Mauriello, BA (*Lafayette College*). Assistant Professor. 3D modeling and animation.

Jocelyn Motter, MFA (*American Film Institute*). Assistant Teaching Professor. Editing.

Glen Muschio, PhD (*Temple University*). Associate Professor. Digital media, society, communication.

Lise Raven, MFA (*New York University*). Assistant Professor. Filmmaker.

Philip W. Salas, BS (*Temple University*). Assistant Teaching Professor. Utilization of advanced set top box data to measure fragmented viewing behavior. Impact of new television distribution technologies on traditional broadcasters and multichannel program providers.

David A. Schwartz, BA (*Rider University*). Associate Teaching Professor. Steadicam operator; cameraman.

Andrew Susskind, BA (*Harvard University*) Program Director of *TV Production & Media Management*. Associate Teaching Professor. Independent television producer and director.

Albert S. Tedesco, MA (*University of Pennsylvania*) Director of the *Paul F. Harron Graduate Program in Television Management*. Associate Teaching Professor. Impact of digital media on broadcast television; broadcasters' response to the challenge of new media; management of publicly and privately held communications companies.

Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor. Digital media, interactive multimedia.

Christine Vachon Visiting Professor. Independent film production.

Michael Wagner, PhD (*Vienna University of Technology*) Program Director, *Digital Media*. Associate Professor. Educational use of digital media and computer games.

Gregory S. Wolmart, MFA (*University of Pennsylvania*). Assistant Professor. Cinema studies; film history.

Jichen Zhu, PhD (*Georgia Institute of Technology*). Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Interdepartmental Faculty

Lawrence Epstein, MBA (*Cornell University*) *Interim Department Head, Arts & Entertainment Enterprise*. Associate Teaching Professor.

Game Design and Production

Major: Game Design and Production

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 186.0

Classification of Instructional Programs (CIP) code: 36.0113

Standard Occupational Classification (SOC) code: 15-1131

About the Program

Drexel's nationally-ranked Game Design and Production program combines a strong comprehension of animation and interactivity, along with an understanding of design, programming, and production.

The major mirrors a sector that has seen an explosion in gaming, not just in homes, but throughout industry and the corporate world. The gaming industry has grown from just a source of entertainment to one that also encompasses the use of "serious gaming," where gaming technologies are used in education and training.

Fully immersive games now use new methods of interaction, such as multi-touch displays, motion control and haptic devices. To best prepare themselves for the demands of careers in these cutting-edge disciplines, students pursue a foundation of design and technology, taking core courses in all aspects of digital media, completing a six month co-op and delving into rigorous coursework in many areas of specialization.

To complement the creative focus of the new game design & production major, a sister concentration in game programming and development (p. 185) is offered as part of Drexel's major in computer science (p. 171).

Additional Information

To find out more about this major, visit the Westphal College's Game Design and Production Major (<http://www.drexel.edu/westphal/undergraduate/GDAP>) page.

Degree Requirements

General education requirements

CIVC 101	Introduction to Civic Engagement	1.0
COM 230	Techniques of Speaking	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
PHYS 121	Physical Science for Design I	4.0
PHYS 122	Physical Science for Design II	4.0

UNIV A101	The Drexel Experience	2.0
Arts and humanities elective		3.0
History (HIST) elective		3.0
Literature (ENGL) elective		3.0
Social science electives		9.0
Free electives		24.0

Art and art history Requirements

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 300 [WI (p. 522)]	History of Modern Design	3.0
VSST 108	Design I for Media	3.0
VSST 109	Design II for Media	3.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0

Media and computer science requirements

CS 171	Computer Programming I	3.0
CS 172	Computer Programming II	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 206	Audio Production and Post	3.0
VSCM 240	Typography I	3.0
SCRP 270 [WI (p. 522)]	Screenwriting I	3.0

Digital media core requirements

ANIM 140	Computer Graphics Imagery I	3.0
ANIM 141	Computer Graphics Imagery II	3.0
ANIM 152	Multimedia Timeline Design	3.0
ANIM 211	Animation I	3.0
DIGM 100	Digital Design Tools	3.0
DIGM 105	Overview of Digital Media	3.0
DIGM 223	Creative Concept Design	3.0
DIGM 250	Professional Practices	3.0
DIGM 350 [WI (p. 522)]	Digital Storytelling	3.0
DIGM 451 [WI (p. 522)]	Explorations in New Media	3.0
DIGM 475 [WI (p. 522)]	Seminar: The Future of Digital Media	3.0
DIGM 492	Senior Project in Digital Media I	3.0
DIGM 493	Senior Project in Digital Media II	3.0
DIGM 494	Senior Project in Digital Media III	3.0
GMAP 260	Overview of Computer Gaming	3.0
WBDV 240	Web Authoring I	3.0
WBDV 241	Vector Authoring I	3.0

Gaming requirements

ANIM 212	Animation II	3.0
ANIM 215	History of Animation	3.0
ANIM 388	Spatial Data Capture	3.0
GMAP 345	Game Development Foundations	3.0
GMAP 377	Game Development: Workshop I	3.0
GMAP 378	Game Development: Workshop II	3.0
GMAP 421	Advanced Game Design and Production	3.0
Select two of the following Gaming Electives:		6.0

GMAP 347	Serious Games	FMVD 206	Audio Production and Post	3.0
GMAP 348	Experimental Games	GMAP 345	Game Development Foundations	3.0
GMAP 367	Character Animation for Gaming	SCRP	Screenwriting I	3.0
GMAP 368	Artificial Intelligence in Gaming	270 [WI (p. 522)]		
GMAP 369	Mobile Game Development	VSCM 240	Typography I	3.0
Total Credits				186.0

Sample Plan of Study

				Credits
Term 1				
DIGM 100	Digital Design Tools			3.0
DIGM 105	Overview of Digital Media			3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research			3.0
PHYS 121	Physical Science for Design I			4.0
UNIV A101	The Drexel Experience			1.0
VSST 110	Introductory Drawing			3.0
	Term Credits			17.0
Term 2				
ANIM 140	Computer Graphics Imagery I			3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing			3.0
FMVD 110	Basic Shooting and Lighting			3.0
PHYS 122	Physical Science for Design II			4.0
UNIV A101	The Drexel Experience			1.0
VSST 108	Design I for Media			3.0
	Term Credits			17.0
Term 3				
ANIM 141	Computer Graphics Imagery II			3.0
ANIM 152	Multimedia Timeline Design			3.0
CIVC 101	Introduction to Civic Engagement			1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres			3.0
MATH 101	Introduction to Analysis I			4.0
VSST 109	Design II for Media			3.0
	Term Credits			17.0
Term 4				
ANIM 211	Animation I			3.0
CS 171	Computer Programming I			3.0
DIGM 223	Creative Concept Design			3.0
GMAP 260	Overview of Computer Gaming			3.0
WBDV 240	Web Authoring I			3.0
	Term Credits			15.0
Term 5				
ANIM 212	Animation II			3.0
ANIM 215	History of Animation			3.0
ARTH 102	History of Art II: High Renaissance to Modern			3.0
COOP 101	Career Management and Professional Development			0.0
CS 172	Computer Programming II			3.0
WBDV 241	Vector Authoring I			3.0
	Term Credits			15.0
Term 6				
ARTH 103	History of Art: Early to Late Modern			3.0
Term 7				
ANIM 388	Spatial Data Capture			3.0
COM 230	Techniques of Speaking			3.0
DIGM 250	Professional Practices			3.0
DIGM 350 [WI (p. 522)]	Digital Storytelling			3.0
VSST 111	Figure Drawing I			3.0
	Term Credits			15.0
Term 8				
ARTH 300 [WI (p. 522)]	History of Modern Design			3.0
DIGM 451 [WI (p. 522)]	Explorations in New Media			3.0
GMAP 377	Game Development: Workshop I			3.0
Free elective				3.0
Gaming elective*				3.0
	Term Credits			15.0
Term 9				
GMAP 378	Game Development: Workshop II			3.0
Social science elective				3.0
Arts and Humanities elective				3.0
Gaming elective*				3.0
Free elective				3.0
	Term Credits			15.0
Term 10				
DIGM 492	Senior Project in Digital Media I			3.0
GMAP 421	Advanced Game Design and Production			3.0
Social science elective				3.0
Arts and Humanities elective				3.0
Free elective				3.0
	Term Credits			15.0
Term 11				
DIGM 493	Senior Project in Digital Media II			3.0
Free electives				9.0
Social science elective				3.0
	Term Credits			15.0
Term 12				
DIGM 475 [WI (p. 522)]	Seminar: The Future of Digital Media			3.0
DIGM 494	Senior Project in Digital Media III			3.0
Arts and Humanities elective				3.0

Free electives	6.0
Term Credits	15.0

Total Credit: 186.0

* See degree requirements (p.).

Co-op/Career Opportunities

Drexel students have broad training in all areas of game design and production, and our students have career opportunities in both entertainment gaming and the broader simulation/training industries.

Co-op Experiences

In an industry where the process of building a career often begins with a few key contacts, the co-op program gives Drexel students the chance to begin meeting people and networking. A recent co-op student at Microsoft Studios worked with producers on several different titles and was offered a job in his junior year that was waiting for him after he completed his senior year.

In addition to the large entertainment companies, students have opportunities to explore how game design is applicable to many local industries ranging from pharmaceuticals to aircraft.

Career Experiences

Our students work in leading entertainment companies including Microsoft Studios, Disney, EA Games, Blizzard, Zynga, 343 Industries, Midway, and NCsoft. Other students chose smaller studios or launch their own companies. Many students chose to work outside of the leading studios by applying their game production skills to more serious endeavors for companies including Lockheed, Comcast, Vanguard, and The Ride Works.

Jobs titles range from Technical Artist, Lead Cinematic Animator, Program Manager, Associate Producer, Marketing Manager, Animator, Facial Capture Artist, Motion Capture Associate, Simulation Developer, etc.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities, or Drexel's RePlay Lab careers (<http://www.replay.drexel.edu/careers.html>) page.

Dual Accelerated Degrees

BS/MS in Digital Media

The accelerated degree programs enable academically qualified students to earn both a bachelor's and a master's degree in five years instead of six — graduating sooner than they would in traditional programs. In addition, the graduate-level courses students take in their junior and senior years are included in their undergraduate tuition, which saves almost a year's worth of their MS tuition.

Current Drexel students may apply for the an accelerated degree programs through the Graduate College of Drexel University (<http://drexel.edu/graduatecollege>) after completing 90.0 credits, but no more than 120.0 credits. Many of our accelerated students have gone on to careers at leading companies including Pixar, Microsoft Studios, Dreamworks, NCSoft, and Disney.

Facilities

Our facilities include more than 100 triple-boot MacPro and Boxx Technology workstations, a 16 camera Vicon motion capture studio, green screen room, a 2-ton motion platform theme park ride, FTIR multitouch displays, laser scanner, stereoscopic projector, eye tracker, fNIR and EEG brain interfaces, and 3D theater, recording studios, etc. Students use professional software including Unreal, Unity3D, Maya, 3D Studio Max, Houdini, Massive, etc.

More information can be found at Drexel RePlay Lab's Facilities (<http://replay.drexel.edu/facilities.html>) page.

Cinema and Television Faculty

Ian N. Abrams, BA (*Duke University*) *Program Director, Screenwriting and Playwriting Program*. Associate Professor. Movies, film, TV, screenwriting, Hollywood.

Ted Artz, BFA (*Tyler School of Art, Temple University*). Associate Professor. Digital media.

John Avarese, BS (*Drexel University*). Assistant Teaching Professor. Composer, film and video scores, mixing and sound design.

David Culver, AS (*Graham Junior College*) *Manager of the Paul F. Harron Studios/DUTV*. Associate Teaching Professor. Film and video.

David Deneen, BFA (*Philadelphia College of Art*). Associate Teaching Professor. Film & video.

Paul Diefenbach, PhD (*University of Pennsylvania*) *Associate Program Director, Game Art & Production*. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA (*Pennsylvania State University*). Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

Troy Finamore, MS (*Drexel University*) *Associate Program Director, Interactive Digital Media*. Assistant Teaching Professor. Advertising, design and interactivity.

Bruce Graham, BA (*Indiana University of Pennsylvania*). Associate Teaching Professor. Playwright.

Gerard M. Hooper, MFA (*Temple University*). Associate Teaching Professor. Film and video; European and non-western cinema.

D. B. Jones, PhD (*Stanford University*) *Dean, Pennoni Honors College*. Professor. Film and video; cinema studies.

Nick Jushchyshyn, MFA (*Academy of Art University*) *Associate Program Director, Animation and Visual Effects*. Visual effects, digital media and animation.

Matt Kauffhold, MA (*University of North Carolina*). Associate Teaching Professor. Screenwriting.

Karin P. Kelly, MFA (*New York University*) *Program Director, Film and Video*. Associate Professor. Film and video; filmmaker and author.

Yvonne D. Leach, MFA (*Temple University*) *Department Head, Cinema and Television Studies*. Associate Professor. Television studies.

David Mauriello, BA (*Lafayette College*). Assistant Professor. 3D modeling and animation.

Jocelyn Motter, MFA (*American Film Institute*). Assistant Teaching Professor. Editing.

Glen Muschio, PhD (*Temple University*). Associate Professor. Digital media, society, communication.

Lise Raven, MFA (*New York University*). Assistant Professor. Filmmaker.

Philip W. Salas, BS (*Temple University*). Assistant Teaching Professor. Utilization of advanced set top box data to measure fragmented viewing behavior. Impact of new television distribution technologies on traditional broadcasters and multichannel program providers.

David A. Schwartz, BA (*Rider University*). Associate Teaching Professor. Steadicam operator; cameraman.

Andrew Susskind, BA (*Harvard University*) Program Director of TV Production & Media Management. Associate Teaching Professor. Independent television producer and director.

Albert S. Tedesco, MA (*University of Pennsylvania*) Director of the Paul F. Harron Graduate Program in Television Management. Associate Teaching Professor. Impact of digital media on broadcast television; broadcasters' response to the challenge of new media; management of publicly and privately held communications companies.

Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor. Digital media, interactive multimedia.

Christine Vachon Visiting Professor. Independent film production.

Michael Wagner, PhD (*Vienna University of Technology*) Program Director, *Digital Media*. Associate Professor. Educational use of digital media and computer games.

Gregory S. Wolmart, MFA (*University of Pennsylvania*). Assistant Professor. Cinema studies; film history.

Jichen Zhu, PhD (*Georgia Institute of Technology*). Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Interdepartmental Faculty

Lawrence Epstein, MBA (*Cornell University*) Interim Department Head, *Arts & Entertainment Enterprise*. Associate Teaching Professor.

Graphic Design

Major: *Graphic Design*

Degree Awarded: *Bachelor of Science*

Calendar Type: *Quarter*

Total Credit Hours: *182.0*

Classification of Instructional Programs (CIP) code: *50.0409*

Standard Occupational Classification (SOC) code: *27-1024*

About the Program

The Bachelor of Science curriculum in graphic design provides a balance of traditional and technical artistic studies enhanced by general education coursework in humanities and social sciences. Students develop a sophisticated approach to creative problem solving and develop skills in typography, image generation, corporate identity, information graphics, web design, three-dimensional design and motion graphics. Students experience a broad range of two- and three-dimensional projects and remain current on electronic applications and emerging technologies.

Students can also pursue advanced elective coursework in web & motion graphic design, environmental graphic design (wayfinding systems, exhibition design, identity graphics), experimental publication design and other interdisciplinary special topics projects.

Additional Information

For more information about the major, visit the Graphic Design (<http://www.drexel.edu/westphal/academics/undergraduate/graphicdesign>) program web page.

Degree Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
PHYS 121	Physical Science for Design I	4.0
UNIV A101	The Drexel Experience	2.0
Arts and humanities electives		9.0
Natural science elective		4.0
Social science electives		9.0
Free electives		23.0
Co-operative education (two terms)		0.0

Visual Studies Requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
PHTO 110	Photography	3.0
VSST 101	Design I	4.0
VSST 102	Design II	4.0
VSST 103	Design III	4.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0
VSST 301	Painting I	4.0
VSST 321	Screenprint I	4.0
Visual Studies (VSST) elective		4.0

Graphic Design Requirements

ARTH 300 [WI (p. 525)]	History of Modern Design	3.0
PHTO 210	Intermediate Photography	3.0
VSCM 100	Computer Imaging I	3.0
VSCM 200	Computer Imaging II	3.0
VSCM 230	Visual Communication I	4.0
VSCM 231	Visual Communication II	4.0

VSCM 232	Visual Communication III	4.0
VSCM 240	Typography I	3.0
VSCM 241	Production	3.0
VSCM 242	Typography II	3.0
VSCM 330	Visual Communication IV	4.0
VSCM 331	Visual Communication V	4.0
VSCM 340	Typography III	3.0
VSCM 350 [WI (p. 525)]	Graphic Design: 20th Century and Beyond	3.0
VSCM 430	Visual Communication VI	4.0
VSCM 450 or VSCM 455	Professional Portfolio Electronic Portfolio	3.0
VSCM 460 or VSCM 477	Professional Practice Graphic Design Seminar	3.0
VSCM 496	Senior Thesis Graphic Design	3.0
VSCM 440	Book Design	4.0
WMGD 210	Motion Graphics I	4.0
WMGD 220	Web Graphics I	4.0
Graphic Design Elective		4.0
Select from the following recommended courses:		
ADGD 200	Introduction to Advertising	
ADGD 210	Print Advertising I	
ADGD 310	Television and Web Advertising	
ADGD 320	Print Advertising II	
EVGD 210	Architectural Signage	
EVGD 200	Introduction to Environmental Graphic Design	
EVGD 220	Wayfinding	
EVGD 310	Design Techniques and Materials	
EVGD 320	Exhibit Design	
EVGD 421	Environmental Branding	
WMGD 330	Web Graphics II	
WMGD 421	Motion Graphics II	
WMGD 465	Special Topics	
Total Credits		182.0

Sample Plan of Study

BS in Graphic Design: General Plan of Study

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PHYS 121	Physical Science for Design I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
VSST 110	Introductory Drawing	3.0
Term Credits		15.0
Term 2		
ARTH 101	History of Art I: Ancient to Medieval	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
UNIV A101	The Drexel Experience	1.0
VSST 102	Design II	4.0

Natural science elective		4.0
Term Credits		15.0
Term 3		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
VSCM 100	Computer Imaging I	3.0
VSST 103	Design III	4.0
Term Credits		17.0
Term 4		
ARTH 103	History of Art: Early to Late Modern	3.0
PHTO 110	Photography	3.0
VSCM 200	Computer Imaging II	3.0
VSCM 230	Visual Communication I	4.0
VSCM 240	Typography I	3.0
Term Credits		16.0
Term 5		
COOP 101	Career Management and Professional Development	0.0
PHTO 210	Intermediate Photography	3.0
VSCM 231	Visual Communication II	4.0
VSCM 242	Typography II	3.0
VSST 111	Figure Drawing I	3.0
Term Credits		13.0
Term 6		
VSCM 232	Visual Communication III	4.0
VSCM 241	Production	3.0
WMGD 220	Web Graphics I	4.0
Free elective		3.0
Term Credits		14.0
Term 7		
ARTH 300 [WI (p. 525)]	History of Modern Design	3.0
VSST 321	Screenprint I	4.0
WMGD 210	Motion Graphics I	4.0
Arts and Humanities elective		3.0
Graphic Design elective *		4.0
Term Credits		18.0
Term 8		
VSCM 330	Visual Communication IV	4.0
VSCM 340	Typography III	3.0
Visual Studies (VSST) elective **		4.0
Arts and Humanities elective		3.0
Social science elective		3.0
Term Credits		17.0
Term 9		
VSST 301	Painting I	4.0
VSCM 331	Visual Communication V	4.0
VSCM 350 [WI (p. 525)]	Graphic Design: 20th Century and Beyond	3.0

Social science elective	3.0
Arts and Humanities elective	3.0
Term Credits	17.0

Term 10

VSCM 430 Visual Communication VI	4.0
VSCM 440 Book Design	4.0
Social science elective	3.0
Free elective	3.0
Term Credits	14.0

Term 11

VSCM 450 Professional Portfolio	3.0
or 455 Electronic Portfolio	
Free electives	9.0
Term Credits	12.0

Term 12

VSCM 460 Professional Practice	3.0
or 477 Graphic Design Seminar	
VSCM 496 Senior Thesis Graphic Design	3.0
Free electives	8.0
Term Credits	14.0

Total Credit: 182.0

* See degree requirements (p. 525) for list of Graphic Design electives.

** Visual Studies (VSST) elective: choose from any upper-level VSST course.

Co-op/Career Opportunities

Potential employers include advertising agencies, publishers, printers, independent and in-house design studios, museums and galleries, magazines and newspapers, and television. Training in visual communication prepares an individual for careers in many fields because the problem-solving methods and organizational skills it builds are widely applicable.

Co-op Experiences

Some past co-op employers of graphic design students include:

- The Franklin Institute
- Philadelphia Museum of Art
- Quirk Books
- Esquire
- Intuitive Company
- Electronic Ink
- Razorfish
- WebLinc
- Happy Cog
- Philadelphia Union
- Hasbro
- Comcast
- National Constitution Center

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Facilities

The Graphic Design classrooms are located on the fourth floor of the URBN Center in the Antoinette Westphal College of Media Arts and Design. There are five dedicated classroom workspaces equipped with up-to-date electronic and traditional tools. Classrooms have work surfaces for traditional practices that will accommodate 15 students, and wall surfaces for critiques or posting examples of printed work. In addition, students have access to a dedicated, non-scheduled Graphic Design "Open Lab" equipped with all necessary technology and work surfaces.

Media Arts Faculty

Jack Cliggett, MFA (*Syracuse University*). Associate Professor. Graphic design; logo design, corporate identity, Chinese propaganda, and thesis.

E. June Ellaway-Lunn, MFA (*Tyler School of Art, Temple University*) *Department Head of Media Arts*. Associate Professor. Graphic design; logo design, corporate identity, publication design, book design, professional practice, professional portfolio, and thesis.

Jody Graff, BS (*Drexel University*) *Program Director, Graphic Design*. Instructor. Graphic design; publication design, annual report design, three-dimensional graphics and packaging, environmental graphic design (exhibition and wayfinding), and thesis.

Andrea Modica, MFA (*Yale University*). Associate Professor. Photography; portraiture, photojournalism, palladium printing, and thesis.

William Rees, BS (*Drexel University*) *Assistant Program Director, Graphic Design*. Instructor. Graphic design; logo design, corporate identity, publication design, electronic imaging, print production, web design, professional portfolio, and thesis.

Stuart Rome, MFA (*Arizona State University*). Professor. Photography; color photography, junior project, and thesis.

Paul Runyon, BFA (*The University of New Mexico*) *Program Director, Photography*. Associate Professor. Studio photography, view-camera photography, studio lighting, business aspects of photography.

Sandra Stewart, BFA (*Temple University*) *Academic Associate Dean, Antoinette Westphal College of Media Arts and Design*. Associate Professor. Graphic design; logo design, corporate identity, publication design, three-dimensional graphics and packaging, and thesis.

Amanda Tinker, MFA (*Temple University*). Instructor. Photography, history of photography, historical and alternative processes, and intermediate photography.

Mark Willie, MFA (*Boston Museum School of Fine Arts*). Instructor. Graphic design; typography, logo design, corporate identity, publication design, publication design, book design, professional portfolio, and thesis.

L. Kylie Wright, BA (*University of Virginia*). Instructor. Photography; digital photography, and master printing.

Shushi Yoshinaga, BFA (*Philadelphia College of the Arts*). Associate Professor. Graphic design; letterform, typography, and thesis.

Interdepartmental Faculty

Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor. Digital media, interactive multimedia.

Blaise J. Tobia, MFA (*University of California, San Diego*) Director of the *Digital Media Program*. Professor. Photography, digital imaging.

Interior Design

Major: Interior Design

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 189.0

Classification of Instructional Programs (CIP) code: 50.0408

Standard Occupational Classification (SOC) code: 27-1025

About the Program

The undergraduate interior design program explores the behavioral, technological, environmental and aesthetic aspects of interior design within the context of increasingly more complex design projects. Combined with art and art history and general education requirements, a core of interior design courses creates a unique education at the forefront of design. Through academics grounded in problem-solving design studios, cooperative employment, and a dedicated faculty, the Interior Design program prepares students for leadership positions in the interior design industry.

The BS interior design program is CIDA accredited (Council for Interior Design Accreditation).

Program Philosophy and Mission

The interior design program at the Antoinette Westphal College of Media Arts & Design is committed to developing the leaders of tomorrow. We believe that combining a studio-based, sequential interior design curriculum, with broad liberal arts study and the experiential learning of a well-established co-op program develops skillful designers, creative thinkers and potential leaders. We offer each student the opportunity for intellectual and personal growth through a hands-on approach to teaching, advising and collaborating. Developing skilled designers, creative thinkers, responsible citizens and professional leaders through academic, experiential and professional learning is the mission of the interior design program. We seek to cultivate students who acknowledge their responsibilities to the safety and well-being of the public and the stewardship of the environment and who can lead in a multifaceted profession and ever-changing world.

For more information about this major, visit the College's Interior Design (<http://www.drexel.edu/westphal/academics/undergraduate/interiordesign>) page.

Degree Requirements

General education requirements

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0

PHYS 182	Applied Physics I	3.0
SOC 101	Introduction to Sociology	3.0
UNIV A101	The Drexel Experience	2.0
Arts and humanities electives		9.0
Natural science elective		4.0
Social science electives		6.0
Free electives *		24.0

Visual studies requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
VSST 101	Design I	4.0
VSST 102	Design II	4.0
VSST 103	Design III	4.0
VSST 110	Introductory Drawing	3.0
VSST 201	Multimedia: Performance	4.0
or VSST 202	Multimedia: Space	
VSST 203	Multimedia: Materials	4.0
VSST 301	Painting I	4.0
VSST 311	Sculpture I	4.0

Interior design requirements

INTR 160	Visualization I: Computer Imaging	3.0
INTR 200	History of Modern Architecture and Interiors	3.0
INTR 211	Textiles for Interiors	3.0
INTR 220	Visualization II: Orthographic	3.0
INTR 225	Environmental Design Theory	3.0
INTR 231	Structure	4.0
INTR 232	Interior Studio I	4.0
INTR 233	Interior Studio II	4.0
INTR 241	Visualization III: Digital	3.0
INTR 245	Visualization IV: 3D Modeling	3.0
INTR 250	Interior Materials	3.0
INTR 300 [WI (p. 528)]	Visual Culture: Interiors	3.0
INTR 305 [WI (p. 528)]	Visual Culture: Furniture	3.0
INTR 331	Residential Design Studio	4.0
INTR 341	Visualization V: Methods	3.0
INTR 350	Interior Detailing	3.0
INTR 351	Interior Lighting	3.0
INTR 430	Commercial Design Studio	4.0
INTR 442	Hospitality Design Studio	4.0
INTR 445	Contract Documentation for Interior Design	3.0
INTR 450 [WI (p. 528)]	Professional Practice	3.0
INTR 451	Interior Systems	3.0
INTR 491	Senior Project I	3.0
INTR 492	Senior Project II	3.0
INTR 493	Senior Project III	3.0
Interior Design elective		3.0

Total Credits **189.0**

Sample Plans of Study

Interior Design: Cycle A

(See Below for Study Abroad plan of study)

		Credits
Term 1		
ARTH 101	History of Art I: Ancient to Medieval	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
Term Credits		15.0
Term 2		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
UNIV A101	The Drexel Experience	1.0
VSST 102	Design II	4.0
VSST 110	Introductory Drawing	3.0
Term Credits		14.0
Term 3		
ARTH 103	History of Art: Early to Late Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
INTR 160	Visualization I: Computer Imaging	3.0
INTR 200	History of Modern Architecture and Interiors	3.0
VSST 103	Design III	4.0
Term Credits		17.0
Term 4		
INTR 220	Visualization II: Orthographic	3.0
INTR 225	Environmental Design Theory	3.0
INTR 231	Structure	4.0
INTR 250	Interior Materials	3.0
PHYS 182	Applied Physics I	3.0
Term Credits		16.0
Term 5		
COOP 101	Career Management and Professional Development	0.0
INTR 232	Interior Studio I	4.0
INTR 241	Visualization III: Digital	3.0
INTR 300 [WI (p. 528)]	Visual Culture: Interiors	3.0
SOC 101	Introduction to Sociology	3.0
	Interior Design elective	3.0
Term Credits		16.0
Term 6		
INTR 211	Textiles for Interiors	3.0
INTR 233	Interior Studio II	4.0
INTR 245	Visualization IV: 3D Modeling	3.0
	Natural science elective	4.0
	Free elective	3.0
Term Credits		17.0

Term 7		
INTR 305 [WI (p. 528)]	Visual Culture: Furniture	3.0
INTR 331	Residential Design Studio	4.0
INTR 341	Visualization V: Methods	3.0
INTR 350	Interior Detailing	3.0
VSST 202 or 201	Multimedia: Space Multimedia: Performance	4.0
Term Credits		17.0
Term 8		
INTR 351	Interior Lighting	3.0
INTR 430	Commercial Design Studio	4.0
INTR 451	Interior Systems	3.0
	Arts and humanities elective	3.0
	Social science elective	3.0
Term Credits		16.0
Term 9		
VSST 203	Multimedia: Materials	4.0
	Arts and humanities elective	3.0
	Social science elective	3.0
	Free electives	6.0
Term Credits		16.0
Term 10		
INTR 442	Hospitality Design Studio	4.0
INTR 450 [WI (p. 528)]	Professional Practice	3.0
INTR 491	Senior Project I	3.0
VSST 301	Painting I	4.0
	Free elective	3.0
Term Credits		17.0
Term 11		
INTR 445	Contract Documentation for Interior Design	3.0
INTR 492	Senior Project II	3.0
	Arts and humanities elective	3.0
	Free electives	6.0
Term Credits		15.0
Term 12		
INTR 493	Senior Project III	3.0
VSST 311	Sculpture I	4.0
	Free electives	6.0
Term Credits		13.0
Total Credit: 189.0		
Interior Design: Cycle A with Study Abroad		
Term 1		Credits
ARTH 101	History of Art I: Ancient to Medieval	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MATH 101	Introduction to Analysis I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
Term Credits		15.0

Term 2		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
UNIV A101	The Drexel Experience	1.0
VSST 102	Design II	4.0
VSST 110	Introductory Drawing	3.0
Term Credits		14.0
Term 3		
ARTH 103	History of Art: Early to Late Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
INTR 160	Visualization I: Computer Imaging	3.0
INTR 200	History of Modern Architecture and Interiors	3.0
VSST 103	Design III	4.0
Term Credits		17.0
Term 4		
INTR 220	Visualization II: Orthographic	3.0
INTR 225	Environmental Design Theory	3.0
INTR 231	Structure	4.0
INTR 250	Interior Materials	3.0
PHYS 182	Applied Physics I	3.0
Term Credits		16.0
Term 5		
COOP 101	Career Management and Professional Development	0.0
INTR 232	Interior Studio I	4.0
INTR 241	Visualization III: Digital	3.0
INTR 300 [WI (p. 528)]	Visual Culture: Interiors	3.0
SOC 101	Introduction to Sociology	3.0
	Interior Design elective	3.0
Term Credits		16.0
Term 6		
INTR 211	Textiles for Interiors	3.0
INTR 233	Interior Studio II	4.0
INTR 245	Visualization IV: 3D Modeling	3.0
	Arts and humanities elective	3.0
	Natural science elective	4.0
Term Credits		17.0
Term 7		
INTR 305 [WI (p. 528)]	Visual Culture: Furniture	3.0
INTR 331	Residential Design Studio	4.0
INTR 341	Visualization V: Methods	3.0
INTR 350	Interior Detailing	3.0
VSST 203	Multimedia: Materials	4.0
Term Credits		17.0
Term 8		
INTR 351	Interior Lighting	3.0
INTR 430	Commercial Design Studio	4.0
INTR 451	Interior Systems	3.0

VSST 202 or 201	Multimedia: Space Multimedia: Performance	4.0
	Social science elective	3.0
Term Credits		17.0
Term 9		
	Free electives (Study Abroad)	18.0
Term Credits		18.0
Term 10		
INTR 442	Hospitality Design Studio	4.0
INTR 450 [WI (p. 528)]	Professional Practice	3.0
INTR 491	Senior Project I	3.0
VSST 301	Painting I	4.0
Term Credits		14.0
Term 11		
INTR 445	Contract Documentation for Interior Design	3.0
INTR 492	Senior Project II	3.0
	Arts and humanities elective	3.0
	Free elective	3.0
	Social science elective	3.0
Term Credits		15.0
Term 12		
INTR 493	Senior Project III	3.0
VSST 311	Sculpture I	4.0
	Arts and humanities elective	3.0
	Free elective	3.0
Term Credits		13.0

Total Credit: 189.0

Co-op/Career Opportunities

Interior design is a multi-faceted field and includes careers with interior design firms, architectural firms, and facilities management organizations; in governmental agencies; and in the furniture and textile industries.

Full-time paid employment in the profession is an integral component of the program at Drexel. The six-month period of co-operative education, undertaken in the junior year, provides an experience of the office and the daily operation of a design firm. Through workshops offered by the Co-op Office students develop the ability to market themselves and locate potential employers. Students may opt to do their co-op in Philadelphia or in another location of their choosing.

Co-op Experiences

Some past co-op employers of interior design students include:

- Ballinger Company
- BBG BBGM, New York City
- Children's Hospital of Philadelphia Facilities
- Daroff Design
- DAS
- Eberlein Design Consultants
- Ewing Cole
- Floss Barber Inc.
- Gensler, New York City
- Granary Associates

- H2L2 Architects/Planners
- Hillier Lewis
- Herman Miller
- Kling Stubbins
- Knoll International
- Marguerite Rogers
- Nelson
- Perkins Eastman, Chicago
- RJMJ
- Stantec
- University of Pennsylvania Facilities
- West Chester University Facilities Office

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

About the Accelerated Degree Program

Qualified students in Interior Design have the option of continuing on into the graduate Interior Architecture + Design program to obtain a dual BS/MS degree. This program allows highly motivated students to graduate with both degrees in a total of five years. Students apply for this accelerated program when they complete 90 credits of coursework, and before completing 120 credits.

Additional requirements for acceptance into the Dual Degree Program:

1. Overall GPA of undergraduate coursework – 3.2 minimum
2. Overall GPA of interior design studio coursework – 3.5 minimum
3. Portfolio Review – interior studio work and foundation visual work
4. Essay – address reason for application, attitude towards profession, professional goals and leadership qualities you possess
5. Two letters of recommendation speaking to your work ethic and leadership skills.

Evaluation Process

A committee of interiors faculty reviews the applications and discusses the merits of the student to undergo the intensity and rigor of the final two years of the program. The Committee consists of no less than three members – Director of the Interiors programs, Associate Director BS Interior Design program and the Associate Director MS Interior Architecture + Design program.

Students should visit the Westphal College of Media Arts and Design (<http://www.drexel.edu/westphal>) for more information.

Facilities

The interior design program is housed in the new URBN Center, a state of the art design and arts facility on Drexel's campus. The URBN Center officially opened in September 2012. A hub for creative minds to gather, share ideas and work together to bring those ideas from the mind to the page, and into the world of tomorrow, interiors students benefit from a wide-range of resources including interior design studios, the interior design resource library, a hybrid making lab, and state-of-the-art computer laboratories. College lab equipment includes scanners, printers, plotters, laser cutters, 3-d printers, computer/video projection systems and other peripheral devices as appropriate to each major.

The URBN Annex houses a black box theater, screening room and the Leonard Pearlstein Gallery. Additional studio and classroom space in

the Peck Problem Solving and Research Center and the Design Arts Annex accommodate photography, basic design, painting, sculpture and a large woodworking shop with industrial-quality equipment. The woodshop is available for use by students for three-dimensional coursework or individual projects.

Architecture + Interiors Faculty

David Ade, AIA, BArch (*Drexel University*). Adjunct Associate Professor. Principal, SMP Architects.

Dr.-Ing. Ulrike Altenmüller-Lewis, AIA, Dr.-Ing., (*Bauhaus Universität Weimar*) *Program Director*. Assistant Professor. Research on educational environments; translations of architectural theory texts. Design studios, lectures and seminar courses.

Stephen Bonitatibus, AIA, MArch (*University of Pennsylvania*). Adjunct Professor. Principal, Bonitatibus Associates.

Mark Brack, PhD (*University of California at Berkeley*). Associate Professor. British and American architecture from 1700 to the present; Hispanic colonial architecture in the American Southwest; vernacular architecture; historic preservation.

Michael Burns, RA, BArch (*Drexel University*). Adjunct Associate Professor. Principal, Michael Burns Architects.

Jon Coddington, AIA, MArch (*University of Pennsylvania*) *Department Head, Department of Architecture + Interiors*. Professor. Architecture, urban design and planning.

Rena Cumby, BArch, MS (*Drexel University*) *Associate Department Head of the Department of Architecture + Interiors*. Associate Professor. Interior designer; foundation studies and design education.

Eugenia Ellis, PhD (*Virginia Polytechnic State University*). Associate Professor. Registered architect; interior design, extended-care facilities design, research on spatial visualization, perception and imagination.

Jeff Fama, MArch (*State University of New York at Buffalo*). Adjunct Associate Professor. Retail, entertainment, and theater design. Graduate interiors thesis advisor.

Gary Garofalo, BS Arch Eng (*Pennsylvania State University*). Adjunct Assistant Professor. Principal Lighting Design Collaborative. Lighting expert. Lighting design.

Don Jones, AIA, MArch (*University of Pennsylvania*). Adjunct Professor. Ewing Cole.

Nicole Koltick, MArch (*University of California*). Assistant Professor. Researching possibilities for architecture and design through the use of unexpected and innovative interdisciplinary models. Foundation design studios, fabrication and technology seminars.

Karin Kuenstler, MS (*Bank Street College of Education and Parsons*). Associate Professor. Interior designer; interior design for corporate and commercial facilities, history of corporate interiors, fiber art.

Maria Kuttruff, MS (*Drexel University*). Adjunct Assistant Professor. Residential interior design. Design studios.

Diana S. Nicholas, AIA, MFA (*University of the Arts, Philadelphia*). Assistant Teaching Professor. Principal of Switched on Design. Design studios, analog and digital visualization.

Karen Pelzer, BS (*Drexel University*) Associate Director of the MS in Interior Architecture and Design Program. Assistant Teaching Professor. Interior designer, hospitality design. Design studios.

Marilynne L. Rose, MS (*Drexel University*). Associate Teaching Professor. NCIDQ interior designer; residential and commercial design. Design studios, lecture and seminar courses.

Debra Ruben, MS (*Drexel University*). Associate Professor. NCIDQ, Interior designer; residential and commercial design. Research on user participation and the design process.

Paul Salvaggio, AIA, BArch (*Pennsylvania State University*). Adjunct Assistant Professor. Principal, Arcus Design Group. Foundation design studios.

Joseph Scanlon, BArch (*Drexel University*). Adjunct Professor. Foundation design studios.

Rachel Schade, AIA, MArch. (*University of Pennsylvania*). Associate Teaching Professor. Principal, Schade & Bolender Architects. Work-study placement. Design studios.

Virginia Smith, MS (*Drexel University*). Adjunct Associate Professor. Exhibit/graphic design, interior design, interior and architectural visualization.

Erik Sundquist, MArch (*Florida International University*) Director of the Hybrid Making Lab of AW CoMAD. Assistant Teaching Professor. Design studios, analog and digital architectural representation and fabrication.

Feenan Susan, BArch (*Temple University*). Adjunct Instructor. Institutional and commercial. Design documentation and graduate thesis.

Simon Tickell, AIA, MArch (*University of Pennsylvania*) Associate Director of the Architecture Evening Program. Associate Teaching Professor. Design studios and professional practice/electives; educational and museum buildings.

Nancy Trainer, FAIA, MArch (*University of Pennsylvania*). Adjunct Professor. Principal, Venturi Scott Brown and Associates, Architects and Planners. Design studios.

Ada Tremonte, BS (*Drexel University*) Associate Director of the BS Program in Interior Design. Assistant Teaching Professor. NCIDQ Interior designer, corporate/commercial design. Design studios, lecture and seminar courses.

Frank de Santis, AIA (*Yale University*). Assistant Teaching Professor. Design studios, analog and digital architectural representation.

Emeritus Faculty

Judith Bing, MArch (*Yale University*). Professor Emeritus. Design studios, lecture and seminar courses.

Sylvia Clark, MArch (*University of Pennsylvania*). Professor Emeritus.

Paul M. Hirshorn, AIA, MArch, MCP, (*University of Pennsylvania*). Professor Emeritus. Design studios. Former Department Head.

Marjorie Kriebel, B.Arch (*University of Pennsylvania*). Professor Emeritus.

Music Industry

Major: Music Industry

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 187.0 - 188.0

Classification of Instructional Programs (CIP) code: 50.1003

Standard Occupational Classification (SOC) code: 27-2041

About the Program

The degree in music industry offers the highly motivated and musically talented student a program of study that combines mastery of the art form with career preparation. Two concentrations are offered—Music Industry Business and Music Industry Technology—providing hands-on experience and a strong academic foundation in relevant areas of this rapidly changing industry. The music industry curriculum is divided into four areas which are combined with cooperative experience: general education, music core, music industry core, and concentration requirements.

In an industry where the process of career building often begins with a few key contacts, the cooperative education program provides Drexel students the opportunity to meet industry professionals and network. The program prepares students for careers in the music industry in such diverse positions as recording engineer, music producer, sound designer, music lawyer, business manager or music publisher. The co-op experience during the sophomore and junior year summer terms involves full-time career-related employment, during which students gain valuable insight into how the entertainment industry works.

About the Concentrations

The major offers two concentrations: music industry business and music industry technology:

- The **music industry business** concentration provides a rigorous academic foundation complemented by a real-world hands-on, highly-intensive business experience. This mission is realized through the students' participation in the MAD Dragon Music Group, a group of student-run enterprises including: MAD Dragon Records, DraKO Booking Agency, MAD Dragon Publishing, MADKo Concert Promotions and a BANTIC media.
- The **music industry technology** concentration focuses on the techniques and technologies of music and audio production. As well as providing the technology-oriented student with the necessary skills to perform as an audio engineer or record producer, the concentration teaches students how to conduct studio management and production company business. The concentration encourages the technology student to interact with the students in the business concentration by recording, mixing and mastering the music for the MAD Dragon Music Group, and engaging in live performance production.

Students can apply for a minor in business administration after completing their music industry core requirements. This emphasis on business courses as part of the core requirements is one of the foundations of the program.

Special Admissions Considerations

Students wishing to be admitted to the music industry major must meet or exceed the general requirements for admission to the University and the College of Media Arts and Design.

The program no longer accepts hard-copy portfolios. However, when applying to the Music Industry program, applicants can provide links in their application materials to electronic examples of pertinent activities,

as well as a resume of music industry related activities. If an applicant chooses, he or she can create a special webpage or site for the Music Industry Program Administration to review. The link should be mentioned in the application essay.

In their major-specific essays, applicants should address their reasons for selecting the music industry major at Drexel and share their passion for this unique area of study.

For more information about this major, visit the College's Music Industry (<http://www.drexel.edu/westphal/academics/undergraduate/musicindustry>) page.

Degree Requirements

All students take the same general education, music industry core and business courses. Students choose their concentration at the time of admission; however it is possible to switch as late as the beginning of junior year.

Concentrations:

- Music Industry Business
- Music Industry Technology

Students are also able to take courses in any other concentration as long as they fulfill the prerequisite requirement(s) and there is room in the class to accommodate the student.

Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 230	Techniques of Speaking	3.0
MATH 101 or MATH 121	Introduction to Analysis I Calculus I	4.0
MATH 102 or MATH 122	Introduction to Analysis II Calculus II	4.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV A101	The Drexel Experience	1.0
Arts and Humanities electives		9.0
Natural science elective *		3.0
Social science electives		9.0
Music core requirements		15.0
Music Industry core requirements		63.0
Concentration requirements		33.0-34.0
Concentration electives		9.0
Free electives **		24.0
Total Credits		187.0-191.0

* PHYS 107 - Acoustics is recommended.

** MKTG 301, PHIL 301, PSY 101 and/or PSY 150 are recommended.

Music Core Requirements

MUSC 121 or MUSC 122	Music Theory I Music Theory II	3.0
MUSC 125	Ear Training I	1.0

MUSC 130	Introduction to Music	3.0
MUSC 190 or MUSC 191	Class Piano I Class Guitar I	2.0
MUSC 323	Songwriting	3.0
Music Elective (Select one)		3.0
MUSC 231 [WI (p. 532)]	Music History I	
MUSC 232 [WI (p. 532)]	Music History II	
MUSC 234	The Beatles	
MUSC 236	Rock Music Through the Mid-60s	
MUSC 238	Rock Music Since the Mid-60s	
MUSC 331	World Musics	
MUSC 333	Afro-American Music USA	
MUSC 336	History of Jazz	
MUSC 338 [WI (p. 532)]	American Popular Music	
MUSC T380	Special Topics in Music	

Total Credits 15.0

Music Industry Core Requirements

ACCT 115	Financial Accounting Foundations	4.0
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MIP 132	Survey of the Recording Industry	3.0
MIP 133	Digital Audio Workstations I	3.0
MIP 161	Copyrights in the Music Industry	3.0
MIP 179	Introduction to Sound Recording	2.0
MIP 227	Listening Techniques	1.0
MIP 270	Live Music Industry	3.0
MIP 293	Survey of Music Production	3.0
MIP 361	Music Publishing	3.0
MIP 374	Entrepreneurship in the Music Industry	3.0
MIP 375 [WI (p. 532)]	Marketing and Promo in Music Industry	3.0
MIP 491	Senior Project in Music Industry *	9.0
STAT 201	Introduction to Business Statistics	4.0
WEST 100	Introduction to Digital Design Tools	3.0

Total Credits 63.0

Repeated over three terms.

Music Industry: Business Concentration Requirements

MIP 276	Sound Recording for Business Concentration	3.0
MIP 336	Contracts and Legal Issues in the Music Industry	3.0
MIP 376	MAD Dragon Music Group (Taken three terms)	9.0
MIP 394	Big Data In The Music Industry	3.0
MIP 395	Digital Revenue & Creative Destruction	3.0
MIP 396	International Recording Business	3.0
MIP 426	Global Trends in the Music Industry	3.0
MIP 467	Artist Representation	3.0

MIP 468	Music Industry E-Commerce	3.0
Select *Three* of the following Business Concentration Electives 9.0		
MIP 170	Radio Management	
MIP 263	Media Promotion	
MIP 318	Music Merchandising	
MIP 331	Music Venues and Concerts	
MIP 341	Touring and Booking	
MIP 365	Cities of Music and Culture	
MIP 366	Music Supervision	
Total Credits		42.0

Music Industry: Recording Arts & Music Production (RAMP) Concentration Requirements

MIP 233	Digital Audio Workstations II	3.0
MIP 279	Sound Recording I	3.0
MIP 333	Digital Audio Workstations III	3.0
MIP 338	Audio Seminar	2.0
MIP 379	Sound Recording II	3.0
MIP 381	Audio for Video	3.0
MIP 388	Music and Audio Freelancing	2.0
MIP 389	Sound Reinforcement	3.0
MIP 477	Music Production	3.0
MIP 481	Mixing and Mastering	3.0
MUSC 122	Music Theory II	3.0
MUSC 229	Modern Arranging Techniques	3.0
Select *three* of the following RAMP Concentration electives: 9.0		
MIP 358	Electronic Music Production	
MIP 382	Scoring to Picture	
MIP 384	Synthesis and Sampling	
MIP 386	Commercial Music Production	
MIP 387	Studio Maintenance	
MIP 390	Video Game Music and Audio	
MIP 391	Analog Recording	
MIP 392	Music Production Master Class	
MIP 433	Digital Audio Workstations IV	
Total Credits		43.0

About the Accelerated Degree Program

The BS in Music Industry/MBA program offers students a program that combines an undergraduate degree in music business and technology with an MBA degree awarded by the Drexel LeBow College of Business. The program is designed to allow students to complete both the bachelor's degree and the Master of Business Administration degree in five years.

The program is offered to qualified students who apply for this option prior to the end of freshmen year or prior to the completion of 90 credits. All students who apply for this option must take the GMAT entrance exam.

Students selected for this program will generally have a minimum of 1350 on the SAT, a GPA of 3.5 or better, and rank in the top 10% of their high school graduating class. A strong candidate for this program will have taken significant AP coursework while in high school.

BS/MBA students may be waived from two MBA Enterprise Management courses, assuming a grade of B or better is earned in specified

undergraduate courses. Students can review the Waiver Policies for the Statement of Curriculum Standing on the LeBow College's website for additional information.

The above conditions hold only for fully accepted BS/MBA students as identified by Enrollment Management.

Additional requirements for the dual degree program:

- A minimum of 3.2 cumulative GPA must be maintained throughout the entire undergraduate portion of this program or the student will not be able to continue on to the MBA.
- Students must take the GMAT examination and achieve a minimum score of 570 prior to the end of the tenth term in order to continue in the program. It is recommended that students take the GMAT examination late in the student's third year.
- Students must submit an acceptable plan of study at least three terms before anticipated start of graduate part of the program.

Sample Plans of Study

Music Industry: Recording Arts & Music Production Concentration

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MIP 132	Survey of the Recording Industry	3.0
MIP 179	Introduction to Sound Recording	2.0
MIP 227	Listening Techniques	1.0
MUSC 121	Music Theory I	3.0
MUSC 190 or 191	Class Piano I Class Guitar I	2.0
UNIV A101	The Drexel Experience	1.0
Term Credits		15.0
Term 2		Credits
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MIP 133	Digital Audio Workstations I	3.0
MIP 161	Copyrights in the Music Industry	3.0
MUSC 130	Introduction to Music	3.0
WEST 100	Introduction to Digital Design Tools	3.0
Term Credits		16.0
Term 3		Credits
ACCT 115	Financial Accounting Foundations	4.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MIP 233	Digital Audio Workstations II	3.0
MIP 270	Live Music Industry	3.0
MUSC 122	Music Theory II	3.0
MUSC 125	Ear Training I	1.0
Term Credits		17.0
Term 4		Credits
COOP 101	Career Management and Professional Development	0.0
MATH 101 or 121	Introduction to Analysis I Calculus I	4.0

MIP 333	Digital Audio Workstations III	3.0
MIP 361	Music Publishing	3.0
MIP 375 [WI (p. 532)]	Marketing and Promo in Music Industry	3.0
Free elective		3.0

Term Credits 16.0

Term 5

ECON 201	Principles of Microeconomics	4.0
MATH 102 or 122	Introduction to Analysis II Calculus II	4.0
MIP 279 or 293	Sound Recording I Survey of Music Production	3.0
Free electives		6.0

Term Credits 17.0

Term 6

BLAW 201	Business Law I	4.0
MIP 279 or PHYS 107	Sound Recording I Acoustics	3.0
MUSC 229	Modern Arranging Techniques	3.0
MUSC 323	Songwriting	3.0
STAT 201	Introduction to Business Statistics	4.0

Term Credits 17.0

Term 7

ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MIP 379	Sound Recording II	3.0
MIP 381	Audio for Video	3.0
Arts & Humanities elective		3.0

Term Credits 17.0

Term 8

MIP 338	Audio Seminar	2.0
MIP 374	Entrepreneurship in the Music Industry	3.0
MIP 389	Sound Reinforcement	3.0
MIP RAMP Concentration elective		3.0
Social Science elective		3.0

Term Credits 14.0

Term 9

COM 230	Techniques of Speaking	3.0
MIP 388	Music and Audio Freelancing	2.0
MIP 481	Mixing and Mastering	3.0
Social Science elective Or PHYS 107 Acoustics		3.0
Free elective		3.0

Term Credits 14.0

Term 10

MIP 491	Senior Project in Music Industry	3.0
MIP RA&MP Concentration elective		3.0
Arts and Humanities elective		3.0
MUSC elective		3.0
Free elective		3.0

Term Credits 15.0

Term 11

MIP 477	Music Production	3.0
MIP 491	Senior Project in Music Industry	3.0
Social Science elective		3.0
Free electives		6.0

Term Credits 15.0

Term 12

MIP 491	Senior Project in Music Industry	3.0
MIP RA&MP Concentration elective		3.0
Arts and Humanities elective		3.0
Free elective		6.0

Term Credits 15.0

Total Credit: 188.0

Music Industry: Business Concentration**Term 1 Credits**

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
MIP 132	Survey of the Recording Industry	3.0
MIP 179	Introduction to Sound Recording	2.0
MIP 227	Listening Techniques	1.0
MUSC 121	Music Theory I	3.0
MUSC 190 or 191	Class Piano I Class Guitar I	2.0
UNIV A101	The Drexel Experience	1.0

Term Credits 15.0

Term 2

CIVC 101	Introduction to Civic Engagement	1.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
MIP 133	Digital Audio Workstations I	3.0
MIP 161	Copyrights in the Music Industry	3.0
MUSC 130	Introduction to Music	3.0
WEST 100	Introduction to Digital Design Tools	3.0

Term Credits 16.0

Term 3

ACCT 115	Financial Accounting Foundations	4.0
COM 230	Techniques of Speaking	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MIP 270	Live Music Industry	3.0
MIP 276	Sound Recording for Business Concentration	3.0
MUSC 125	Ear Training I	1.0

Term Credits 17.0

Term 4

COOP 101	Career Management and Professional Development	0.0
MATH 101	Introduction to Analysis I	4.0
MIP 361	Music Publishing	3.0
MIP 375 [WI (p. 532)]	Marketing and Promo in Music Industry	3.0
Natural science elective		3.0
Free elective		3.0

Term Credits 16.0

Term 5		
BLAW 201	Business Law I	4.0
ECON 201	Principles of Microeconomics	4.0
MATH 102	Introduction to Analysis II	4.0
MIP 239	Survey of Music Production	3.0
Social Science elective		3.0
Term Credits		18.0
Term 6		
MIP 336	Contracts and Legal Issues in the Music Industry	3.0
MIP 467	Artist Representation	3.0
MUSC 323	Songwriting	3.0
STAT 201	Introduction to Business Statistics	4.0
Social Science elective		3.0
Term Credits		16.0
Term 7		
ECON 202	Principles of Macroeconomics	4.0
FIN 301	Introduction to Finance	4.0
MIP 376	MAD Dragon Music Group	3.0
MIP 395	Digital Revenue Creative Destruction	3.0
MIP Business Concentration elective		3.0
Term Credits		17.0
Term 8		
MIP 374	Entrepreneurship in the Music Industry	3.0
MIP 376	MAD Dragon Music Group	3.0
MIP 394	Big Data In The Music Industry	3.0
Free electives		6.0
Term Credits		15.0
Term 9		
MIP 376	MAD Dragon Music Group	3.0
MIP 426	Global Trends in the Music Industry	3.0
MIP 468	Music Industry E-Commerce	3.0
Arts & Humanities elective		3.0
Free elective		3.0
Term Credits		15.0
Term 10		
MIP 396	International Recording Business	3.0
MIP 491	Senior Project in Music Industry	3.0
Arts and Humanities elective		3.0
MUSC elective		3.0
Free elective		3.0
Term Credits		15.0
Term 11		
MIP 491	Senior Project in Music Industry	3.0
MIP Business Concentration elective		3.0
Social science elective		3.0
Free electives		6.0
Term Credits		15.0
Term 12		
MIP 491	Senior Project in Music Industry	3.0
MIP Business Concentration elective		3.0
Arts and Humaniteis elective		3.0

Free electives	3.0
Term Credits	12.0

Total Credit: 187.0

* See degree requirements (p. 533).

Arts & Entertainment Enterprise Faculty

Xela Batchelder, PhD (*Ohio State University*). Assistant Professor. Entertainment and arts management; theater management, touring, presenting and booking.

Jean Brody, DFA (*Yale School of Drama*) Program Director, Online MS in Arts Administration. Associate Teaching Professor. Arts administration.

Lawrence Epstein, MBA (*Cornell University*) Interim Department Head, Arts & Entertainment Enterprise. Associate Teaching Professor.

Julie Goodman Hawkins, MFA (*Temple University*) Program Director, MS in Arts Administration. Assistant Professor. Cultural policy, political activism in the arts, changes in economic and social policy, arts sector changes.

James L. Klein, BA (*Oberlin College*). Associate Professor. Music technologist, sound and recording engineer, songwriter for film, TV and radio music.

Michelle Manghise, BS (*St. John's University*). Assistant Teaching Professor. 25-year veteran of music industry; music publishing, copyright, artist management, entrepreneurship, entertainment marketing.

Brian Moore, MS, MFA (*Drexel University; Louisiana State University*) Program Director, BS in Entertainment and Arts Management. Assistant Teaching Professor. Nonprofit organizations: fund development; strategic planning; communications and marketing; and executive management.

John Seay, BMus (*James Madison University*). Associate Professor. Sound and recording engineer, music technologist, music producer and studio technician.

Cyrille Taillandier Associate Teaching Professor. Recording engineer, music producer and digital editor.

Neville Vakharia, MS (*Drexel University*) Research Director. Assistant Professor. Technology in the arts, strategic planning and evaluation, management and leadership, innovation and entrepreneurship.

Darren Walters, BA (*University of Delaware*). Associate Teaching Professor. General Manager of Mad Dragon Records and co-owner and President of Jade Tree, an independent record label.

Andrew Zitcer, MCP (*University of Pennsylvania*). Assistant Teaching Professor. Arts and community development, community based organizations, governance modes, organizational planning, narrative and social theory.

Photography

Major: Photography

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0

Classification of Instructional Programs (CIP) code: 50.0605

Standard Occupational Classification (SOC) code: 27-4021

About the Program

The photography curriculum is designed to provide the basis for both technical and aesthetic proficiency. Through a hands-on program blending traditional processes with the latest digital technologies, the photography curriculum provides all the tools necessary for aspiring artists/photographers to achieve a breadth of experience not generally developed in traditional fine art or commercial photography programs.

The photography major provides students with a unified fine arts/professional curriculum offering a wide range of studio, real-world, and academic experiences—intermixed with ongoing critiques and evaluation—including the studio, the darkroom, and the computer. The major prepares students to understand photography as a system of visual communication with its foundation in an ever-changing technology. Graduates may be employed in a variety of photo-related businesses, initiate their own photographic enterprises, or choose to go on to advanced studies.

The College's extensive photographic facilities (<http://www.drexel.edu/westphal/undergraduate/PHTO/Facilities>) are available to every photography major at Drexel. Incoming students are only required to bring a 35mm film camera that can be used on a manual setting.

Additional Information

For more information about this major, visit the College's Photography (<http://www.drexel.edu/westphal/undergraduate/PHTO>) website.

Degree Requirements

General education requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
PHYS 121	Physical Science for Design I	4.0
COOP 101	Career Management and Professional Development	0.0
UNIV A101	The Drexel Experience	2.0

Arts and humanities electives	9.0
Natural science elective	3.0-4.0
Social science electives	9.0

Free electives 24.0

Visual Studies requirements

ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
VSST 101	Design I	4.0
VSST 102	Design II	4.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0

Visual Studies electives 12.0

Students select three additional visual studies (VSST) courses as electives.

Photography requirements

PHTO 110	Photography	3.0
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PHTO 140	Digital Photography I	4.0
PHTO 210	Intermediate Photography	3.0
PHTO 231	Color Photography	4.0
PHTO 233	Large Format Photography	4.0
PHTO 234	Studio Photography	4.0
PHTO 236	Photojournalism	4.0
PHTO 240	Digital Photography II	4.0
PHTO 253	Fine Black & White Printing	3.0
PHTO 275 [WI (p. 536)]	History of Photography I	3.0
PHTO 276	History of Photography II	3.0
PHTO 334	Advanced Studio Photography	4.0
PHTO 336	Assignment Photography	3.0
PHTO 340	Digital Photography III	4.0
PHTO 361	Advanced Photography	4.0
PHTO 392	Junior Project in Photography	3.0
PHTO 451	Photography and Business	3.0
PHTO 452 [WI (p. 536)]	History of Contemporary Photography	3.0
PHTO 492	Senior Thesis in Photography I	3.0
PHTO 493	Senior Thesis in Photography II	3.0
PHTO 495	Senior Thesis in Photography III	3.0
Photography electives		9.0

Students select three courses from the following:

PHTO 335	Portraiture
PHTO 453	Photography Production
PHTO 455	Landscape Photography
PHTO 456	Fashion Photography
PHTO 457	Palladium Printing
PHTO 458	Advertising Portfolio Development
PHTO 459	Marketing for Photographers

Total Credits 180.0

Sample Plan of Study

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PHYS 121	Physical Science for Design I	4.0
PHTO 140	Digital Photography I	4.0
VSST 101	Design I	4.0
UNIV A101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		
ARTH 101	History of Art I: Ancient to Medieval	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHTO 110	Photography	3.0
VSST 102	Design II	4.0
UNIV A101	The Drexel Experience	1.0
Term Credits		14.0
Term 3		

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
PHTO 210	Intermediate Photography	3.0
Natural science elective		3.0

Term Credits **16.0**

Term 4

ARTH 103	History of Art: Early to Late Modern	3.0
PHTO 233	Large Format Photography	4.0
PHTO 253	Fine Black White Printing	3.0
VSST 110	Introductory Drawing	3.0
Free elective		3.0

Term Credits **16.0**

Term 5

COOP 101	Career Management and Professional Development	0.0
PHTO 236	Photojournalism	4.0
PHTO 240	Digital Photography II	4.0
VSST 111	Figure Drawing I	3.0
Social science elective		3.0
Free elective		3.0

Term Credits **17.0**

Term 6

PHTO 231	Color Photography	4.0
PHTO 275 [WI (p. 536)]	History of Photography I	3.0
Arts and Humanities elective		3.0
Social science elective		3.0

Term Credits **13.0**

Term 7

PHTO 234	Studio Photography	4.0
PHTO 276	History of Photography II	3.0
PHTO 451	Photography and Business	3.0
VSST elective*		4.0
Free elective		3.0

Term Credits **17.0**

Term 8

Spring/Summer Co-Op Cycle		
PHTO 334	Advanced Studio Photography	4.0
PHTO 392	Junior Project in Photography	3.0
Arts and Humanities elective		3.0
VSST elective*		4.0

Term Credits **14.0**

Term 9

Spring/Summer Co-Op Cycle		
PHTO 336	Assignment Photography	3.0
PHTO 361	Advanced Photography	4.0
Arts and Humanities elective		3.0
Social science elective		3.0
VSST elective*		4.0

Term Credits **17.0**

Term 10

PHTO 452 [WI (p. 536)]	History of Contemporary Photography	3.0
PHTO 492	Senior Thesis in Photography I	3.0
Photography elective*		3.0
Free electives		6.0

Term Credits **15.0**

Term 11

PHTO 493	Senior Thesis in Photography II	3.0
Photography elective*		3.0
Free electives		6.0

Term Credits **12.0**

Term 12

PHTO 340	Digital Photography III	4.0
PHTO 495	Senior Thesis in Photography III	3.0
Photography elective*		3.0
Free elective		3.0

Term Credits **13.0**

Total Credit: 180.0**Term 1**

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PHYS 121	Physical Science for Design I	4.0
PHTO 140	Digital Photography I	4.0
VSST 101	Design I	4.0
UNIV A101	The Drexel Experience	1.0

Term Credits **16.0**

Term 2

ARTH 101	History of Art I: Ancient to Medieval	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
PHTO 110	Photography	3.0
VSST 102	Design II	4.0
UNIV A101	The Drexel Experience	1.0

Term Credits **14.0**

Term 3

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
PHTO 210	Intermediate Photography	3.0
Natural science elective		3.0

Term Credits **16.0**

Term 4

PHTO 253	Fine Black White Printing	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
PHTO 233	Large Format Photography	4.0
VSST 110	Introductory Drawing	3.0
Free elective		3.0

Term Credits **16.0**

Term 5

COOP 101	Career Management and Professional Development	0.0
PHTO 236	Photojournalism	4.0
PHTO 240	Digital Photography II	4.0
VSST 111	Figure Drawing I	3.0
	Social science elective	3.0
	Free elective	3.0
Term Credits		17.0

Term 6

PHTO 231	Color Photography	4.0
PHTO 275 [WI (p. 536)]	History of Photography I	3.0
	Arts and Humanities elective	3.0
	Social science elective	3.0
Term Credits		13.0

Term 7

PHTO 234	Studio Photography	4.0
PHTO 276	History of Photography II	3.0
PHTO 451	Photography and Business	3.0
	VSST elective*	4.0
	Free elective	3.0
Term Credits		17.0

Term 8

Fall/Winter Co-Op Cycle		
PHTO 334	Advanced Studio Photography	4.0
PHTO 361	Advanced Photography	4.0
PHTO 392	Junior Project in Photography	3.0
	Arts and Humanities elective	3.0
	VSST elective*	4.0
Term Credits		18.0

Term 9

Fall/Winter Co-Op Cycle		
PHTO 336	Assignment Photography	3.0
	Arts and Humanities elective	3.0
	Social science elective	3.0
	VSST elective*	4.0
Term Credits		13.0

Term 10

PHTO 452 [WI (p. 536)]	History of Contemporary Photography	3.0
PHTO 492	Senior Thesis in Photography I	3.0
	Photography elective*	3.0
	Free electives	6.0
Term Credits		15.0

Term 11

	Photography elective*	3.0
	Free electives	6.0
PHTO 493	Senior Thesis in Photography II	3.0
Term Credits		12.0

Term 12

PHTO 340	Digital Photography III	4.0
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PHTO 495	Senior Thesis in Photography III	3.0
	Photography elective*	3.0
	Free elective	3.0
Term Credits		13.0

Total Credit: 180.0

* See degree requirements (p. 537).

Co-op/Career Opportunities

Photographers pursue careers in a wide variety of fields. Primary choices among Drexel graduates include journalism, illustration, fashion and advertising, and fine arts.

Recent co-op placements have included:

- Micheal Creagh, New York City
- The Edywnn Houk Gallery, New York City
- Jonathan Pushnik, Advertising Photographer, Philadelphia, PA
- Philadelphia Magazine, Philadelphia, PA
- Jason Varney, Editorial Photographer, Philadelphia
- Saturday Night Live, New York City

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Photography

The minor in photography gives students a thorough understanding of photographic practices using a combination of aesthetics and technology. This flexible minor has been developed to accommodate both Antoinette Westphal College of Media Arts and Design majors as well as majors from any other college. It is an excellent choice for students who are majoring in marketing, communications and journalism. Many employers in these fields are now routinely request that candidates have a good working knowledge of Photoshop and photographic practices.

PHTO 110	Photography	3.0
PHTO 140	Digital Photography I	4.0
PHTO 210	Intermediate Photography	3.0
PHTO 231	Color Photography	4.0
PHTO 240	Digital Photography II	4.0
PHTO 234	Studio Photography	4.0
PHTO 236	Photojournalism	4.0

Additional Suggested Electives (Optional)

PHTO 275 [WI (p. 536)]	History of Photography I	
PHTO 276	History of Photography II	
PHTO 451	Photography and Business	
PHTO 452 [WI (p. 536)]	History of Contemporary Photography	

Total Credits 26.0

Media Arts Faculty

Jack Cliggett, MFA (*Syracuse University*). Associate Professor. Graphic design; logo design, corporate identity, Chinese propaganda, and thesis.

E. June Ellaway-Lunn, MFA (*Tyler School of Art, Temple University*)
Department Head of Media Arts. Associate Professor. Graphic design;
logo design, corporate identity, publication design, book design,
professional practice, professional portfolio, and thesis.

Jody Graff, BS (*Drexel University*) *Program Director, Graphic Design*.
Instructor. Graphic design; publication design, annual report design,
three-dimensional graphics and packaging, environmental graphic design
(exhibition and wayfinding), and thesis.

Andrea Modica, MFA (*Yale University*). Associate Professor.
Photography; portraiture, photojournalism, palladium printing, and thesis.

William Rees, BS (*Drexel University*) *Assistant Program Director, Graphic Design*.
Instructor. Graphic design; logo design, corporate identity,
publication design, electronic imaging, print production, web design,
professional portfolio, and thesis.

Stuart Rome, MFA (*Arizona State University*). Professor. Photography;
color photography, junior project, and thesis.

Paul Runyon, BFA (*The University of New Mexico*) *Program Director, Photography*.
Associate Professor. Studio photography, view-camera
photography, studio lighting, business aspects of photography.

Sandra Stewart, BFA (*Temple University*) *Academic Associate Dean, Antionette Westphal College of Media Arts and Design*. Associate
Professor. Graphic design; logo design, corporate identity, publication
design, three-dimensional graphics and packaging, and thesis.

Amanda Tinker, MFA (*Temple University*). Instructor. Photography, history
of photography, historical and alternative processes, and intermediate
photography.

Mark Willie, MFA (*Boston Museum School of Fine Arts*). Instructor.
Graphic design; typography, logo design, corporate identity, publication
design, publication design, book design, professional portfolio, and thesis.

L. Kylie Wright, BA (*University of Virginia*). Instructor. Photography; digital
photography, and master printing.

Shushi Yoshinaga, BFA (*Philadelphia College of the Arts*). Associate
Professor. Graphic design; letterform, typography, and thesis.

Interdepartmental Faculty

Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor.
Digital media, interactive multimedia.

Blaise J. Tobia, MFA (*University of California, San Diego*) *Director of the Digital Media Program*. Professor. Photography, digital imaging.

Product Design

Major: Product Design

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 187.0

Classification of Instructional Programs (CIP) code: 50.0404

Standard Occupational Classification (SOC) code: 27-1021

About the Program

Product design combines the fields of art, business, and engineering to design the products people use every day. The program in product design

focuses creativity and intellect, and prepares students for careers in a range of product design fields including corporate product design, design consulting, entrepreneurial endeavors, sustainable product development, and global design initiatives.

The major in product design is centered on teaching students the skills to develop and design products for a vast array of industries, specializing in multidisciplinary design research focused on product development and commercialization. It will also encourage collaboration in green design, sustainability and innovation in product development, facilitating and combining the fields of art, business, engineering and technology.

Students have the opportunity to create products ranging from furniture and toys to medical devices and consumer electronics in design competitions and *charrettes*. Students learn in state-of-the-art facilities that include a modeling shop and studio, laser cutters, 3D printers, rapid prototypers and molding clays and tools. The modeling shop and studio are large design-centered spaces, built to promote and sustain the studio culture students will enter upon graduation.

Students enrolled in the product design major will be expected to pursue a minor outside of product design that will allow them to apply their design capabilities toward a specific area of expertise.

For more information about this major, visit the College's Product Design (<http://www.drexel.edu/westphal/academics/undergraduate/productdesign>) page.

Degree Requirements

In addition to the following requirements for graduation, students enrolled in the Product Design major will be expected to pursue a minor outside of product design that will allow them to apply their design capabilities toward a specific area of expertise.

General education requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
CHEM 201	Why Things Work: Everyday Chemistry	3.0
COM 220	Qualitative Research Methods	3.0
MATH 101	Introduction to Analysis I	4.0
PHYS 103	General Physics I	4.0
PSY 101	General Psychology I	3.0
PSY 332	Human Factors and Cognitive Engineering	3.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV A101	The Drexel Experience	1.0
Arts and humanities electives		9.0
Free electives		27.0

Visual studies requirements

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 300 [WI (p. 540)]	History of Modern Design	3.0
DIGM 100	Digital Design Tools	3.0
PHTO 110	Photography	3.0
PHTO 234	Studio Photography	4.0
VSCM 230	Visual Communication I	4.0

VSCM 240	Typography I	3.0
VSST 101	Design I	4.0
VSST 102	Design II	4.0
VSST 103	Design III	4.0
VSST 110	Introductory Drawing	3.0
VSST 111	Figure Drawing I	3.0
Select one of the following:		4.0
VSST 201	Multimedia: Performance	
VSST 202	Multimedia: Space	
VSST 203	Multimedia: Materials	

Product Design requirements

ECON 201	Principles of Microeconomics	4.0
ENGR 220	Fundamentals of Materials	4.0
DSMR 201	Analysis of Product	3.0
MEM 201	Foundations of Computer Aided Design	3.0
MGMT 260	Introduction to Entrepreneurship	4.0
PROD 101	History and Analysis of Product Design	3.0
PROD 205	Applied Making I	3.0
PROD 210	Introduction to Product Design	3.0
PROD 220	Product Design Form Studio	4.0
PROD 225	Computer Aided Imagining in Product Design	3.0
PROD 230	Product Design Process Studio	4.0
PROD 235	Applied Design Visualization	3.0
PROD 245	Seminar Professional Landscape	3.0
PROD 255	Applied Materials in Product Design	3.0
PROD 340	Interdisciplinary Product Design Studio	4.0
PROD 345	Applied Human Centered Design	3.0
PROD 425	Applied Design Research	3.0
PROD 460	Research Synthesis Studio	4.0
PROD 470	Create Build Studio	4.0
PROD 475	Professional Practice in Product Design	3.0
PROD 480	Exhibition Studio	4.0

Optional Product Design electives

PROD 215	Design Thinking in Product Design	
PROD 350	Sponsored Product Design Studio	
PROD 399	Independent Study in Product Design	
PROD 465	Special Topics in Product Design	

Total Credits 187.0**Sample Plan of Study**

Term 1		Credits
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PROD 101	History and Analysis of Product Design	3.0
UNIV A101	The Drexel Experience	1.0
VSST 101	Design I	4.0
VSST 110	Introductory Drawing	3.0
Term Credits		14.0
Term 2		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
DIGM 100	Digital Design Tools	3.0

ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
VSST 102	Design II	4.0
Arts and Humanities elective		3.0
Term Credits		17.0

Term 3

ARTH 103	History of Art: Early to Late Modern	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
VSST 103	Design III	4.0
VSST 111	Figure Drawing I	3.0

Term Credits 17.0**Term 4**

PHYS 103	General Physics I	4.0
PROD 205	Applied Making I	3.0
PROD 210	Introduction to Product Design	3.0
PROD 235	Applied Design Visualization	3.0
VSCM 240	Typography I	3.0

Term Credits 16.0**Term 5**

COOP 101	Career Management and Professional Development	0.0
ECON 201	Principles of Microeconomics	4.0
MEM 201	Foundations of Computer Aided Design	3.0
PROD 220	Product Design Form Studio	4.0
VSCM 230	Visual Communication I	4.0

Term Credits 15.0**Term 6**

CHEM 201	Why Things Work: Everyday Chemistry	3.0
DSMR 201	Analysis of Product	3.0
ENGR 220	Fundamentals of Materials	4.0
PROD 225	Computer Aided Imagining in Product Design	3.0
PROD 230	Product Design Process Studio	4.0

Term Credits 17.0**Term 7**

PHTO 110	Photography	3.0
PROD 245	Seminar Professional Landscape	3.0
PROD 255	Applied Materials in Product Design	3.0
Select one of the following:		4.0

- VSST 202 Multimedia: Space
- VSST 201 Multimedia: Performance
- VSST 203 Multimedia: Materials

Free elective 3.0

Term Credits 16.0**Term 8**

PHTO 234	Studio Photography	4.0
PROD 340	Interdisciplinary Product Design Studio	4.0
PSY 101	General Psychology I	3.0
Arts and Humanities elective		3.0
Free elective		3.0

Term Credits 17.0**Term 9**

COM 220	Qualitative Research Methods	3.0
PROD 345	Applied Human Centered Design	3.0
PSY 332	Human Factors and Cognitive Engineering	3.0
Social science elective		3.0
Free elective		3.0

Term Credits	15.0
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Term 10

ARTH 300 [WI (p. 540)]	History of Modern Design	3.0
PROD 425	Applied Design Research	3.0
PROD 460	Research Synthesis Studio	4.0
Free electives		6.0

Term Credits	16.0
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Term 11

MGMT 260	Introduction to Entrepreneurship	4.0
PROD 470	Create Build Studio	4.0
Free electives		6.0

Term Credits	14.0
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Term 12

PROD 475	Professional Practice in Product Design	3.0
PROD 480	Exhibition Studio	4.0
Free electives		6.0

Term Credits	13.0
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Total Credit: 187.0

Co-op/Career Opportunities

Product designers have careers in a wide range of industries including consumer electronics, housewares, furniture, fashion accessories, medical devices, toys, automotive and transportation. The work of product designers improves the usefulness and appearance of countless products that contribute to the quality of our work and personal lives.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Minor in Product Design

Students in this minor—through a combination of three studio courses and four applied lecture courses—learn to combine skills in creative problem solving with a visual product design process. Students develop product concepts and collaborate on the development of product ideas, including the creation and integration of new technologies, sustainability, health-care and socially responsible design, all of which are beneficial for design professionals.

The minor is specifically created to offer students a unique multi-disciplinary studio experience. Students will develop skills in the rapid visualization of ideas, creative problem solving, transformative design thinking and an understanding of the product development process in a collaborative setting. This minor is offered to all students having an interest in developing product ideas, including students from the College of Engineering, the LeBow College of Business, and the School of Biomedical Engineering as well as College of Media Arts and Design students who would like to add a product focus to their design degree.

Academic requirements

To be eligible for the minor in product design, a student must have completed a minimum of 30.0 undergraduate credits, have declared a major, and have a minimum GPA of 2.7. No pre-requisite courses are required. Students may be encouraged to augment or prepare for this minor. Only upon review by the faculty advisor for the minor will students with design credits from other institutions or departments be allowed to apply these to the requirements.

Required courses

PROD 101	History and Analysis of Product Design	3.0
PROD 205	Applied Making I	3.0
PROD 210	Introduction to Product Design	3.0
PROD 215	Design Thinking in Product Design	4.0
PROD 230	Product Design Process Studio	4.0
PROD 235	Applied Design Visualization	3.0
PROD 340	Interdisciplinary Product Design Studio	4.0

Total Credits	24.0
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Fashion, Product Design & Merchandising Faculty

Kristen Ainscoe, BS (*Drexel University*). Assistant Teaching Professor. Visual merchandiser; merchandise management.

Catherine Byers, MA (*American University*). Assistant Teaching Professor. Journalism; marketing and communications.

Nick Cassway, BFA (*Tyler School of Art*). Assistant Teaching Professor. Curating; experimental portraiture; computer design.

Anne C. Cecil, MA (*University of the Arts*) Program Director, *Design & Merchandising*. Teaching Professor. Web designer, product designer, merchandising and artist.

Renee Weiss Chase, MS (*Drexel University*). Professor. Fashion designer; computer-aided design systems for the fashion curriculum.

Anita Dennis, AST (*Art Institute of Philadelphia*) *Fashion Laboratory Technician*. Assistant Teaching Professor. Fashion designer and technician; construction skills.

Genevieve Dion, MFA (*University of the Arts*). Assistant Professor. Industrial designer, wearable artist, new materials technology research.

Michael Glaser, MFA (*Ohio State University*) Program Director for *Product Design*. Assistant Professor. Quantifying the designer's intuition; the interplay between digital and physical forms; human desire to shape our surroundings.

Cynthia Golebuski, MS (*Drexel University*) Associate Program Director, *Fashion Design*. Assistant Teaching Professor. Fashion designer, illustrator, computer aided design.

Roberta Hochberger Gruber, MS (*Drexel University*) *Head of the Fashion and Product Design & Merchandising Department*. Associate Professor. Fashion designer and illustrator; wearable artist, merchandiser, special events.

Joseph H. Hancock, II, PhD (*Ohio State University*). Associate Professor. Apparel merchandising, textiles and clothing, culture and marketing strategies.

Lisa L. Hayes, BFA (*Syracuse University*) Program Director, *Fashion Design*. Associate Professor. Fashion designer, product designer, pattern design.

Jan Marshall, BA (*Long Island University*). Assistant Teaching Professor. Fashion designer, knitwear, product development, fashion analysis.

Kathi Martin, MSIS (*Drexel University*) Associate Director of the Graduate Program in *Fashion Design*. Associate Professor. Fashion and textile designer; textile artist; computer-aided design, best practices online databases and graphic interfaces for fashion and historic costume, virtual characters for fashion design.

Alphonso McClendon, MS (*Drexel University*). Assistant Professor. Fashion designer, textile designer, computer aided design.

Beth Phillips, MS (*Georgetown University*). Associate Teaching Professor. Business and international marketing, linguist, analysis of products.

Juanita Phillips, BS (*Drexel University*). Assistant Teaching Professor. Fashion designer and educator.

Clare Sauro, MA (*Fashion Institute of Technology*) Curator of the *Drexel Historic Costume Collection*. Assistant Teaching Professor. Museum studies: costume and textiles.

Screenwriting and Playwriting

Major: Screenwriting and Playwriting

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 182.0

Classification of Instructional Programs (CIP) code: 50.0504

Standard Occupational Classification (SOC) code: 27-3043

About the Program

The Westphal College Screenwriting & Playwriting program is designed to guide and prepare students for a writing career for the stage or screen. The program emphasizes both the principles of dramatic writing and a practical hands-on approach to instruction. Graduates are armed with the skills, experience, and confidence to gain an edge in a growing and competitive field.

Students in the Screenwriting & Playwriting program begin the lifelong process of accumulating a writer's capital: the ideas, understandings, facts, and methods of perception, as well as the technical knowledge, needed to write compellingly for performance. Students learn to create scripts that meet industry standards for theater, feature film and television as well as acquire hands-on experience in the techniques of stage and filmed production. Graduates of this program are prepared to pursue careers in any of numerous fields that require dramatic writing or to enter one of the highly competitive graduate programs in the field.

For more information about this major, visit the College's Screenwriting & Playwriting (<http://www.drexel.edu/westphal/undergraduate/SCRP>) page.

Degree Requirements

General education requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
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ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 119	Mathematical Foundations for Design	4.0
UNIV A101	The Drexel Experience	2.0
Arts and Humanities electives (excluding ENGL courses)		9.0
Natural science electives		8.0
Social science electives		9.0
Electives		31.0

Visual Studies Requirements

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
DIGM 220	Digital Still Imaging I	3.0
MUSC 130	Introduction to Music	3.0
VSST 108	Design I for Media	3.0

Screenwriting and Playwriting Requirements

Literature requirements

ENGL 315 [WI (p. 543)]	Shakespeare	3.0
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Select one of the following Western Literature survey courses: 3.0

ENGL 200 [WI (p. 543)] Classical to Medieval Literature

ENGL 201 Renaissance to the Enlightenment

ENGL 202 [WI (p. 543)] Romanticism to Modernism

Select one of the following Non-Western Literature survey courses: 3.0

ENGL 203 [WI (p. 543)] Post-Colonial Literature I

or ENGL 204 Post-Colonial Literature II

Literature (ENGL) electives 6.0

Cinema studies/Theatre studies requirements

ENGL 216 [WI (p. 543)]	Readings in Drama	3.0
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THTR 121 [WI (p. 543)]	Dramatic Analysis	3.0
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FMST 101	Film History I: Emergence	3.0
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FMST 102	Film History II: New Waves	3.0
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Theatre (THTR) choice elective (any advanced acting, directing or production course) 3.0

Cinema studies (FMST Film Studies or TVST Television Studies) elective 3.0

Methods requirements

FMVD 110	Basic Shooting and Lighting	3.0
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FMVD 115	Basic Editing	3.0
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FMVD 120	Basic Sound	3.0
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THTR 210	Acting: Fundamentals	3.0
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THTR 211	Acting: Scene Study	2.0
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THTR 240	Theatre Production I	3.0
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THTR 320	Play Direction	3.0
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Writing requirements

SCRP 220	Playwriting I	3.0
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SCRP 225	Playwriting II	3.0
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SCRP 270 [WI (p. 543)]	Screenwriting I	3.0
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SCRP 275 [WI (p. 543)]	Screenwriting II	3.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
SCRP 280 [WI (p. 543)]	Writing the Short Film	3.0	MUSC 130	Introduction to Music	3.0
SCRP 310	Literature for Screenwriters	3.0	SCRP 225	Playwriting II	3.0
SCRP 370	Screenplay Story Development	3.0	UNIV A101	The Drexel Experience	1.0
SCRP 495	Senior Project in Dramatic Writing I	3.0	Natural science elective		4.0
SCRP 496	Senior Project in Dramatic Writing II	3.0		Term Credits	17.0
SCRP 497	Senior Project in Dramatic Writing III	3.0	Term 3		
WRIT 225 [WI (p. 543)]	Creative Writing	3.0	ARTH 103	History of Art: Early to Late Modern	3.0
Writing Choice: select one of the following courses:		3.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
COM 260 [WI (p. 543)]	Fundamentals of Journalism		FMVD 110	Basic Shooting and Lighting	3.0
COM 280	Public Relations Principles and Theory		MATH 119	Mathematical Foundations for Design	4.0
WRIT 220 [WI (p. 543)]	Creative Nonfiction Writing		VSST 108	Design I for Media	3.0
Select one of the following two-course sequences:		6.0		Term Credits	16.0
SCRP 382	Playwriting Workshop I		Term 4		
& SCRP 383	and Playwriting Workshop II		FMVD 115	Basic Editing	3.0
SCRP 380	Screenwriting Workshop I		SCRP	Screenwriting I	3.0
& SCRP 381	and Screenwriting Workshop II		270 [WI (p. 543)]		
Total Credits		182.0	ENGL 204	Post-Colonial Literature II	3.0
			or 203 [WI (p. 543)]	Post-Colonial Literature I	
CONCENTRATION OPTIONS			Literature (ENGL) elective		3.0
Concentration in Writing Comics & Graphic Novels			Free elective		3.0
SCRP 260	Writing Comics	3.0		Term Credits	15.0
SCRP 263	Comic Book Editing	3.0	Term 5		
SCRP 266	Graphic Novel Art and Industry	3.0	COOP 101	Career Management and Professional Development	0.0
SCRP 384	Comic/Graphic Novel Writing Workshop I	3.0	ENGL	Readings in Drama	3.0
SCRP 385	Comic/Graphic Novel Writing Workshop II	3.0	216 [WI (p. 543)]		
Concentration in Narrative Game Writing			FMST 102	Film History II: New Waves	3.0
GMAP 260	Overview of Computer Gaming	3.0	SCRP	Screenwriting II	3.0
SCRP 290	Game: Universe & Story	3.0	275 [WI (p. 543)]		
SCRP 295	Future of Narrative Games	3.0	THTR 210	Acting: Fundamentals	3.0
SCRP 377	Game Writing Workshop I	3.0		Term Credits	12.0
SCRP 378	Game Writing Workshop II	3.0	Term 6		
			FMVD 120	Basic Sound	3.0
Sample Plan of Study			SCRP 370	Screenplay Story Development	3.0
Term 1			THTR 211	Acting: Scene Study	2.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	Western literature survey course *		3.0
FMST 101	Film History I: Emergence	3.0	Natural Science elective		4.0
SCRP 220	Playwriting I	3.0		Term Credits	15.0
THTR	Dramatic Analysis	3.0	Term 7		
121 [WI (p. 543)]			DIGM 220	Digital Still Imaging I	3.0
UNIV A101	The Drexel Experience	1.0	SCRP	Writing the Short Film	3.0
			280 [WI (p. 543)]		
Term Credits		13.0	SCRP 310	Literature for Screenwriters	3.0
Term 2			Film Studies/Television Studies elective *		3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0	Free elective		3.0
				Term Credits	15.0

Term 8			ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 315 [WI (p. 543)]	Shakespeare	3.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
THTR 240	Theatre Production I	3.0	MUSC 130	Introduction to Music	3.0
THTR 320	Play Direction	3.0	SCRP 225	Playwriting II	3.0
SCRP 382 or 380	Playwriting Workshop I Screenwriting Workshop I	3.0	UNIV 101	The Drexel Experience	1.0
Arts and Humanities elective (excluding ENGL courses)		3.0	Natural Science elective		4.0
Free elective		3.0			
	Term Credits	18.0		Term Credits	17.0
Term 9			Term 3		
SCRP 383 or 381	Playwriting Workshop II Screenwriting Workshop II	3.0	ARTH 103	History of Art: Early to Late Modern	3.0
Writing choice		3.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Arts and Humanities elective (excluding ENGL courses)		3.0	FMVD 110	Basic Shooting and Lighting	3.0
Literature (ENGL) elective		3.0	MATH 119	Mathematical Foundations for Design	4.0
Social science elective		3.0	VSST 108	Design I for Media	3.0
	Term Credits	15.0		Term Credits	16.0
Term 10			Term 4		
SCRP 495	Senior Project in Dramatic Writing I	3.0	ENGL 203 [WI (p. 543)]	Post-Colonial Literature I (or)	3.0
WRIT 225 [WI (p. 543)]	Creative Writing	3.0	ENGL 204	Post-Colonial Literature II	
Free elective		3.0	FMVD 115	Basic Editing	3.0
Social science elective		3.0	SCRP 270 [WI (p. 543)]	Screenwriting I	3.0
Arts and Humanities elective (excluding ENGL courses)		3.0	Literature (ENGL) elective		3.0
	Term Credits	15.0	Free elective		3.0
Term 11				Term Credits	15.0
SCRP 496	Senior Project in Dramatic Writing II	3.0	Term 5		
Free electives		6.0	COOP 101	Career Management and Professional Development	0.0
Theatre elective*		3.0	ENGL 216 [WI (p. 543)]	Readings in Drama	3.0
Social science elective		3.0	FMST 102	Film History II: New Waves	3.0
	Term Credits	15.0	SCRP 260	Writing Comics	3.0
Term 12			SCRP 275 [WI (p. 543)]	Screenwriting II	3.0
SCRP 497	Senior Project in Dramatic Writing III	3.0	THTR 210	Acting: Fundamentals	3.0
Free electives		13.0		Term Credits	15.0
	Term Credits	16.0	Term 6		
Total Credit: 182.0			ENGL 200 [WI (p. 543)]	Classical to Medieval Literature (or)	3.0
			ENGL 201	Renaissance to the Enlightenment	
			ENGL 202 [WI (p. 543)]	Romanticism to Modernism	
			FMVD 120	Basic Sound	3.0
			SCRP 263	Comic Book Editing	3.0
			SCRP 370	Screenplay Story Development	3.0
			THTR 211	Acting: Scene Study	2.0
			Natural Science elective		4.0
				Term Credits	18.0
Term 1		Credits			
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0			
FMST 101	Film History I: Emergence	3.0			
SCRP 220	Playwriting I	3.0			
THTR 121 [WI (p. 543)]	Dramatic Analysis	3.0			
UNIV A101	The Drexel Experience	1.0			
	Term Credits	13.0			
Term 2					

* See degree requirements.

Writing Comics and Graphic Novels Concentration

Term 7			THTR	Dramatic Analysis	3.0
DIGM 220	Digital Still Imaging I	3.0	121 [WI		
SCRP	Writing the Short Film	3.0	(p. 543)]		
280 [WI			UNIV A101	The Drexel Experience	1.0
(p. 543)]					
SCRP 310	Literature for Screenwriters	3.0			
FMST or TVST elective		3.0			
Free elective		3.0			
	Term Credits	15.0			
Term 8			Term 2		
ENGL	Shakespeare	3.0	ARTH 102	History of Art II: High Renaissance to Modern	3.0
315 [WI			ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
(p. 543)]			MUSC 130	Introduction to Music	3.0
SCRP 384	Comic/Graphic Novel Writing Workshop I	3.0	SCRP 225	Playwriting II	3.0
THTR 240	Theatre Production I	3.0	UNIV 101	The Drexel Experience	1.0
THTR 320	Play Direction	3.0	Natural Science elective		4.0
Arts and Humanities elective		3.0			
	Term Credits	15.0			
Term 9			Term 3		
SCRP 385	Comic/Graphic Novel Writing Workshop II	3.0	ARTH 103	History of Art: Early to Late Modern	3.0
Arts and Humanities elective		3.0	ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Literature (ENGL) elective		3.0	FMVD 110	Basic Shooting and Lighting	3.0
Social Science elective		3.0	MATH 119	Mathematical Foundations for Design	4.0
Writing elective		3.0	VSST 108	Design I for Media	3.0
	Term Credits	15.0			
Term 10			Term 4		
SCRP 266	Graphic Novel Art and Industry	3.0	ENGL	Post-Colonial Literature I (or)	3.0
SCRP 495	Senior Project in Dramatic Writing I	3.0	203 [WI		
WRIT 225 [WI	Creative Writing	3.0	(p. 543)]		
(p. 543)]			ENGL 204	Post-Colonial Literature II	
Arts and Humanities elective		3.0	FMVD 115	Basic Editing	3.0
Social Science elective		3.0	GMAP 260	Overview of Computer Gaming	3.0
	Term Credits	15.0	SCRP	Screenwriting I	3.0
Term 11			270 [WI		
SCRP 496	Senior Project in Dramatic Writing II	3.0	(p. 543)]		
Free elective		3.0	Literature (ENGL) elective		3.0
Social Science elective		3.0			
THTR elective		3.0			
	Term Credits	12.0	Term 5		
Term 12			COOP 101	Career Management and Professional Development	0.0
SCRP 497	Senior Project in Dramatic Writing III	3.0	ENGL	Readings in Drama	3.0
Free electives		13.0	216 [WI		
	Term Credits	16.0	(p. 543)]		
Total Credit: 182.0			FMST 102	Film History II: New Waves	3.0
Writing Narrative Games Concentration			SCRP	Screenwriting II	3.0
Term 1		Credits	275 [WI		
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0	(p. 543)]		
FMST 101	Film History I: Emergence	3.0	SCRP 290	Game: Universe Story	3.0
SCRP 220	Playwriting I	3.0	THTR 210	Acting: Fundamentals	3.0
			Term Credits	15.0	
			Term 6		
			ENGL	Classical to Medieval Literature (or)	3.0
			200 [WI		
			(p. 543)]		
			ENGL 201	Renaissance to the Enlightenment	
			ENGL	Romanticism to Modernism	
			202 [WI		
			(p. 543)]		

FMVD 120	Basic Sound	3.0
SCRP 295	Future of Narrative Games	3.0
SCRP 370	Screenplay Story Development	3.0
THTR 211	Acting: Scene Study	2.0
Natural Science elective		4.0

Term Credits 18.0

Term 7

DIGM 220	Digital Still Imaging I	3.0
SCRP 280 [WI (p. 543)]	Writing the Short Film	3.0
SCRP 310	Literature for Screenwriters	3.0
FMST elective		3.0
TVST elective		3.0
Free elective		3.0

Term Credits 18.0

Term 8

ENGL 315 [WI (p. 543)]	Shakespeare	3.0
SCRP 377	Game Writing Workshop I	3.0
THTR 240	Theatre Production I	3.0
THTR 320	Play Direction	3.0
Arts and Humanities elective		3.0

Term Credits 15.0

Term 9

SCRP 378	Game Writing Workshop II	3.0
Arts and Humanities elective		3.0
Literature (ENGL) elective		3.0
Social Science elective		3.0
Writing elective		3.0

Term Credits 15.0

Term 10

SCRP 495	Senior Project in Dramatic Writing I	3.0
WRIT 225 [WI (p. 543)]	Creative Writing	3.0
Arts and Humanities elective		3.0
Social Science elective		3.0

Term Credits 12.0

Term 11

SCRP 496	Senior Project in Dramatic Writing II	3.0
Free elective		3.0
THTR elective		3.0
Social Science elective		3.0

Term Credits 12.0

Term 12

SCRP 497	Senior Project in Dramatic Writing III	3.0
Free electives		13.0

Term Credits 16.0

Total Credit: 182.0

Co-op/Career Opportunities

Dramatic writing is writing for production — work intended for performance on the stage or screen. These days, “screen” can mean movie, TV, or computer, and the work can be anything from full three-act stage plays to 15-second commercials.

Co-op Experiences

By working for professional writers, entertainment management companies, television stations, magazines and advertising and public relations firms, Screenwriting & Playwriting students gain valuable insights into how the entertainment industry works.

In an industry where the process of building a career often begins with a few key contacts, the co-op program gives Drexel students the chance to begin meeting people and networking.

In the Program's first few years, co-op students were placed with Disney Video Animation, several prominent Hollywood talent managers, the editor and publisher of a screenwriters' magazine, at Marvel Comics and in the production office of "Star Trek: Enterprise."

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Cinema and Television Faculty

Ian N. Abrams, BA (*Duke University*) Program Director, *Screenwriting and Playwriting Program*. Associate Professor. Movies, film, TV, screenwriting, Hollywood.

Ted Artz, BFA (*Tyler School of Art, Temple University*). Associate Professor. Digital media.

John Avarese, BS (*Drexel University*). Assistant Teaching Professor. Composer, film and video scores, mixing and sound design.

David Culver, AS (*Graham Junior College*) Manager of the *Paul F. Harron Studios/DUTV*. Associate Teaching Professor. Film and video.

David Deneen, BFA (*Philadelphia College of Art*). Associate Teaching Professor. Film & video.

Paul Diefenbach, PhD (*University of Pennsylvania*) Associate Program Director, *Game Art & Production*. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA (*Pennsylvania State University*). Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

Troy Finamore, MS (*Drexel University*) Associate Program Director, *Interactive Digital Media*. Assistant Teaching Professor. Advertising, design and interactivity.

Bruce Graham, BA (*Indiana University of Pennsylvania*). Associate Teaching Professor. Playwright.

Gerard M. Hooper, MFA (*Temple University*). Associate Teaching Professor. Film and video; European and non-western cinema.

D. B. Jones, PhD (*Stanford University*) Dean, *Pennoni Honors College*. Professor. Film and video; cinema studies.

Nick Jushchyshyn, MFA (*Academy of Art University*) Associate Program Director, *Animation and Visual Effects*. Visual effects, digital media and animation.

Matt Kaufhold, MA (*University of North Carolina*). Associate Teaching Professor. Screenwriting.

Karin P. Kelly, MFA (*New York University*) Program Director, *Film and Video*. Associate Professor. Film and video; filmmaker and author.

Yvonne D. Leach, MFA (*Temple University*) Department Head, *Cinema and Television Studies*. Associate Professor. Television studies.

David Mauriello, BA (*Lafayette College*). Assistant Professor. 3D modeling and animation.

Jocelyn Motter, MFA (*American Film Institute*). Assistant Teaching Professor. Editing.

Glen Muschio, PhD (*Temple University*). Associate Professor. Digital media, society, communication.

Lise Raven, MFA (*New York University*). Assistant Professor. Filmmaker.

Philip W. Salas, BS (*Temple University*). Assistant Teaching Professor. Utilization of advanced set top box data to measure fragmented viewing behavior. Impact of new television distribution technologies on traditional broadcasters and multichannel program providers.

David A. Schwartz, BA (*Rider University*). Associate Teaching Professor. Steadicam operator; cameraman.

Andrew Susskind, BA (*Harvard University*) Program Director of *TV Production & Media Management*. Associate Teaching Professor. Independent television producer and director.

Albert S. Tedesco, MA (*University of Pennsylvania*) Director of the *Paul F. Harron Graduate Program in Television Management*. Associate Teaching Professor. Impact of digital media on broadcast television; broadcasters' response to the challenge of new media; management of publicly and privately held communications companies.

Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor. Digital media, interactive multimedia.

Christine Vachon Visiting Professor. Independent film production.

Michael Wagner, PhD (*Vienna University of Technology*) Program Director, *Digital Media*. Associate Professor. Educational use of digital media and computer games.

Gregory S. Wolmart, MFA (*University of Pennsylvania*). Assistant Professor. Cinema studies; film history.

Jichen Zhu, PhD (*Georgia Institute of Technology*). Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Interdepartmental Faculty

Lawrence Epstein, MBA (*Cornell University*) Interim Department Head, *Arts & Entertainment Enterprise*. Associate Teaching Professor.

TV Production & Media Management

Major: TV Production and Media Management

Degree Awarded: Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 189.0

Classification of Instructional Programs (CIP) code: 10.0202

Standard Occupational Classification (SOC) code: 27-2012

About the Program

The TV Production and Media Management program educates students to conceive, produce, and market entertainment and information through current and evolving television platforms. The program addresses the creative aspects, the craft, and the business of producing fictional and nonfictional content, and prepares students to work in all distribution formats.

The TV Production and Media Management program combines the resources of DUTV, Drexel's fully-equipped, high-definition television station, with a comprehensive academic program to provide students with foundational experiences in the development, writing, production, editing, programming, multi-platform distribution, management, and promotion of television content.

The major offers a course of study of 189.0 credits with tracks in Comedy & Drama Production, New & Non-Fiction Production, and Industry & Enterprise. Students are taught by and work with a faculty of notable industry professionals whose experience, passion, and contacts help prepare them to enter and navigate the competitive world of television.

The major is designed as a four year, co-op program. For more information about this major, visit the College's TV Production and Media Management (<http://www.drexel.edu/westphal/academics/undergraduate/television>) page.

Degree Requirements

All TV Production & Media Management majors take the same core courses for the first five terms (through the winter term of their sophomore year). These core courses encompass production fundamentals, digital media fundamentals, an introduction to television industry and enterprise, and beginning screenwriting. Finally, there is an introductory TV studio course, TV field course, and television studies course. The core requirements build a foundation for further advanced and specialized courses, taught in the student's area of concentration.

By the spring term their sophomore year, students select one of the following concentrations:

- **TV Comedy & Drama:** Students who choose this track gain an education in fictional programming. They will further hone their production skills in lighting and editing; they will be introduced to acting so they can better understand directing actors.
- **TV Industry & Enterprise:** Students choosing this track gain an education in the business of television, completing three courses in the LeBow College of Business: business law, entrepreneurship, and marketing. They learn about the financial aspects of television and are introduced to managing the IT area as it relates to television.
- **TV News & Non-Fiction Production:** Students who choose this track gain an education in documentary, news and nonfiction programming. They will hone their production skills in lighting and editing; they will

learn how to direct TV studio programs and remote programs using multiple cameras.

Degree Requirements

Written Analysis and Communication Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0

Mathematics and Natural Sciences Requirements

MATH 101	Introduction to Analysis I	4.0
or MATH 119	Mathematical Foundations for Design	
Two natural science electives		6.0-8.0

Arts/Humanities Requirements

HIST 203	United States History since 1900	3.0
or HIST 268	Twentieth Century World II	
English (ENGL) elective		3.0
Arts and Humanities elective		3.0

Social Science Requirements

ECON 201	Principles of Microeconomics	4.0
ECON 202	Principles of Macroeconomics	4.0
Social Science elective		3.0-4.0

University Seminar Requirements

Co-op 101: Career Management/Professional Development		0.0
CIVC 101	Introduction to Civic Engagement	1.0
UNIV A101	The Drexel Experience	2.0
Free electives		24.0

Visual Studies Requirements

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
DIGM 220	Digital Still Imaging I	3.0
VSST 108	Design I for Media	3.0
VSST 109	Design II for Media	3.0

Communications Requirements

COM 150	Mass Media and Society	3.0
COM 230	Techniques of Speaking	3.0

Television Core Requirements

DIGM 100	Digital Design Tools	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 115	Basic Editing	3.0
FMVD 120	Basic Sound	3.0
SCRP 270 [WI (p. 548)]	Screenwriting I	3.0
TVIE 180	TV Industry Overview	3.0
TVIE 280	Research, Sales and Programming	3.0
TVIE 285	Media Law and Ethics	3.0
TVIE 480	TV Professions and Business	3.0
TVPR 100	TV Studio: Basic Operations	3.0
TVPR 212	TV Commercials and Promos	3.0
TVST 260	History of Television	3.0
WBDV 240	Web Authoring I	3.0
Select three of the following:		9.0

Students select any three DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST courses.

Concentration Requirements 51.0

Total Credits 189.0

TV Comedy & Drama Production Concentration Requirements

FMVD 200	Acting for the Screen	3.0
FMVD 202	Directing for the Screen	3.0
FMVD 215	Narrative Video Production	3.0
FMVD 235	Intermediate Lighting	3.0
FMVD 237	Intermediate Editing	3.0
TVPR 200	TV Studio: Live Directing	3.0
TVPR 230	Scripted TV Production	3.0
TVPR 240	Producing for Television	3.0
TVPR 315	Episodic Webisode Production	3.0
TVPR 495	Senior Project: TV Production I	3.0
TVPR 496	Senior Project: TV Production II	3.0
TVPR 497	Senior Project: TV Production III	3.0
SCRIP 241	Writing TV Comedy	3.0
or SCRIP 242	Writing TV Drama	
TVPR 201	TV Studio: Comedy	3.0
or TVPR 202	TV Studio: Drama	
TVPR 351	TV Comedy Series I	3.0
or TVPR 354	TV Drama Series I	
TVPR 352	TV Comedy Series II	3.0
or TVPR 355	TV Drama Series II	
TVST 361	Art of TV Comedy	3.0
or TVST 362	Art of TV Drama	

Total Credits 51.0

TV Industry & Enterprise Concentration Requirements

BLAW 201	Business Law I	4.0
EAM 365	Media and Entertainment Business	3.0
EAM 211	Strategic Management for Entertainment and Arts Management	3.0
EAM 391 [WI (p. 548)]	Promotion, Press and Publicity	3.0
MGMT 260	Introduction to Entrepreneurship	4.0
MKTG 301	Introduction to Marketing Management	4.0
TVIE 290	Introduction to Money and the Media	3.0
TVIE 495	Senior Project: TV Enterprise I	3.0
TVIE 496	Senior Project: TV Enterprise II	3.0
TVIE 497	Senior Project: TV Enterprise III	3.0
TVIT 270	Digital Content Delivery	3.0
TVST 261	History of TV Journalism	3.0
TVST 361	Art of TV Comedy	3.0
or TVST 362	Art of TV Drama	

Practicum

Select three of the TVIE practicum courses:		9.0
TVIE 390	Practicum: Promotions (example)	
TVIE 391	Practicum: Programming (example)	

TVIE 392	Practicum: New Media Management (example)	
Total Credits		51.0
TV News & Nonfiction Production Concentration Requirements		
COM 260 [WI (p. 548)]	Fundamentals of Journalism	3.0
FMVD 210	Documentary Video Production	3.0
FMVD 235	Intermediate Lighting	3.0
FMVD 237	Intermediate Editing	3.0
TVPR 200	TV Studio: Live Directing	3.0
TVPR 205	TV Studio: Advanced Live Directing	3.0
TVPR 220	TV News Writing	3.0
TVPR 221	TV News Production	3.0
TVPR 236	Reality TV Production	3.0
TVPR 315	Episodic Webisode Production	3.0
TVPR 340	Remote TV Production	3.0
TVPR 356	DNews	3.0
TVPR 357	DNews II	3.0
TVPR 495	Senior Project: TV Production I	3.0
TVPR 496	Senior Project: TV Production II	3.0
TVPR 497	Senior Project: TV Production III	3.0
TVST 261	History of TV Journalism	3.0
Total Credits		51.0

Sample Plans of Study

TV Comedy & Drama Production

Term 1		Credits
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 120	Basic Sound	3.0
VSST 108	Design I for Media	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FMVD 115	Basic Editing	3.0
TVPR 100	TV Studio: Basic Operations	3.0
UNIV A101	The Drexel Experience	1.0
VSST 109	Design II for Media	3.0
Term Credits		16.0
Term 3		
ARTH 103	History of Art: Early to Late Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
DIGM 100	Digital Design Tools	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
TVIE 180	TV Industry Overview	3.0
Mathematics course		4.0
Term Credits		17.0

Term 4		
DIGM 220	Digital Still Imaging I	3.0
ECON 201	Principles of Microeconomics	4.0
SCRP 270 [WI (p. 548)]	Screenwriting I	3.0
TVIE 280	Research, Sales and Programming	3.0
HIST 268 or 203	Twentieth Century World II United States History since 1900	3.0
Term Credits		16.0
Term 5		
COOP 101	Career Management and Professional Development	0.0
ECON 202	Principles of Macroeconomics	4.0
TVIE 285	Media Law and Ethics	3.0
TVPR 212	TV Commercials and Promos	3.0
TVST 260	History of Television	3.0
WBDV 240	Web Authoring I	3.0
Term Credits		16.0
Term 6		
FMVD 200	Acting for the Screen	3.0
FMVD 215	Narrative Video Production	3.0
FMVD 235	Intermediate Lighting	3.0
TVPR 200	TV Studio: Live Directing	3.0
SCRP 242 or 241	Writing TV Drama Writing TV Comedy	3.0
Term Credits		15.0
Term 7		
FMVD 202	Directing for the Screen	3.0
FMVD 237	Intermediate Editing	3.0
TVPR 230	Scripted TV Production	3.0
TVPR 240	Producing for Television	3.0
TVPR 202 or 201	TV Studio: Drama TV Studio: Comedy	3.0
Term Credits		15.0
Term 8		
COM 230	Techniques of Speaking	3.0
TVPR 351 or 354	TV Comedy Series I TV Drama Series I	3.0
TVST 361 or 362	Art of TV Comedy Art of TV Drama	3.0
Natural science elective		4.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0
Term Credits		16.0
Term 9		
TVPR 315	Episodic Webisode Production	3.0
TVPR 355 or 352	TV Drama Series II TV Comedy Series II	3.0
Social science elective		4.0
Natural science elective		4.0
Arts and Humanities elective		3.0
Term Credits		17.0

Term 10

TVIE 480	TV Professions and Business	3.0
TVPR 495	Senior Project: TV Production I	3.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0
Free elective		3.0
English (ENGL) elective		3.0
Term Credits		15.0

Term 11

TVPR 496	Senior Project: TV Production II	3.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0
Free electives		9.0
Term Credits		15.0

Term 12

TVPR 497	Senior Project: TV Production III	3.0
Free electives		12.0
Term Credits		15.0

Total Credit: 189.0**TV Industry and Enterprise****Term 1**

		Credits
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 120	Basic Sound	3.0
UNIV A101	The Drexel Experience	1.0
VSST 108	Design I for Media	3.0
Term Credits		16.0

Term 2

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FMVD 115	Basic Editing	3.0
TVPR 100	TV Studio: Basic Operations	3.0
UNIV A101	The Drexel Experience	1.0
VSST 109	Design II for Media	3.0
Term Credits		16.0

Term 3

ARTH 103	History of Art: Early to Late Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
DIGM 100	Digital Design Tools	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
TVIE 180	TV Industry Overview	3.0
Mathematics course		4.0
Term Credits		17.0

Term 4

DIGM 220	Digital Still Imaging I	3.0
ECON 201	Principles of Microeconomics	4.0
SCRIP 270 [WI (p. 548)]	Screenwriting I	3.0

TVIE 280	Research, Sales and Programming	3.0
HIST 268 or 203	Twentieth Century World II United States History since 1900	3.0

Term Credits 16.0**Term 5**

COOP 101	Career Management and Professional Development	0.0
ECON 202	Principles of Macroeconomics	4.0
TVIE 285	Media Law and Ethics	3.0
TVPR 212	TV Commercials and Promos	3.0
TVST 260	History of Television	3.0
WBDV 240	Web Authoring I	3.0

Term Credits 16.0**Term 6**

EAM 211	Strategic Management for Entertainment and Arts Management	3.0
EAM 365	Media and Entertainment Business	3.0
MGMT 260	Introduction to Entrepreneurship	4.0
TVIE 290	Introduction to Money and the Media	3.0
TVST 261	History of TV Journalism	3.0

Term Credits 16.0**Term 7**

BLAW 201	Business Law I	4.0
EAM 391 [WI (p. 548)]	Promotion, Press and Publicity	3.0
TVIT 270	Digital Content Delivery	3.0
Select one of the following:		3.0
TVIE 390	Practicum: Promotions	
TVIE 392	Practicum: New Media Management	
TVIE 391	Practicum: Programming	
Social science elective		4.0

Term Credits 17.0**Term 8**

COM 230	Techniques of Speaking	3.0
Select one of the following:		3.0
TVIE 390	Practicum: Promotions	
TVIE 391	Practicum: Programming	
TVIE 392	Practicum: New Media Management	
TVST 361 or 362	Art of TV Comedy Art of TV Drama	3.0
Natural science elective		4.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0

Term Credits 16.0**Term 9**

MKTG 301	Introduction to Marketing Management	4.0
Select one of the following:		3.0
TVIE 390	Practicum: Promotions	
TVIE 392	Practicum: New Media Management	
TVIE 391	Practicum: Programming	
Arts and Humanities elective		3.0
Natural science elective		4.0

Free elective		3.0
Term Credits		17.0
Term 10		
TVIE 480	TV Professions and Business	3.0
TVIE 495	Senior Project: TV Enterprise I	3.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0
Free elective		3.0
English (ENGL) elective		3.0
Term Credits		15.0
Term 11		
TVIE 496	Senior Project: TV Enterprise II	3.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0
Free electives		9.0
Term Credits		15.0
Term 12		
TVIE 497	Senior Project: TV Enterprise III	3.0
Free electives		9.0
Term Credits		12.0
Total Credit: 189.0		

TV News and Nonfiction Production

Term 1		Credits
COM 150	Mass Media and Society	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 120	Basic Sound	3.0
UNIV A101	The Drexel Experience	1.0
VSST 108	Design I for Media	3.0
Term Credits		16.0
Term 2		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FMVD 115	Basic Editing	3.0
TVPR 100	TV Studio: Basic Operations	3.0
VSST 109	Design II for Media	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		16.0
Term 3		
ARTH 103	History of Art: Early to Late Modern	3.0
CIVC 101	Introduction to Civic Engagement	1.0
DIGM 100	Digital Design Tools	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
TVIE 180	TV Industry Overview	3.0
Mathematics course		4.0
Term Credits		17.0
Term 4		
DIGM 220	Digital Still Imaging I	3.0
ECON 201	Principles of Microeconomics	4.0

SCRIP	Screenwriting I	3.0
270 [WI (p. 548)]		
TVIE 280	Research, Sales and Programming	3.0
HIST 268 or 203	Twentieth Century World II United States History since 1900	3.0
Term Credits		16.0
Term 5		
COOP 101	Career Management and Professional Development	0.0
ECON 202	Principles of Macroeconomics	4.0
TVIE 285	Media Law and Ethics	3.0
TVPR 212	TV Commercials and Promos	3.0
TVST 260	History of Television	3.0
WBDV 240	Web Authoring I	3.0
Term Credits		16.0
Term 6		
COM 260 [WI (p. 548)]	Fundamentals of Journalism	3.0
FMVD 210	Documentary Video Production	3.0
TVPR 200	TV Studio: Live Directing	3.0
TVPR 220	TV News Writing	3.0
TVST 261	History of TV Journalism	3.0
Term Credits		15.0
Term 7		
FMVD 235	Intermediate Lighting	3.0
FMVD 237	Intermediate Editing	3.0
TVPR 205	TV Studio: Advanced Live Directing	3.0
TVPR 221	TV News Production	3.0
TVPR 236	Reality TV Production	3.0
Term Credits		15.0
Term 8		
COM 230	Techniques of Speaking	3.0
TVPR 340	Remote TV Production	3.0
TVPR 356	DNews	3.0
Natural science elective		4.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0
Term Credits		16.0
Term 9		
TVPR 315	Episodic Webisode Production	3.0
TVPR 357	DNews II	3.0
Social science elective		4.0
Natural science elective		4.0
Arts and Humanities elective		3.0
Term Credits		17.0
Term 10		
TVIE 480	TV Professions and Business	3.0
TVPR 495	Senior Project: TV Production I	3.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.		3.0
Free elective		3.0

English (ENGL) elective	3.0
Term Credits	15.0
Term 11	
TVPR 496 Senior Project: TV Production II	3.0
Any DIGM, EAM, FMVD, FMST, SCRIP, TVIE, TVIT, TVPR, or TVST course.	3.0
Free electives	9.0
Term Credits	15.0
Term 12	
TVPR 497 Senior Project: TV Production III	3.0
Free electives	12.0
Term Credits	15.0
Total Credit: 189.0	

Co-op/Career Opportunities

As the fourth largest television market and home of Comcast, one of the most rapidly expanding cable companies in the United States, Philadelphia is a major national television center. The TV Production & Media Management program takes advantage of this in numerous ways, including adjunct faculty, guest speakers, scholarship possibilities, internships, co-op experiences, and joint ventures. The major interacts with the Paul F. Harron TV Studios, which houses DUTV (<http://dutv.drexel.edu/television/Main.html>) and two television studios. Students produce projects in the TV studios as part of their course work. As for DUTV, it will provide a laboratory in which students can learn, and will also benefit from the productions that students will work on, and in some cases, produce, themselves. Drexel also offers a graduate level program in Television Management, and some students in the undergraduate major may wish to apply to the graduate program.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Television Facilities

DUTV, an educational access channel operated by Drexel University, provides a laboratory for students majoring in Television. The Paul F. Harron TV Studios houses DUTV as well as two television studios (newly renovated with a one million dollar gift to the College) providing students with workspace as well as hands-on management experience that is so essential to the program.

Film and video facilities include a shooting studio with a green screen, large and small screening rooms, a fully equipped television studio; digital editing facilities; specially outfitted multimedia rooms for all courses; digital video camcorders; 16mm film cameras, and lighting and audio equipment.

Cinema and Television Faculty

Ian N. Abrams, BA (*Duke University*) Program Director, Screenwriting and Playwriting Program. Associate Professor. Movies, film, TV, screenwriting, Hollywood.

Ted Artz, BFA (*Tyler School of Art, Temple University*). Associate Professor. Digital media.

John Avarese, BS (*Drexel University*). Assistant Teaching Professor. Composer, film and video scores, mixing and sound design.

David Culver, AS (*Graham Junior College*) Manager of the Paul F. Harron Studios/DUTV. Associate Teaching Professor. Film and video.

David Deneen, BFA (*Philadelphia College of Art*). Associate Teaching Professor. Film & video.

Paul Diefenbach, PhD (*University of Pennsylvania*) Associate Program Director, Game Art & Production. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA (*Pennsylvania State University*). Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

Troy Finamore, MS (*Drexel University*) Associate Program Director, Interactive Digital Media. Assistant Teaching Professor. Advertising, design and interactivity.

Bruce Graham, BA (*Indiana University of Pennsylvania*). Associate Teaching Professor. Playwright.

Gerard M. Hooper, MFA (*Temple University*). Associate Teaching Professor. Film and video; European and non-western cinema.

D. B. Jones, PhD (*Stanford University*) Dean, Pennoni Honors College. Professor. Film and video; cinema studies.

Nick Jushchyshyn, MFA (*Academy of Art University*) Associate Program Director, Animation and Visual Effects. Visual effects, digital media and animation.

Matt Kauffhold, MA (*University of North Carolina*). Associate Teaching Professor. Screenwriting.

Karin P. Kelly, MFA (*New York University*) Program Director, Film and Video. Associate Professor. Film and video; filmmaker and author.

Yvonne D. Leach, MFA (*Temple University*) Department Head, Cinema and Television Studies. Associate Professor. Television studies.

David Mauriello, BA (*Lafayette College*). Assistant Professor. 3D modeling and animation.

Jocelyn Motter, MFA (*American Film Institute*). Assistant Teaching Professor. Editing.

Glen Muschio, PhD (*Temple University*). Associate Professor. Digital media, society, communication.

Lise Raven, MFA (*New York University*). Assistant Professor. Filmmaker.

Philip W. Salas, BS (*Temple University*). Assistant Teaching Professor. Utilization of advanced set top box data to measure fragmented viewing behavior. Impact of new television distribution technologies on traditional broadcasters and multichannel program providers.

David A. Schwartz, BA (*Rider University*). Associate Teaching Professor. Steadicam operator; cameraman.

Andrew Susskind, BA (*Harvard University*) Program Director of TV Production & Media Management. Associate Teaching Professor. Independent television producer and director.

Albert S. Tedesco, MA (*University of Pennsylvania*) Director of the Paul F. Harron Graduate Program in Television Management. Associate Teaching Professor. Impact of digital media on broadcast television; broadcasters'

response to the challenge of new media; management of publicly and privately held communications companies.

Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor. Digital media, interactive multimedia.

Christine Vachon Visiting Professor. Independent film production.

Michael Wagner, PhD (*Vienna University of Technology*) Program Director, *Digital Media*. Associate Professor. Educational use of digital media and computer games.

Gregory S. Wolmart, MFA (*University of Pennsylvania*). Assistant Professor. Cinema studies; film history.

Jichen Zhu, PhD (*Georgia Institute of Technology*). Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Interdepartmental Faculty

Lawrence Epstein, MBA (*Cornell University*) Interim Department Head, *Arts & Entertainment Enterprise*. Associate Teaching Professor.

Interactive Digital Media

Major: *Interactive Digital Media*

Degree Awarded: *Bachelor of Science (BS)*

Calendar Type: *Quarter*

Total Credit Hours: *186.0*

Classification of Instructional Programs (CIP) code: *11.0801*

Standard Occupational Classification (SOC) code: *15-1134; 27-1014*

About the Major

We design for people, not screens. We are the evangelists of interactivity. We focus on humans and their behavior; on verbs, not nouns. We are empathetic. We care about the user experience. Great content and great design are the tip of the iceberg when it comes to interactive products that engage the mind, heart and body. We aim for design that engages and delights. We are passionate. We create digital products that promote and inspire human activity, and which adapt to individual choice and deliver personalized content. Our products and processes are agile. They can change gracefully over time and still retain their own unique identity. We are future-proof.

Here, we understand that the past is just as important as the future. We learn the core principles to define and stay ahead of the curve. We are flexible and versatile. We know that in an industry of constant change our work is never done and our education never stops. We prepare for this change by building upon a solid foundation in order to discover the trends of tomorrow. To us, work and play have the same definition. We are curious.

We believe that discoveries are made through experimentation and that magical things happen through collaboration. Desktops, laptops, mobile devices, glasses and watches are only the beginning. We know that anything that can be connected will be connected. We are adaptable. While others focus on technology, we choose to focus on creativity. We believe that design and code are inseparable. They are the tools that we use to render the intent of our imagination.

Additional Information

To find out more, visit the Westphal College's Interactive Digital Media Major (<http://www.drexel.edu/westphal/academics/undergraduate/web>) web page.

Degree Requirements

General Education Requirements

CIVC 101	Introduction to Civic Engagement	1.0
COM 230	Techniques of Speaking	3.0
COOP 101	Career Management and Professional Development	0.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
MATH 101	Introduction to Analysis I	4.0
PHYS 121	Physical Science for Design I	4.0
PHYS 122	Physical Science for Design II	4.0
UNIV A101	The Drexel Experience	2.0
Arts and humanities elective		3.0
History (HIST) elective		3.0
Literature (ENGL) elective		3.0
Social science electives		9.0
Free electives		24.0

Art and Art History Requirements

ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 300 [WI (p. 554)]	History of Modern Design	3.0
VSST 108	Design I for Media	3.0
VSST 109	Design II for Media	3.0
VSST 110	Introductory Drawing	3.0

Media and Information Science Requirements

DIGM 220	Digital Still Imaging I	3.0
FMVD 110	Basic Shooting and Lighting	3.0
FMVD 206	Audio Production and Post	3.0
IDM 211	User Interface Design I	3.0
IDM 212	User Interface Design II	3.0
IDM 231	Scripting for Interactive Digital Media I	3.0
IDM 232	Scripting for Interactive Digital Media II	3.0

Digital Media Core Requirements

ANIM 140	Computer Graphics Imagery I	3.0
ANIM 152	Multimedia Timeline Design	3.0
DIGM 100	Digital Design Tools	3.0
DIGM 105	Overview of Digital Media	3.0
DIGM 223	Creative Concept Design	3.0
DIGM 250	Professional Practices	3.0
DIGM 350 [WI (p. 554)]	Digital Storytelling	3.0
DIGM 451 [WI (p. 554)]	Explorations in New Media	3.0

DIGM 475 [WI (p. 554)]	Seminar: The Future of Digital Media	3.0
DIGM 490	Digital Media Senior Project	9.0
DIGM 491	Digital Media Senior Project Studio	3.0
GMAP 260	Overview of Computer Gaming	3.0
IDM 221	Web Design I	3.0
Interactive Digital Media Requirements		
IDM 101	History of Web Development	3.0
IDM 215	User Experience Design	3.0
IDM 222	Web Design II	3.0
IDM 240	Interactive Graphics	3.0
IDM 245	Web Game Design	3.0
IDM 250	Content Management Systems	3.0
IDM 361	Interactive App Design I	3.0
IDM 371	Interactive Digital Media Workshop I	3.0
IDM 372	Interactive Digital Media Workshop II	3.0
Select two of the following:		6.0
IDM 362	Interactive App Design II	
IDM 380	Special Topics in Interactive Digital Media	
IDM 381	Experimental Interactive Technologies	
IDM 399	Independent Project in Interactive Digital Media	
Total Credits		186.0

Sample Plan of Study

		Credits
Term 1		
DIGM 100	Digital Design Tools	3.0
DIGM 105	Overview of Digital Media	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
PHYS 121	Physical Science for Design I	4.0
UNIV A101	The Drexel Experience	1.0
VSST 110	Introductory Drawing	3.0
Term Credits		17.0
Term 2		
ANIM 140	Computer Graphics Imagery I	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
FMVD 110	Basic Shooting and Lighting	3.0
PHYS 122	Physical Science for Design II	4.0
UNIV A101	The Drexel Experience	1.0
VSST 108	Design I for Media	3.0
Term Credits		17.0
Term 3		
ANIM 152	Multimedia Timeline Design	3.0
CIVC 101	Introduction to Civic Engagement	1.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
IDM 101	History of Web Development	3.0
MATH 101	Introduction to Analysis I	4.0
VSST 109	Design II for Media	3.0
Term Credits		17.0
Term 4		
DIGM 220	Digital Still Imaging I	3.0

DIGM 223	Creative Concept Design	3.0
GMAP 260	Overview of Computer Gaming	3.0
IDM 211	User Interface Design I	3.0
IDM 221	Web Design I	3.0
Term Credits		15.0
Term 5		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
IDM 212	User Interface Design II	3.0
IDM 222	Web Design II	3.0
IDM 231	Scripting for Interactive Digital Media I	3.0
Term Credits		12.0
Term 6		
ARTH 103	History of Art: Early to Late Modern	3.0
FMVD 206	Audio Production and Post	3.0
IDM 215	User Experience Design	3.0
IDM 232	Scripting for Interactive Digital Media II	3.0
IDM 240	Interactive Graphics	3.0
Term Credits		15.0
Term 7		
COM 230	Techniques of Speaking	3.0
COOP 101	Career Management and Professional Development	0.0
DIGM 250	Professional Practices	3.0
IDM 245	Web Game Design	3.0
IDM 250	Content Management Systems	3.0
Free Elective		3.0
Term Credits		15.0
Term 8		
ARTH 300 [WI (p. 554)]	History of Modern Design	3.0
DIGM 451 [WI (p. 554)]	Explorations in New Media	3.0
IDM 361	Interactive App Design I	3.0
IDM 371	Interactive Digital Media Workshop I	3.0
Arts and Humanities elective		3.0
Term Credits		15.0
Term 9		
DIGM 350 [WI (p. 554)]	Digital Storytelling	3.0
IDM 372	Interactive Digital Media Workshop II	3.0
Free elective		3.0
History (HIST) Elective		3.0
IDM Elective		3.0
Term Credits		15.0
Term 10		
DIGM 490	Digital Media Senior Project	3.0
DIGM 491	Digital Media Senior Project Studio	1.0
Free Elective		3.0
IDM Elective		3.0
Literature (ENGL) Elective		3.0

Social Science Elective		3.0
Term Credits		16.0
Term 11		
DIGM 490	Digital Media Senior Project	3.0
DIGM 491	Digital Media Senior Project Studio	1.0
Free Electives		9.0
Social Science Elective		3.0
Term Credits		16.0
Term 12		
DIGM 475 [WI (p. 554)]	Seminar: The Future of Digital Media	3.0
DIGM 490	Digital Media Senior Project	3.0
DIGM 491	Digital Media Senior Project Studio	1.0
Free electives		6.0
Social Science Elective		3.0
Term Credits		16.0
Total Credit: 186.0		

Co-op/Career Opportunities

Students who study interactive digital media can move on to careers as web designers, graphic designers, digital media designers, user research & experience specialists, multimedia artists, interactive designers, web programmers, and web user interface designers.

Co-op Experiences

Some past co-op employers of film and video students include:

- Brownstein Group
- Comcast
- Digitas Health
- eCity Interactive
- Electronic Ink
- Happy Cog

Visit the Drexel Steinbright Career Development Center (<http://drexel.edu/scdc>) web page for more detailed information on co-op and post-graduate opportunities.

Dual Accelerated Degree

The accelerated degree program enables academically qualified students to earn both their bachelor's degree and a master's degree in digital media — graduating sooner than they would in traditional programs.

Current Drexel digital media students may apply for the accelerated BS/MS degree through the Office of Graduate Studies after completing 90.0 credits, but no more than 120.0 credits. Contact the Office of Graduate Studies (<http://www.drexel.edu/graduatestudies>) for further information.

Minor in Interactive Digital Media

The Interactive Digital Media Minor requires the completion of eight courses (minimum 24 credits). The minor provides basic foundations in interactivity, including: design and development of websites and mobile applications with the opportunity for individualized tailoring according to the student's interests. It is open to all University students and is administered and advised by the Digital Media program.

Required Courses

DIGM 100	Digital Design Tools	3.0
IDM 221	Web Design I	3.0
Select six of the following:		18.0
IDM 100	Introduction to Web Development	
IDM 101	History of Web Development	
IDM 211	User Interface Design I	
IDM 212	User Interface Design II	
IDM 215	User Experience Design	
IDM 222	Web Design II	
IDM 231	Scripting for Interactive Digital Media I	
IDM 232	Scripting for Interactive Digital Media II	
IDM 240	Interactive Graphics	
IDM 245	Web Game Design	
IDM 250	Content Management Systems	
IDM 361	Interactive App Design I	
IDM 362	Interactive App Design II	
IDM 371	Interactive Digital Media Workshop I	
IDM 372	Interactive Digital Media Workshop II	
IDM 380	Special Topics in Interactive Digital Media	
IDM 381	Experimental Interactive Technologies	
INFO 110	Human-Computer Interaction I	
INFO 151	Web Systems and Services I	
INFO 152	Web Systems and Services II	

Total Credits **24.0**

Facilities

Digital media program facilities include a motion capture and green screen studio, a screening room, DSLR digital still cameras, HD video cameras and lighting equipment, triple boot PowerMac stations (Mac / Windows / Unix) with dual monitors, wacom tablets, game consoles, mobile devices, and 2 undergraduate open labs with 24/7 access.

Additionally, the program houses the RePlay Lab (<http://replay.drexel.edu/facilities.html>) in the URBN Center which is a collaborative effort between the Digital Media program and the Computer Science department (in the College of Engineering). At Drexel University, game development does not "live" in solely one department, and so mirrors the true nature of game development in commercial settings.

Cinema and Television Faculty

Ian N. Abrams, BA (*Duke University*) Program Director, Screenwriting and Playwriting Program. Associate Professor. Movies, film, TV, screenwriting, Hollywood.

Ted Artz, BFA (*Tyler School of Art, Temple University*). Associate Professor. Digital media.

John Avarese, BS (*Drexel University*). Assistant Teaching Professor. Composer, film and video scores, mixing and sound design.

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Paul Diefenbach, PhD (*University of Pennsylvania*) Associate Program Director, *Game Art & Production*. Assistant Professor. Game development, real-time rendering.

Jeremy Fernsler, BA (*Pennsylvania State University*). Assistant Teaching Professor. Digital effects artist; compositor and animator for the feature film visual effects industry.

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Bruce Graham, BA (*Indiana University of Pennsylvania*). Associate Teaching Professor. Playwright.

Gerard M. Hooper, MFA (*Temple University*). Associate Teaching Professor. Film and video; European and non-western cinema.

D. B. Jones, PhD (*Stanford University*) Dean, *Pennoni Honors College*. Professor. Film and video; cinema studies.

Nick Jushchysyn, MFA (*Academy of Art University*) Associate Program Director, *Animation and Visual Effects*. Visual effects, digital media and animation.

Matt Kaufhold, MA (*University of North Carolina*). Associate Teaching Professor. Screenwriting.

Karin P. Kelly, MFA (*New York University*) Program Director, *Film and Video*. Associate Professor. Film and video; filmmaker and author.

Yvonne D. Leach, MFA (*Temple University*) Department Head, *Cinema and Television Studies*. Associate Professor. Television studies.

David Mauriello, BA (*Lafayette College*). Assistant Professor. 3D modeling and animation.

Jocelyn Motter, MFA (*American Film Institute*). Assistant Teaching Professor. Editing.

Glen Muschio, PhD (*Temple University*). Associate Professor. Digital media, society, communication.

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Andrew Susskind, BA (*Harvard University*) Program Director of *TV Production & Media Management*. Associate Teaching Professor. Independent television producer and director.

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Jervis Thompson, BS (*Drexel University*). Associate Teaching Professor. Digital media, interactive multimedia.

Christine Vachon Visiting Professor. Independent film production.

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Gregory S. Wolmart, MFA (*University of Pennsylvania*). Assistant Professor. Cinema studies; film history.

Jichen Zhu, PhD (*Georgia Institute of Technology*). Assistant Professor. Developing humanistic and interpretive framework of computational technology, particularly artificial intelligence (AI), and constructing AI-based cultural artifacts; interactive storytelling, games and software studies.

Interdepartmental Faculty

Lawrence Epstein, MBA (*Cornell University*) Interim Department Head, *Arts & Entertainment Enterprise*. Associate Teaching Professor.

Westphal Studies Program

Major: *Westphal Studies*

Degree Awarded: *Bachelor of Science (BS)*

Calendar Type: *Quarter*

Total Credit Hours: *180.0*

Classification of Instructional Programs (CIP) code: *50.0101*

Standard Occupational Classification (SOC) code: *27-1019*

About the Program

The Westphal Studies program provides an individualized course of study initiated by a student. The student must have completed two terms of the junior year in an Antoinette Westphal College of Media Arts and Design major to be eligible for admission into this major.

A small number of students in the Antoinette Westphal College of Media Arts and Design decide that their goals lie at the periphery of the major or the intersection between several majors and would be served by more latitude than offered in the highly specified courses in their major. For these students, the Westphal Studies program major broadens future career goals and allows exploration combined with a focused exposure to a second field. It acknowledges the specialization that is characteristic of the majors in the College and the expectations of the professional fields for which our students are being prepared. Simultaneously, it recognizes the breadth and rapidly changing nature of many disciplines and permits a student who has acquired a basic working knowledge of a specific aspect of media arts and design to investigate a clearly defined alternative.

Admission to the program is limited to currently matriculated College of Media Arts and Design students who have completed the major-intensive sophomore year and experienced a co-op placement or completed their junior-year courses. The following items are required as part of the application:

- A student-generated, individualized plan of study, developed with and signed by a member of the Westphal Studies Program Advisors Committee
- A statement in writing of the student's goals in applying to the major and the rationale of how the proposed plan of study addresses those goals
- A definition of appropriate co-operative education placement if the student has not completed a six-month employment in the field of his or her major

- A letter from the student's current program director

Approval by the Westphal Studies Program Advisors Committee is required for admission to the major; it is not automatic upon request. The committee must be convinced by the validity of the applicant's reasons for applying, the proposed study plan, and accompanying documentation. Details about the application procedure may be obtained from the director of Westphal Studies Program.

Recommended Plan of Study

This program requires an individualized plan of study. Students sign off on this agreed-upon plan with the Director of the Studies of the Westphal Studies program. A student must have completed two terms of junior year in a College of Media Arts and Design major to be eligible for admission into this major.

The student, in consultation with her/his advisor and the director of the program, devises a personalized interdisciplinary study plan. The approved plan of study provides a rationale for the concentration and how the elective credits are to be used. This plan of study must be completed and approved before admission into the major.

Degree Requirements

General Education Requirements

General Education Requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV A101	The Drexel Experience	2.0
Arts and humanities electives		9.0
Mathematics and natural science electives **		12.0
Social science electives		9.0
Co-operative education ***		0.0
Total Credits		41.0

* Students taking the Architecture Part-Time Evening program do not have this requirement.

** At least one course in mathematics and one course in natural science are required.

*** Not required if prior major did not require co-operative education experience.

Other Requirements

Requirements	Hours
Unrestricted electives	max of 75.0
Professional requirements*	min of 51.0
Concentration or minor**	min of 24.0

* All professional and visual studies courses required in prior major through winter term of junior year must be successfully completed.

** Up to 9 credits of general education and professional requirements may be included in this minimum.

Art History

Major: Art History

Degree Awarded: Bachelor of Arts (BA) or Bachelor of Science (BS)

Calendar Type: Quarter

Total Credit Hours: 180.0-184.0

Classification of Instructional Programs (CIP) code: 50.0701

Standard Occupational Classification (SOC) code: 25-4011; 25-4012; 25-4013

About the Program

The history of art explores the meanings, values, and purposes of the visual arts within the historical cultures that create them. Works of fine and applied arts are understood not merely as aesthetic forms, but as expressions of the social, economic, scientific, religious, and political contexts that gave rise to them. The study of art history thus effectively serves the high purposes of a liberal education by equipping students with an understanding of world cultures and their histories from multiple disciplinary perspectives, and by encouraging the development of critical thinking, reading, and writing skills.

The art history program has a uniquely flexible curricular design in that it permits students to pursue art history as either a Bachelor of Arts or a Bachelor of Science degree. The BA degree is intended for students wishing to become professional art historians or who wish to supplement the art history curriculum with other courses leading to a specific career path. The BS degree is designed to allow students to combine the art history major with another major or to tailor the curriculum to their specific interests and aspirations. Both the BA and BS degrees require a total of 180.0-184.0 credit hours.

Bachelor of Arts

The BA degree requires 60.0 credit hours of art history, 71.0-75.0 credit hours of General Education courses, and 49.0 credit hours of Free Electives. The BA degree requires a strong component of Arts and Humanities courses in order to prepare students to enter the professional world of art historians by exposing them to critical reasoning, philosophy, anthropology, literature, world cultures, and foreign languages. The 49.0 credit hours of Free Electives can be used under faculty advisement to take additional art history courses, develop special competencies and areas of interest (e.g., race and gender studies; the histories of technology, science and philosophy; Asian or Africana studies; writing, literature, and criticism; design history; museum studies, etc.), or gain competencies in various applied or technical areas. This BA program requires two 3-month co-ops.

Bachelor of Science

The BS degree also requires 60.0 credit hours of art history, but it only requires 35.0-39.0 credit hours of General Education courses, thereby freeing up 85.0 credit hours of coursework to accommodate another major or to design a personalized curriculum. The 85.0 credit hours of free electives provided by the BS degree permits the student to simultaneously pursue a second major, one or more minors, or simply explore the life of the mind by taking courses, with faculty advisement, in diverse fields. This program does not require a co-op taken in addition to that which is required by the second major.

Another feature of the this program is that it offers two accelerated, five# year degree tracks leading to MS degrees in either Museum Leadership or Arts Administration.

Degree Requirements (BA)

General education requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
Mathematics and Natural Science		12.0-16.0
ENGL: Western Literature Elective		3.0
ENGL: Non-Western Literature Elective		3.0
Arts and Humanities		6.0
HIST 161	Themes in World Civilization I	3.0
PHIL 101	Introduction to Western Philosophy	3.0
PHIL 105	Critical Reasoning	3.0
Select one of the following:		
HIST 162	Themes in World Civilization II	3.0
or HIST 163	Themes in World Civilization III	
Foreign Language		12.0
Social Sciences		6.0
ANTH 101	Introduction to Cultural Diversity	3.0
PSCI 120	History of Political Thought	4.0
COOP 101	Career Management and Professional Development	0.0
UNIV A101	The Drexel Experience	2.0
Electives *		48.0

Art History requirements

ARCH 141	Architecture and Society I	3.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 111	Introduction to Studio Methods and Materials	3.0
ARTH 200	Principles and Methods of Art History	3.0
ARTH 300 [WI (p. 558)]	History of Modern Design	3.0
ARTH 301	Asian Art and Culture	3.0
ARTH 313	20th Century Modernism (1900-1955)	3.0
ARTH 325	Ancient Greek and Roman Art	3.0
or ARTH 327	Italian Renaissance Art	
ARTH 400	Art History Senior Thesis	3.0
ARTH 477	Art History Seminar	3.0

Art History Electives select 8 courses from the following 24.0

Design

ARTH 335 [WI (p. 558)]	History of Costume I: Preclassical to Directoire
ARTH 336 [WI (p. 558)]	History of Costume II: Directoire to World War I
ARTH 337	History of Costume: Post World War I to Present

Western Art: Ancient to Modern

ARTH 310	Early American Art
ARTH 326	Medieval Art
ARTH 328	Northern Renaissance
ARTH 329	Art of the 17th and 18th Centuries

Modern/Contemporary/Theory/Criticism

ARTH 311	Twentieth-Century American Art
ARTH 312	Early Modernism (1850-1900)
ARTH 314	Contemporary Art (1955-Present)
ARTH 315	History of African-American Art
ARTH 317	Modern Art Theory and Criticism

Asia, Africa, Latin America

ARTH 302	Art of India
ARTH 303	Art of China
ARTH 304	Art of Japan
ARTH 316	African Art

Advanced Course Work

ARTH 465 [WI (p. 558)]	Special Topics in Art History
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Architecture

ARCH 142	Architecture and Society II
ARCH 143	Architecture and Society III
ARCH 144	Architecture and Society IV
ARCH 344 [WI (p. 558)]	History of Modern Architecture I
ARCH 346 [WI (p. 558)]	History of Philadelphia Architecture
ARCH 499 [WI (p. 558)]	Special Topics in Architecture

Total Credits 180.0-184.0

Sample Plan of Study (BA)

Term 1		Credits
ANTH 101	Introduction to Cultural Diversity	3.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 111	Introduction to Studio Methods and Materials	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HIST 161	Themes in World Civilization I	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		Credits
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 200	Principles and Methods of Art History	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
HIST 162	Themes in World Civilization II	3.0
or 163	Themes in World Civilization III	
PHIL 105	Critical Reasoning	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		16.0
Term 3		Credits
ARTH 103	History of Art: Early to Late Modern	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 101	Introduction to Western Philosophy	3.0
Arts and Humanities elective		3.0
Social Science elective		3.0
Term Credits		15.0

Term 4		
COOP 101	Career Management and Professional Development	0.0
Art History elective		3.0
Foreign Language		4.0
Math		3.0-4.0
Natural Science		3.0-4.0
Term Credits		13.0-15.0
Term 5		
ENGL (Western Literature)		3.0
Foreign Language		4.0
Math		3.0-4.0
Natural Science		3.0-4.0
Term Credits		13.0-15.0
Term 6		
ARTH 325 or 327	Ancient Greek and Roman Art Italian Renaissance Art	3.0
PSCI 120	History of Political Thought	4.0
Arts and Humanities elective		3.0
ENGL (Non-Western Literature)		3.0
Foreign Language		4.0
Term Credits		17.0
Term 7		
ARTH 300 [WI (p. 558)]	History of Modern Design	3.0
Art History elective		3.0
Free electives		12.0
Term Credits		18.0
Term 8		
ARTH 313	20th Century Modernism (1900-1955)	3.0
Art History electives		6.0
Free electives		6.0
Term Credits		15.0
Term 9		
ARCH 141	Architecture and Society I	3.0
Free electives		12.0
Term Credits		15.0
Term 10		
ARTH 301	Asian Art and Culture	3.0
ARTH 477	Art History Seminar	3.0
Art History elective		3.0
Social Science elective		3.0
Term Credits		12.0
Term 11		
Art History electives		6.0
Free electives		9.0
Term Credits		15.0
Term 12		
ARTH 400	Art History Senior Thesis	3.0
Art History elective		3.0

Free electives	9.0
Term Credits	15.0

Total Credit: 180.0-184.0

Degree Requirements (BS)

General Education requirements

ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
UNIV A101	The Drexel Experience	2.0
Mathematics and Natural Science		12.0-16.0
Arts and Humanities		6.0
Social Sciences		6.0
Free Electives		85.0

Art History requirements

ARCH 141	Architecture and Society I	3.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 111	Introduction to Studio Methods and Materials	3.0
ARTH 200	Principles and Methods of Art History	3.0
ARTH 300 [WI (p. 558)]	History of Modern Design	3.0
ARTH 301	Asian Art and Culture	3.0
ARTH 313	20th Century Modernism (1900-1955)	3.0
ARTH 325	Ancient Greek and Roman Art (Or)	3.0
ARTH 327	Italian Renaissance Art	3.0
ARTH 400	Art History Senior Thesis	3.0
ARTH 477	Art History Seminar	3.0

Art History Electives: Select 8 courses from the following 24.0

Design

ARTH 335 [WI (p. 558)]	History of Costume I: Preclassical to Directoire
ARTH 336 [WI (p. 558)]	History of Costume II: Directoire to World War I
ARTH 337	History of Costume: Post World War I to Present

Western Art: Ancient to Modern

ARTH 310	Early American Art
ARTH 326	Medieval Art
ARTH 328	Northern Renaissance
ARTH 329	Art of the 17th and 18th Centuries

Modern/Contemporary/Theory/Criticism

ARTH 311	Twentieth-Century American Art
ARTH 312	Early Modernism (1850-1900)
ARTH 314	Contemporary Art (1955-Present)
ARTH 315	History of African-American Art
ARTH 317	Modern Art Theory and Criticism

Asia, Africa, Latin America

ARTH 302	Art of India
ARTH 303	Art of China
ARTH 304	Art of Japan

ARTH 316	African Art	
Advanced Course Work		
ARTH 465 [WI]	Special Topics in Art History (p. 558)]	
Architecture		
ARCH 142	Architecture and Society II	
ARCH 143	Architecture and Society III	
ARCH 144	Architecture and Society IV	
ARCH 344 [WI]	History of Modern Architecture I (p. 558)]	
ARCH 346 [WI]	History of Philadelphia Architecture (p. 558)]	
ARCH 499 [WI]	Special Topics in Architecture (p. 558)]	
Total Credits		183.0-187.0

Sample Plan of Study (BS)

	Credits
Term 1	
ARTH 101	History of Art I: Ancient to Medieval 3.0
ARTH 111	Introduction to Studio Methods and Materials 3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research 3.0
UNIV A101	The Drexel Experience 1.0
Free elective	6.0
Term Credits	16.0
Term 2	
ARTH 102	History of Art II: High Renaissance to Modern 3.0
ARTH 200	Principles and Methods of Art History 3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0
UNIV A101	The Drexel Experience 1.0
Free elective	6.0
Term Credits	16.0
Term 3	
ARTH 103	History of Art: Early to Late Modern 3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres 3.0
Arts and Humanities elective	3.0
Free elective	3.0
Social Science elective	3.0
Term Credits	15.0
Term 4	
COOP 101	Career Management and Professional Development 0.0
Art History elective	3.0
Math	3.0-4.0
Natural Science	3.0-4.0
Free elective	4.0
Term Credits	13.0-15.0
Term 5	
Math	3.0-4.0
Natural Science	3.0-4.0
Free elective	6.0
Term Credits	12.0-14.0

Term 6		
ARTH 325	Ancient Greek and Roman Art (Or)	3.0
ARTH 327	Italian Renaissance Art	
Arts and Humanities elective		3.0
Free elective		11.0
Term Credits		17.0

Term 7		
ARTH 300 [WI]	History of Modern Design (p. 558)]	3.0
Art History elective		3.0
Free elective		12.0
Term Credits		18.0

Term 8		
ARTH 313	20th Century Modernism (1900-1955)	3.0
Art History elective		6.0
Free elective		6.0
Term Credits		15.0

Term 9		
ARCH 141	Architecture and Society I	3.0
Free elective		13.0
Term Credits		16.0

Term 10		
ARTH 301	Asian Art and Culture	3.0
ARTH 477	Art History Seminar	3.0
Art History elective		3.0
Social Science elective		3.0
Term Credits		12.0

Term 11		
Art History elective		6.0
Free elective		9.0
Term Credits		15.0

Term 12		
ARTH 400	Art History Senior Thesis	3.0
Art History elective		3.0
Free elective		9.0
Term Credits		15.0

Total Credit: 180.0-184.0

Minor in Art History

The minor in art history provides a broad humanistic background not only for students planning to attend graduate and professional schools in the fields of applied, media and design arts, social and information sciences, education, business and medicine, but also for those entering a more general job market. The minor is designed to be flexible enough to appeal both to Antoinette Westphal College of Media Arts and Design majors and majors from the other colleges.

Required Courses

ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
Select five of the following: *		15.0

Art History

ARTH 300 [WI] History of Modern Design
(p. 558)]

ARTH 301 Asian Art and Culture

ARTH 302 Art of India

ARTH 303 Art of China

ARTH 304 Art of Japan

ARTH 320 Art in the Age of Technology

ARTH 335 [WI] History of Costume I: Preclassical to Directoire
(p. 558)]

ARTH 336 [WI] History of Costume II: Directoire to World War I
(p. 558)]

ARTH 337 History of Costume: Post World War I to Present

ARTH 340 Women in Art

ARTH 399 Independent Study In Art His

ARTH 465 [WI] Special Topics in Art History
(p. 558)]

ARTH 477 Art History Seminar

History of Architecture

ARCH 141 Architecture and Society I

ARCH 142 Architecture and Society II

ARCH 143 Architecture and Society III

ARCH 341 [WI] Theories of Architecture I
(p. 558)]

ARCH 342 [WI] Theories of Architecture II
(p. 558)]

ARCH 343 Theories of Architecture III

ARCH 344 [WI] History of Modern Architecture I
(p. 558)]

ARCH 345 [WI] History of Modern Architecture II
(p. 558)]

ARCH 346 [WI] History of Philadelphia Architecture
(p. 558)]

ARCH 347 [WI] Architectural Study Tour
(p. 558)]

ARCH 348 [WI] Studies in Vernacular Architecture
(p. 558)]

ARCH 399 Independent Study in Architecture

ARCH 421 [WI] Environmental Psychology and Design Theory
(p. 558)]

ARCH 441 Urban Design Seminar

ARCH 442 Urban Design Seminar II

ARCH 499 [WI] Special Topics in Architecture
(p. 558)]

History of Film

FMST 150 American Classic Cinema

FMST 250 The Documentary Tradition

FMST 255 Hitchcock

FMST 260 The Western

FMST 265 Special Topics in Cinema Studies

FMVD 335 The 16mm Film Project

History of Interior Design

INTR 200 History of Modern Architecture and Interiors

INTR 300 [WI] Visual Culture: Interiors
(p. 558)]

INTR 305 [WI] Visual Culture: Furniture
(p. 558)]

History of Graphic Design

VSCM 350 [WI] Graphic Design: 20th Century and Beyond
(p. 558)]

History of Theatre

THTR 221 [WI] Theatre History I
(p. 558)]

THTR 222 [WI] Theatre History II
(p. 558)]

History of Photography

PHTO 275 [WI] History of Photography I
(p. 558)]

PHTO 276 History of Photography II

PHTO 452 [WI] History of Contemporary Photography
(p. 558)]

Total Credits**24.0****Dual/Accelerated Degree****Art History BA/ Arts Administration MS**

This five-year, accelerated degree program leading to a Master of Science in Arts Administration, is an excellent option for the student who wishes to broaden and deepen his or her knowledge of the world's cultures and their histories and further develop his or her capacities for critical thinking, reading, and writing.

Specialized University resources, such as the Pearlstein Gallery, the Drexel Museum, and the Historic Costume Collection, are available to directly support student's studies.

Degree Requirements**General Education Requirements**

ENGL 101 Composition and Rhetoric I: Inquiry and Exploratory Research 3.0

ENGL 102 Composition and Rhetoric II: Advanced Research and Evidence-Based Writing 3.0

ENGL 103 Composition and Rhetoric III: Themes and Genres 3.0

Mathematics and Natural Science 12.0-16.0

ENGL: Western Literature Elective 3.0

ENGL: Non-Western Literative Elective 3.0

Arts and Humanities 6.0

HIST 161 Themes in World Civilization I 3.0

PHIL 101 Introduction to Western Philosophy 3.0

PHIL 105 Critical Reasoning 3.0

Select one of the following:

HIST 162 Themes in World Civilization II 3.0

or HIST 163 Themes in World Civilization III

Foreign Lanuage 12.0

Social Sciences 6.0

ANTH 101 Introduction to Cultural Diversity 3.0

PSCI 120 History of Political Thought 4.0

COOP 101 Career Management and Professional Development 0.0

UNIV A101	The Drexel Experience	2.0
Electives		48.0

Art History Requirements

ARCH 141	Architecture and Society I	3.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 111	Introduction to Studio Methods and Materials	3.0
ARTH 200	Principles and Methods of Art History	3.0
ARTH 300 [WI (p. 558)]	History of Modern Design	3.0
ARTH 301	Asian Art and Culture	3.0
ARTH 313	20th Century Modernism (1900-1955)	3.0
ARTH 325	Ancient Greek and Roman Art	3.0
or ARTH 327	Italian Renaissance Art	
ARTH 400	Art History Senior Thesis	3.0
ARTH 477	Art History Seminar	3.0
Art History Electives select 8 courses from the following:		24.0

Design

ARTH 335 [WI (p. 558)]	History of Costume I: Preclassical to Directoire	
ARTH 336 [WI (p. 558)]	History of Costume II: Directoire to World War I	
ARTH 337	History of Costume: Post World War I to Present	

Western Art: Ancient to Modern

ARTH 310	Early American Art	
ARTH 326	Medieval Art	
ARTH 328	Northern Renaissance	
ARTH 329	Art of the 17th and 18th Centuries	

Modern/Contemporary/Theory/Criticism

ARTH 311	Twentieth-Century American Art	
ARTH 312	Early Modernism (1850-1900)	
ARTH 314	Contemporary Art (1955-Present)	
ARTH 315	History of African-American Art	
ARTH 317	Modern Art Theory and Criticism	

Asia, Africa, Latin America

ARTH 302	Art of India	
ARTH 303	Art of China	
ARTH 304	Art of Japan	
ARTH 316	African Art	

Advanced Course Work

ARTH 465 [WI (p. 558)]	Special Topics in Art History	
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Architecture

ARCH 142	Architecture and Society II	
ARCH 143	Architecture and Society III	
ARCH 144	Architecture and Society IV	
ARCH 344 [WI (p. 558)]	History of Modern Architecture I	
ARCH 346 [WI (p. 558)]	History of Philadelphia Architecture	
ARCH 499 [WI (p. 558)]	Special Topics in Architecture	

Arts Administration Requirements

AADM 505	Overview Of Arts Administration	3.0
AADM 510	Writing for the Arts	3.0
AADM 610	Financial Accounting for Non-Profit Arts Organizations	3.0
AADM 620	Law and the Arts	3.0
AADM 650	Fund Development for the Arts	3.0
AADM 670	Audience Development	3.0
AADM 710	Strategic Planning and Evaluation	3.0
AADM 750	Arts Administration Seminar	3.0
AADM 751	Management Techniques In the Arts	3.0
AADM 770	Technology and the Marketing of the Arts	3.0
AADM 798	Thesis Development	1.5
AADM 799	Thesis Completion	1.5
Arts Administration Electives		12.0

Total Credits 225.0-229.0**Sample Plan of Study**

Term 1		Credits
ANTH 101	Introduction to Cultural Diversity	3.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 111	Introduction to Studio Methods and Materials	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HIST 161	Themes in World Civilization I	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 200	Principles and Methods of Art History	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
HIST 162	Themes in World Civilization II	3.0
or 163	Themes in World Civilization III	
PHIL 105	Critical Reasoning	3.0
UNIV 101	The Drexel Experience	1.0
Term Credits		16.0
Term 3		
ARTH 103	History of Art: Early to Late Modern	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 101	Introduction to Western Philosophy	3.0
Arts and Humanities elective		3.0
Social Science elective		3.0
Term Credits		15.0
Term 4		
COOP 101	Career Management and Professional Development	0.0
Art History elective		3.0
Foreign Language		4.0
Math choice		3.0-4.0
Natural Science		3.0-4.0
Term Credits		13.0-15.0
Term 5		

ENGL: Western Literature	3.0	AADM 610	Financial Accounting for Non-Profit Arts Organizations	3.0
Foreign Language	4.0	AADM 650	Fund Development for the Arts	3.0
Math Choice	3.0-4.0	AADM 670	Audience Development	3.0
Natural Science	3.0-4.0			
Term Credits	13.0-15.0	Term Credits		9.0
Term 6		Term 15		
ARTH 325 Ancient Greek and Roman Art or 327 Italian Renaissance Art	3.0	AADM 750	Arts Administration Seminar	3.0
PSCI 120 History of Political Thought	4.0	AADM 770	Technology and the Marketing of the Arts	3.0
ENGL: Non-Western Literature	3.0	AADM elective		3.0
Foreign Language	4.0	Term Credits		9.0
Arts and Humanities elective	3.0	Term 16		
Term Credits	17.0	AADM 620	Law and the Arts	3.0
Term 7		AADM 798	Thesis Development	1.5
ARTH History of Modern Design	3.0	AADM 799	Thesis Completion	1.5
300 [WI (p. 558)]		AADM elective		3.0
Art History elective	3.0	Term Credits		9.0
Free electives	12.0	Total Credit: 225.0-229.0		
Term Credits	18.0			
Term 8		Dual/Accelerated Degree		
ARTH 313 20th Century Modernism (1900-1955)	3.0	Art History BA/ Museum Leadership MS		
Art History electives	6.0	This five-year, accelerated degree program leading to a Master of Science in Museum Leadership, is an excellent option for the student who wishes to broaden and deepen his or her knowledge of the world's cultures and their histories and further develop his or her capacities for critical thinking, reading, and writing, or gain competencies in various applied or technical areas.		
Free electives	6.0	Specialized University resources, such as the Pearlstein Gallery, the Drexel Museum, and the Historic Costume Collection, are available to students wishing to pursue careers in Museum work.		
Term Credits	15.0			
Term 9		Degree Requirements		
ARCH 141 Architecture and Society I	3.0	General Education requirements		
Free electives	12.0	ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
Term Credits	15.0	ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
Term 10		ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
AADM 505 Overview Of Arts Administration	3.0	Mathematics and Natural Science		12.0-16.0
ARTH 301 Asian Art and Culture	3.0	ENGL: Western Literature Elective		3.0
ARTH 477 Art History Seminar	3.0	ENGL: Non-Western Literature Elective		3.0
Art History elective	3.0	Arts and Humanities		6.0
Social Science elective	3.0	HIST 161	Themes in World Civilization I	3.0
Term Credits	15.0	PHIL 101	Introduction to Western Philosophy	3.0
Term 11		PHIL 105	Critical Reasoning	3.0
AADM 751 Management Techniques In the Arts	3.0	Select one of the following:		
Art History elective	3.0	HIST 162	Themes in World Civilization II	3.0
Free electives	12.0	or HIST 163	Themes in World Civilization III	
Term Credits	18.0	Foreign Language		12.0
Term 12		Social Sciences		6.0
AADM 710 Strategic Planning and Evaluation	3.0	ANTH 101	Introduction to Cultural Diversity	3.0
Art History elective	3.0	PSCI 120	History of Political Thought	4.0
Free electives	9.0	COOP 101	Career Management and Professional Development	0.0
ARTH 400 Art History Senior Thesis	3.0			
Term Credits	18.0			
Term 13				
AADM 510 Writing for the Arts	3.0			
AADM electives	6.0			
Term Credits	9.0			
Term 14				

UNIV A101	The Drexel Experience	2.0
Free electives		48.0

Art History requirements

ARCH 141	Architecture and Society I	3.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 103	History of Art: Early to Late Modern	3.0
ARTH 111	Introduction to Studio Methods and Materials	3.0
ARTH 200	Principles and Methods of Art History	3.0
ARTH 300 [WI (p. 558)]	History of Modern Design	3.0
ARTH 301	Asian Art and Culture	3.0
ARTH 313	20th Century Modernism (1900-1955)	3.0
ARTH 325	Ancient Greek and Roman Art	3.0
or ARTH 327	Italian Renaissance Art	
ARTH 400	Art History Senior Thesis	3.0
ARTH 477	Art History Seminar	3.0
Art History Electives select 8 courses from the following:		24.0

Design

ARTH 335 [WI (p. 558)]	History of Costume I: Preclassical to Directoire	
ARTH 336 [WI (p. 558)]	History of Costume II: Directoire to World War I	
ARTH 337	History of Costume: Post World War I to Present	

Western Art: Ancient to Modern

ARTH 310	Early American Art	
ARTH 326	Medieval Art	
ARTH 328	Northern Renaissance	
ARTH 329	Art of the 17th and 18th Centuries	

Modern/Contemporary/Theory/Criticism

ARTH 311	Twentieth-Century American Art	
ARTH 312	Early Modernism (1850-1900)	
ARTH 314	Contemporary Art (1955-Present)	
ARTH 315	History of African-American Art	
ARTH 317	Modern Art Theory and Criticism	

Asia, Africa, Latin America

ARTH 302	Art of India	
ARTH 303	Art of China	
ARTH 304	Art of Japan	
ARTH 316	African Art	

Advanced Course Work

ARTH 465 [WI (p. 558)]	Special Topics in Art History	
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Architecture

ARCH 142	Architecture and Society II	
ARCH 143	Architecture and Society III	
ARCH 144	Architecture and Society IV	
ARCH 344 [WI (p. 558)]	History of Modern Architecture I	
ARCH 346 [WI (p. 558)]	History of Philadelphia Architecture	
ARCH 499 [WI (p. 558)]	Special Topics in Architecture	

Museum Leadership requirements

AADM 610	Financial Accounting for Non-Profit Arts Organizations	3.0
AADM 650	Fund Development for the Arts	3.0
INFO 748	Museum Informatics	3.0
MUSL 500	Museum History and Philosophy	3.0
MUSL 510	Museum Leadership	3.0
MUSL 530	Inside the Museum	3.0
MUSL 670	Museum Communications and Marketing	3.0
MUSL 710	Bricks and Mortar	3.0
MUSL 750	Museum Leadership Practicum I	3.0
MUSL 755	Museum Leadership Practicum II	3.0
MUSL electives		12.0
MUSM 500	Foundations of Informal Education in Museum Settings	3.0

Total Credits 225.0-229.0**Sample Plan of Study**

Term 1		Credits
ANTH 101	Introduction to Cultural Diversity	3.0
ARTH 101	History of Art I: Ancient to Medieval	3.0
ARTH 111	Introduction to Studio Methods and Materials	3.0
ENGL 101	Composition and Rhetoric I: Inquiry and Exploratory Research	3.0
HIST 161	Themes in World Civilization I	3.0
UNIV A101	The Drexel Experience	1.0
Term Credits		16.0
Term 2		Credits
ARTH 102	History of Art II: High Renaissance to Modern	3.0
ARTH 200	Principles and Methods of Art History	3.0
ENGL 102	Composition and Rhetoric II: Advanced Research and Evidence-Based Writing	3.0
HIST 162	Themes in World Civilization II	3.0
or 163	Themes in World Civilization III	
PHIL 105	Critical Reasoning	3.0
UNIV 101	The Drexel Experience	1.0
Term Credits		16.0
Term 3		Credits
ARTH 103	History of Art: Early to Late Modern	3.0
ENGL 103	Composition and Rhetoric III: Themes and Genres	3.0
PHIL 101	Introduction to Western Philosophy	3.0
Arts and Humanities elective		3.0
Social Science elective		3.0
Term Credits		15.0
Term 4		Credits
COOP 101	Career Management and Professional Development	0.0
Art History (ARTH) elective		3.0
Foreign Language course		4.0
Math course		3.0-4.0
Natural Science course		3.0-4.0
Term Credits		13.0-15.0
Term 5		Credits

ENGL: Western Literature	3.0
Foreign Language course	4.0
Math course	3.0-4.0
Natural Science course	3.0-4.0
Term Credits	13.0-15.0
Term 6	
ARTH 325 Ancient Greek and Roman Art or 327 Italian Renaissance Art	3.0
ENGL Non-Western Literature	3.0
PSCI 120 History of Political Thought	4.0
Foreign Language course	4.0
Arts and Humanities elective	3.0
Term Credits	17.0
Term 7	
ARTH History of Modern Design 300 [WI (p. 558)]	3.0
Art History (ARTH) elective	3.0
Free electives	12.0
Term Credits	18.0
Term 8	
ARTH 313 20th Century Modernism (1900-1955)	3.0
Art History (ARTH) electives	6.0
Free electives	6.0
Term Credits	15.0
Term 9	
ARCH 141 Architecture and Society I	3.0
Free electives	12.0
Term Credits	15.0
Term 10	
ARTH 301 Asian Art and Culture	3.0
ARTH 477 Art History Seminar	3.0
MUSL 500 Museum History and Philosophy	3.0
Art History (ARTH) elective	3.0
Social Science elective	3.0
Term Credits	15.0
Term 11	
MUSM 500 Foundations of Informal Education in Museum Settings	3.0
Art History (ARTH) electives	6.0
Free electives	9.0
Term Credits	18.0
Term 12	
ARTH 400 Art History Senior Thesis	3.0
MUSL 710 Bricks and Mortar	3.0
Art History (ARTH) elective	3.0
Free electives	9.0
Term Credits	18.0
Term 13	
MUSL 750 Museum Leadership Practicum I	3.0
Museum Leadership (MUSL) electives	6.0
Term Credits	9.0

Term 14	
AADM 650 Fund Development for the Arts	3.0
MUSL 510 Museum Leadership	3.0
MUSL 530 Inside the Museum	3.0
Term Credits	9.0
Term 15	
AADM 610 Financial Accounting for Non-Profit Arts Organizations	3.0
INFO 748 Museum Informatics	3.0
MUSL 670 Museum Communications and Marketing	3.0
Term Credits	9.0
Term 16	
MUSL 755 Museum Leadership Practicum II	3.0
Museum Leadership (MUSL) electives	6.0
Term Credits	9.0
Total Credit: 225.0-229.0	

Co-op/Career Opportunities

Co-op Opportunities

Drexel's enviable geographical location in the northeast corridor of the United States provides a distinct advantage for an art history program because of the proximity of many important Museums, galleries, and auction houses. The Philadelphia Museum of Art, Pennsylvania Academy of Fine Arts, Barnes Foundation, Rodin Museum, Institute of Contemporary Art, and the Penn Museum of Archeology and Anthropology are all local and easily accessible. The Winterthur Museum, New Museum, Guggenheim, Metropolitan Museum of Art, Sotheby's, and Christie's, are all within a reasonable distance by train, bus, or car. These institutions will offer students an abundance of opportunities for first-hand study of the histories of art, architecture, and design. Proximity to these institutions can also provide for many choice opportunities for cooperative education experiences.

Some possibilities include:

- Barnes Foundation
- Philadelphia Museum of Art
- Pennsylvania Academy of Fine Arts
- American Philosophical Society
- Moderne Gallery (Old City)
- Calderwood Gallery (Center City)
- RagoArts Auction House, Lambertville, NJ
- Twelve Gates Gallery for Contemporary South Asian Art
- Newark Museum, NJ
- Metropolitan Museum of Art
- Brooklyn Museum
- Mural Arts Program
- Asia Society NY
- Christie's NY

Career Opportunities

A major in art history can prepare students for a wide variety of careers, as well as preparation for graduate school.

Possible career paths:

- Museum Administrator
- Gallery Director
- Curator
- Museum Registrar
- Museum Educator
- Art Consultant
- Art Librarian
- Editor
- Art Law
- Artist Representative
- Non-profit and governmental organizations

As a particularly broad humanities discipline, art history serves as an outstanding pre-professional degree, providing excellent preparation for popular professions such as law and medicine.

Visit the Drexel Steinbright Career Development Center (<http://www.drexel.edu/scdc>) page for more detailed information on co-op and post-graduate opportunities.

Art & Art History Faculty

Jennifer Blazina, MFA (*Cranbrook Academy of Art, Bloomfield Hills, MI*). Assistant Professor. Coordinator of printmaking, fine arts.

Joseph F. Gregory, PhD (*SUNY at Binghamton*) Chair, Department of Art and Art History. Associate Professor. Modern art, interdisciplinary studies, art theory, contemporary photography, Northern Renaissance, Baroque, nineteenth century, and the iconography of Bruegel's religious narratives.

Lydia Hunn, MFA (*University of Pennsylvania*). Professor. Multi-media performance, sculpture, media design.

Bruce W. Pollock, M.F.A. (*Tyler School of Art, Philadelphia*) Studio Head of Painting. Assistant Professor. Abstract painting and drawing.

Sara Steinwachs, MFA (*Yale University*). Assistant Professor. Visual studies, the urban environment and nature within the man-made world.

Mark Stockton, MFA (*Syracuse University*). Assistant Professor. Drawing, painting, and design.

Blaise J. Tobia, MFA (*University of California, San Diego*) Director of the Digital Media Program. Professor. Photography, digital imaging.

William Weiss, MFA (*Yale University*). Assistant Professor. Drawing, design.

Interdepartmental Faculty

Andrew Susskind, BA (*Harvard University*) Program Director of TV Production & Media Management. Associate Teaching Professor. Independent television producer and director.

Emeritus Faculty

Dennis C. Will, MFA (*University of Wisconsin*). Professor Emeritus. Visual studies; sculpture and painting; visual language.

Minor in Digital Media

The Digital Media Minor requires the completion of eight courses (minimum 24.0 credits). The minor provides basic foundations in digital

media, including; 3D animation, game art, and interactivity with the opportunity for individualized tailoring according to the student's interests.

The Digital Media Minor is open to all University students.

Required Courses:

DIGM 100	Digital Design Tools	3.0
DIGM 105	Overview of Digital Media	3.0
ANIM 140	Computer Graphics Imagery I	3.0
GMAP 260	Overview of Computer Gaming	3.0
IDM 100	Introduction to Web Development	3.0
Select any three courses in ANIM, DIGM, GMAP or WBDV		9.0

Total Credits **24.0**

Minor in Fine Art

To be eligible for the minor in fine art, a student must have completed 30.0 undergraduate credits, have a declared major, and have a minimum GPA of 2.7. The academic credit requirements for the minor must be completed at or before the time of graduation.

Basic design pre-requisite courses are required for most visual studies courses, and some of these may have already been taken for a student's major. However, only nine credits of major-related coursework can be applied to the credits required for the minor in fine arts. Students with design credits from other schools or departments may be allowed to apply them to their pre-requisite requirements only upon review by the fine art minor faculty advisor.

Required Courses

VSST 101	Design I	4.0
or VSST 108	Design I for Media	
VSST 110	Introductory Drawing	3.0
Select a minimum of an additional 17.0 credits from the following:		17.0
VSST 102	Design II	
VSST 103	Design III	
VSST 111	Figure Drawing I	
VSST 109	Design II for Media	
VSST 112	Figure Drawing II	
VSST 201	Multimedia: Performance	
VSST 202	Multimedia: Space	
VSST 203	Multimedia: Materials	
VSST 204	Materials Exploration	
VSST 301	Painting I	
VSST 302	Painting 2	
VSST 303	Painting 3	
VSST 310	Sculpture: Metal Fabrication	
VSST 311	Sculpture I	
VSST 312	Sculpture II	
VSST 313	Sculpture III	
VSST 321	Screenprint I	
VSST 322	Printmaking I	
VSST 323	Printmaking II	
VSST 324	Advanced Printmaking	
VSST 325	Screenprint II	
VSST 399	Independent Study: Visual Studies	

VSST 465	Special Topics in Visual Studies	
PHTO 110	Photography	
PHTO 210	Intermediate Photography	
PHTO 233	Large Format Photography	
PHTO 253	Fine Black & White Printing	
Total Credits		24.0

Minor in Interdisciplinary Smart Initiatives

The Interdisciplinary Smart Initiatives Minor provides students across the University an experience of both breadth and depth through multi-disciplinary practices and learning. Students will develop skills and knowledge in the topics associated with problem solving, innovative technology, leadership and immersive participatory experiences. Skills and knowledge will be delivered through collaborative teaching and coursework, skill building, experimentation, experiential learning, and engaging research initiatives.

This minor provides the opportunities to engage in a variety of University venues and initiatives that places students on the leading edge of their chosen paths. The Interdisciplinary Smart Initiatives Minor is intended to build on experiential learning that is the foundation of a Drexel education.

Admission Requirements

The Interdisciplinary Smart Initiatives Minor is be open to all University students that meet the criteria for acceptance. Because of the nature of the minor, success is dependent upon students showing self-discipline, being highly motivated and self-reliant. All applications for the minor will be submitted to the director of the minor.

The following are the requirements that students must meet to be considered:

- **Required Essay:** Student statement of interest and desired goals
- **Required Recommendation:** Two letters of recommendation from faculty that speaks to the student's ability to be collegial and collaborative, exhibit initiative and resourcefulness and ability to work independently.

Required Courses

WEST 210	Innovative Problem Solving	4.0
WEST 310	Active Learning and Exploration	4.0
WEST 220	Multimodal Research	4.0
WEST 320	Active Engagement Projects	4.0

Electives *

Choose 9 credits from the following subject areas:

Antoinette Westphal College of Media Arts & Design		
INTR 310	Sustainability: History, Theory and Critic	
PROD 215	Design Thinking in Product Design	
College of Engineering		
CAEE 201	Introduction to Infrastructure Engineering	
CIVE 240 [WI (p. 568)]	Engineering Economic Analysis	
College of Computing & Informatics		
INFO 101	Introduction to Information Technology	
INFO 105	Introduction to Informatics	

LeBow College of Business

BUSN 103	Advanced First Year Business Seminar	
MIS 200	Management Information Systems	
MGMT 260	Introduction to Entrepreneurship	
MGMT 364	Technology Management	

College of Arts and Sciences

COM 111	Principles of Communication	
COM 317 [WI (p. 568)]	Environmental Communication	
COM 220	Qualitative Research Methods	
ENVS 260	Environmental Science and Society	
PSY 352	Environmental Psychology	
BIO 264	Ethnobotany	
SOC 341	Environmental Movements in America	

School of Biomedical Engineering, Science and Health Systems

BMES 130	Problem Solving in Biomedical Engineering	
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Total Credits **25.0**

* Other courses may be substituted with the approval of the minor director.

Minor in Jazz and African-American Music

The minor in jazz and African-American music takes advantage of Drexel faculty expertise in those areas. This minor can include course work in jazz history, African-American music, jazz theory, private study in jazz performance, and ensemble work in several ensembles devoted to jazz.

MUSC 121	Music Theory I	3.0
MUSC 125	Ear Training I	1.0
MUSC 126	Ear Training II	1.0
MUSC 196	Jazz Class Piano	2.0
MUSC 241	Private Lesson (3 terms)	6.0
MUSC 300	Improvisation	3.0
MUSC 331	World Musics	3.0
MUSC 333	Afro-American Music USA	3.0
MUSC 336	History of Jazz	3.0
Ensembles*		

Total Credits **25.0**

* 6 terms of MUSC 107 and/or MUSC 108, MUSC 112, MUSC 115

Performing Arts Faculty

Luke Abruzzo, MM (*Rutgers University, Mason Gross School of the Arts*)
Music Program Director. Assistant Teaching Professor. Music theory, electronic music, guitar.

Nicholas Anselmo, MFA (*University of California*) *Theater Program Director; Director of the Mandell Professionals in Residence Project*

(MPiRP). Associate Teaching Professor. Directing, acting, musical theater and scene study.

Scott Bacon, MS (Drexel University) *Ensemble Coordinator*. Assistant Teaching Professor. Rock music, introduction to music, piano class and private percussion instruction.

Karen Banos, BFA (University of Pennsylvania). Adjunct Instructor. Violin and viola.

Farid Barron Adjunct Instructor. Jazz piano instruction

Mark Beecher Adjunct Instructor. Percussion ensemble and instruction.

Angela Bilger, MA (Julliard School of Music). Adjunct Instructor. French horn.

Bobbi Block, MA (Villanova University). Adjunct Instructor. Theatrical improvisation.

Damon Bonetti, MFA (Florida State University). Adjunct Instructor. Acting fundamentals, scene study and play direction.

Jenna Simone Boyes, DPT (Drexel University). Adjunct Professor. Kinesiology for dance.

Perry Brisbon, MM (Temple University). Adjunct Instructor. Voice.

Wesley Broadnax, DMA (Michigan State) *Director of Concert Band and Pep Band*. Assistant Professor. An active guest conductor, clinician and adjudicator; conducted several All-State and honors bands both nationally and internationally.

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Wanda Canfield, MA (Temple University). Adjunct Instructor. Piano.

Jose-Antonio (Dom) Chacon, MFA (Temple University). Adjunct Instructor. Theater production; lighting design.

Antoinette Coward-Gilmore, MA (New York University). Adjunct Instructor. African dance, modern dance.

Peter DiMuro, MFA (Connecticut College). Associate Teaching Professor. Professional modern dancer, actor and choreographer focusing on group process driven, collaborative work. Specializes in community based projects with wide ranging social concerns.

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Clyde Evans Adjunct Assistant Professor. Director of Chosen Dance Company; hip-hop.

Ellen Gerdes, EdM (Temple University). Adjunct Instructor. Pedagogy and politics of dance in China and Taiwan; dance and cultural studies.

Miriam Giguere, PhD (Temple University) *Department Head, Performing Arts*. Associate Professor. Professional modern dancer, choreographer and dance educator whose research centers on cognition during the creative process. She has published nationally and internationally and is a frequent presenter on the integration of dance and academics at national and international conferences.

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Lucinda Lea, BA (Indiana University). Adjunct Assistant Professor. Ballet.

Marcie Mamura, MFA (University of Oregon). Adjunct Assistant Professor. Assistant Director, FreshDance.

Beth McNamara, MFA (Drexel University). Survey of Dance/Movement Therapy.

Jennifer Morley, MFA (Temple University). Assistant Teaching Professor. Master Pilates instructor and director of the Drexel Pilates Teaching Training program; modern dance, choreography.

Dawn Morningstar, MA (Drexel University). Adjunct Assistant Professor. Practicing dance/movement therapist.

Carl Paris, PhD (Temple University). Adjunct Associate Professor. Interdisciplinary approach to dance studies, cultural studies and issues around black dance and performance.

Steven Powell, DMus (Indiana University). Professor. Successful composer and the author of articles on sound synthesis and choral performance techniques. He owns his own music publishing company, does professional music engraving, is the author of music publication software, and is an expert in desktop publishing.

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Meredith Rainey Adjunct Assistant Professor. Former soloist with Pennsylvania Ballet and director of Carbon Dance Theater. Ballet, choreography.

Heather Smalley, BS (Drexel University). Adjunct Assistant Professor. Arts administration.

George L. Starks, Jr., PhD (Wesleyan). Professor. Jazz and classical saxophonist who has received recognition from Downbeat magazine, and is a nationally respected scholar and ethnomusicologist who has published on many aspects of the African-American musical tradition.

Ximena Varela, MA (Drexel University). Assistant Professor. Comparative cultural policy, linkages between changes in economic and social policy and shifts in models of organization in the arts.

Stephen Welsh, MFA (Temple University). Adjunct Assistant Professor. Choreography, modern dance.

Minor in Music

The minor in music requires 26.0 credits, including work in music theory, history, applied music (class or private lessons), and ensemble performance, and 9.0 credits of music electives.

MUSC 121	Music Theory I	3.0
MUSC 125	Ear Training I	1.0
MUSC 126	Ear Training II	1.0
MUSC 331	World Musics	3.0

MUSC 231 [WI (p. 569)]	Music History I	3.0
MUSC 232 [WI (p. 569)]	Music History II	3.0
MUSC 241	Private Lesson (Students take 3 terms)	6.0
Music electives		6.0
Ensembles (Six terms from MUSC 101 to MUSC 118)		0.0
Total Credits		26.0

Performing Arts Faculty

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Mark Beecher Adjunct Instructor. Percussion ensemble and instruction.

Angela Bilger, MA (*Julliard School of Music*). Adjunct Instructor. French horn.

Bobbi Block, MA (*Villanova University*). Adjunct Instructor. Theatrical improvisation.

Damon Bonetti, MFA (*Florida State University*). Adjunct Instructor. Acting fundamentals, scene study and play direction.

Jenna Simone Boyes, DPT (*Drexel University*). Adjunct Professor. Kinesiology for dance.

Perry Brisbon, MM (*Temple University*). Adjunct Instructor. Voice.

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Stephen Welsh, MFA (*Temple University*). Adjunct Assistant Professor. Choreography, modern dance.

Minor in Music Performance

The minor in music performance requires two years of private lessons study with our artist faculty, culminating in a recital. The Music Program will provide support for the recital venue and accompanist. Students must audition and be approved to pursue this minor.

Required Courses

MUSC 121	Music Theory I	3.0
MUSC 125	Ear Training I	1.0
MUSC 126	Ear Training II	1.0
MUSC 241	Private Lesson (5 terms)	10.0
MUSC 231 [WI (p. 571)]	Music History I	3.0
MUSC 232 [WI (p. 571)]	Music History II	3.0
MUSC 331	World Musics	3.0
MUSC 342	Applied Music-Recital Ensembles (six terms from MUSC 101 to MUSC 118))	2.0 0.0
Total Credits		26.0

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Ximena Varela, MA (*Drexel University*). Assistant Professor. Comparative cultural policy, linkages between changes in economic and social policy and shifts in models of organization in the arts.

Stephen Welsh, MFA (*Temple University*). Adjunct Assistant Professor. Choreography, modern dance.

Music Theory and Composition

The minor in music theory and composition is aimed at people who are writing their own music or who would like to begin doing so. Students will take courses in music theory, arranging, composition, and digital composition, and end with a portfolio of several completed pieces.

Requirements

MUSC 121	Music Theory I	3.0
MUSC 122	Music Theory II	3.0
MUSC 229	Modern Arranging Techniques	3.0
MUSC 125	Ear Training I	1.0
MUSC 249	Digital Music Composition	3.0
MUSC 231 [WI (p. 572)]	Music History I	3.0
MUSC 232 [WI (p. 572)]	Music History II	3.0
MUSC 252	Music Composition	3.0
MUSC 331	World Musics	3.0
MUSC 241	Private Lesson (*)	2.0
Ensembles (**)		
Total Credits		27.0

* Students are strongly encouraged to register for the section designated for composition.

** Ensembles (6 terms from MUSC 101 to MUSC 118)

Performing Arts Faculty

Luke Abruzzo, MM (*Rutgers University, Mason Gross School of the Arts*) *Music Program Director*. Assistant Teaching Professor. Music theory, electronic music, guitar.

Nicholas Anselmo, MFA (*University of California*) *Theater Program Director; Director of the Mandell Professionals in Residence Project (MPIRP)*. Associate Teaching Professor. Directing, acting, musical theater and scene study.

Scott Bacon, MS (*Drexel University*) *Ensemble Coordinator*. Assistant Teaching Professor. Rock music, introduction to music, piano class and private percussion instruction.

Karen Banos, BFA (*University of Pennsylvania*). Adjunct Instructor. Violin and viola.

Farid Barron Adjunct Instructor. Jazz piano instruction

Mark Beecher Adjunct Instructor. Percussion ensemble and instruction.

Angela Bilger, MA (*Julliard School of Music*). Adjunct Instructor. French horn.

Bobbi Block, MA (*Villanova University*). Adjunct Instructor. Theatrical improvisation.

Damon Bonetti, MFA (*Florida State University*). Adjunct Instructor. Acting fundamentals, scene study and play direction.

Jenna Simone Boyes, DPT (*Drexel University*). Adjunct Professor. Kinesiology for dance.

Perry Brisbon, MM (*Temple University*). Adjunct Instructor. Voice.

Wesley Broadnax, DMA (*Michigan State*) *Director of Concert Band and Pep Band*. Assistant Professor. An active guest conductor, clinician and adjudicator; conducted several All-State and honors bands both nationally and internationally.

Jim Bunting, BFA (*University of the Arts, Philadelphia*). Adjunct Instructor. Jazz dance.

Wanda Canfield, MA (*Temple University*). Adjunct Instructor. Piano.

Jose-Antonio (Dom) Chacon, MFA (*Temple University*). Adjunct Instructor. Theater production; lighting design.

Antoinette Coward-Gilmore, MA (*New York University*). Adjunct Instructor. African dance, modern dance.

Peter DiMuro, MFA (*Connecticut College*). Associate Teaching Professor. Professional modern dancer, actor and choreographer focusing on group process driven, collaborative work. Specializes in community based projects with wide ranging social concerns.

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Stephen Welsh, MFA (*Temple University*). Adjunct Assistant Professor. Choreography, modern dance.

Minor in Performing Arts

Designed for the student who wishes to explore the fields of dance, music and theater rather than specialize in one area, the minor in performing arts provides motivated students the opportunity to learn about all three areas while performing for two years in one or more of the department's performing groups.

Required Courses

DANC 210	Introduction to Dance	3.0
MUSC 130	Introduction to Music	3.0
Applied music (two terms selected from MUSC 241/242)		4.0
THTR 115	Theatrical Experience	3.0
Theatre Elective		3.0
Dance Elective		3.0
Performing Arts Electives		7.0
Performing Arts Practicum *		0.0
Total Credits		26.0

* Performing arts practicum (6 terms from MUSC 101 - MUSC 115, THTR 130 , and/or DANC 131 - DANC 133).

Performing Arts Faculty

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Certificate in Retail Leadership

Certificate Level: Undergraduate

Admission Requirements: High school diploma, GED, retail experience

Certificate Type: Certificate

Number of Credits of Completion: 19.0-21.0

Instructional Delivery: Online, Campus, Hybrid

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Note: Effective Fall 2014, students are no longer being accepted into this certificate program.

In the increasingly competitive world of retailing, retail managers need to gain knowledge and skills necessary to lead in this field. The Certificate in Retail Leadership develops professional leaders, introducing the concept of the product and/or corporate brand, analyzing best practices in retail, and developing appropriate strategies for success for various organizational models.

Students will also discover various stakeholders that impact a retail organization's ability to build and maintain its reputation, analyze the in-store environment to create and maintain a desired image, create strong retail positioning strategy, and develop and maintain a positive perception of the brand.

Program content combines leadership, style, trends, and strategy to focus on key areas of the retail industry including:

- Retail store management
- Retail operations and strategy
- In-store visual merchandising
- Retail store leadership

Drexel's Certificate in Retail Leadership provides a program for those working in retail interested in either enriching their undergraduate education or those without a bachelor's degree who are interested in returning to a university setting for professional development and perhaps a degree.

The program requires two core courses, and 12.0 - 14.0 credits of electives chosen from a list of courses.

Required Courses

DSMR 231	Retail Principles	3.0
DSMR 232	Retail Merchandise Planning	4.0
Select four of the following:		12.0-14.0
CAT 302	Customer Service Theory and Practice	

CRTV 301	Foundations in Creativity
MGMT 260	Introduction to Entrepreneurship
MKTG 301	Introduction to Marketing Management
PRST 212	Creative Studies in the World Wide Web
PRST 330	Career & Professional Development
RETL 315	Power of Retail Brands
RETL 325	Applied In-Store Visual Strategies
RETL 400	Retail Leadership Capstone

Total Credits 19.0-21.0

Contact Joseph H. Hancock, II at jhh33@drexel.edu for more information.

Minor in Retail

The retail minor, administered by the Design & Merchandising Program, provides basic foundations in retail operations, buying and merchandise planning and e-commerce. The curriculum allows the opportunity for individualized tailoring according to a student's interests. The minor is open to all Drexel University students, and requires the completion of eight or nine courses for a minimum of 24.0 credits.

Required Courses:

DSMR 231	Retail Principles *	3.0
DSMR 232	Retail Merchandise Planning *	4.0
DSMR 305	eTailing	3.0
DSMR 324	Retail Directions	3.0
DSMR 325	Retail Buying and Assortment Strategies	4.0
Select 2-3 courses (minimum 7.0 credits):		7.0-9.0
DSMR 205	eFashion Promotion	
DSMR 233 [WI	Retail Image Analysis (p. 575)]	
DSMR 313	International Fashion Merchandising	
DSMR 326	Fashion Product Promotion	

Total Credits 24.0-26.0

* All courses are currently open to all DSMR students. DSMR 231 and DSMR 232 are required for all students enrolled in DSMR and the retail leadership certificate. The three elective courses can be delivered during other quarters as required. All courses will be restricted to appropriately include the students enrolled in the retail minor. As the industry and curriculum change courses will be added and adapted accordingly.

Screenwriting

Minor in Screenwriting

The minor in screenwriting is intended to guide the student from the acquisition of basic screenwriting skills through the completion of a full-length feature screenplay. Fifteen of the credits are directly craft-oriented, teaching the student what she needs to know to translate her ideas into a format suitable for production; the other nine credits are dedicated to background knowledge intended to inform her creative thinking.

Film & video majors should note that they will be taking half of the courses in the screenwriting minor as part of their degree requirements, making this minor a relatively simple addition to their education.

Required courses

FMST 150	American Classic Cinema	3.0
FMST 160	European Cinema	3.0
SCRP 270 [WI	Screenwriting I (p. 575)]	3.0
SCRP 275 [WI	Screenwriting II (p. 575)]	3.0
SCRP 310	Literature for Screenwriters	3.0
SCRP 370	Screenplay Story Development	3.0
SCRP 380	Screenwriting Workshop I	3.0
SCRP 381	Screenwriting Workshop II	3.0

Total Credits 24.0

Minor in Somatics

An understanding of movement and body language has become increasingly important across many fields including Communication, Corporate Training, Movement Therapy, Education, Performance, Rehabilitation, Sport and Fitness. Physical health, clear communication and effective leadership all rely on an awareness of how we carry our bodies through our lives. The Somatics Minor provides an in-depth study of the body, building from an understanding of its functional/structural basis, to its patterns and habits. We focus on how to interpret, analyze, and articulate somatic concepts and develop strategies for application.

Admission requirements

Admission on consultation with Somatics Coordinator:

Jennifer Morley
jsm76@drexel.edu
215.895.2018

Minor Requirements

DANC 120	Yoga	3.0
DANC 180	Dance Improvisation	2.0
DANC 260	Injury Prevention for Dance	3.0
DANC 261	Foundations of Somatic Theory and Practice	3.0
DANC 262	Dance and Fitness	3.0
DANC 330	Introduction to Laban Movement Analysis	3.0
DANC 360	Dance Kinesiology	3.0
Complete two of the following courses:		4.0

DANC 140	Ballet Technique I
DANC 141	Ballet Technique II
DANC 142	Ballet Dance Technique III
DANC 150	Modern Dance Technique I
DANC 151	Modern Dance Technique II
DANC 152	Modern Dance Technique III
DANC 160	Jazz Dance Technique I
DANC 161	Jazz Dance Technique II
DANC 162	Jazz Dance Technique III
DANC 170	Hip-Hop Dance Technique I
DANC 171	Hip-Hop Dance Technique II

DANC 190	African Dance Technique I	
DANC 191	African Dance Technique II	
Total Credits		24.0

Minor in Sustainability in the Built Environment

The intent of this minor is to prepare students to engage and analyze future design challenges from a sustainability perspective. Students completing this program will be able to approach these challenges in a resourceful and insightful way, with a solid foundation of sustainability principles. The emphasis on collaboration and trans-disciplinary teamwork will allow students to serve as agile leaders in their future careers and be active participants in the critical discourse of their field.

In addition to the 15.0 credits of core courses, students select 9.0 credits of electives. The list below will be updated as new courses in sustainability become available. Students having a question about the inclusion of a course not currently listed as a possible elective should check with the coordinator for this minor.

Additional Information

For additional information about this program, visit the College's Sustainability in the Built Environment web page. Or contact the program's advisor:

Diana Nicholas
URBN Center, Suite 410
Phone: 215.571.4432
dsn35@drexel.edu

Required Courses

ARCH 315	Sustainable Built Environment I	3.0
ARCH 320	Sustainable Built Environment II	3.0
INTR 310	Sustainability: History, Theory and Critic	3.0
INTR 410	Collaborative Research in Sustainability	3.0

Arts and Sciences Course

Students must select one of the following courses from the Arts and Science College or an approved substitute with the permission of the advisor for this minor:

ANTH 360	Culture and the Environment	
ENVS 260	Environmental Science and Society	
PHIL 341	Philosophy of the Environment	
SOC/ENVP 345	Sociology of the Environment	

Additional Electives *

Students select three of the following (or alternative options with the permission of the advisor for this minor):

ANTH 360	Culture and the Environment	
ARCH 348 [WI (p. 576)]	Studies in Vernacular Architecture	
ARCH 463	Emerging Architectural Technology	
ARCH 465	Energy and Architecture	
CAEE 201	Introduction to Infrastructure Engineering	
COM 317 [WI (p. 576)]	Environmental Communication	

INTR 465/ENVP 360	Special Topics in Interior Design	
ENVS 260	Environmental Science and Society	
PHIL 341	Philosophy of the Environment	
SOC 341	Environmental Movements in America	
SOC/ENVP 345	Sociology of the Environment	
Total Credits		24.0

* The elective list will be updated as new courses in sustainability become available. If a student has questions regarding inclusion of a course not on this list, he or she should see the Advisor for the Sustainability in the Built Environment Minor Program.

Minor in Television Industry and Enterprise

Students with a 3.0 or higher G.P.A. may apply for the TV Industry & Enterprise minor program. Once accepted, they take 21.0 credits of required courses that provide a basic foundation in the historical, financial, and programming elements of the television industry. The remaining 6.0 credits of study provide students the opportunity to have more hands-on production experience and/or to delve more deeply into the academic study of a specific area of interest.

Required Courses

TVIE 180	TV Industry Overview	3.0
TVIE 280	Research, Sales and Programming	3.0
TVIE 285	Media Law and Ethics	3.0
TVIE 290	Introduction to Money and the Media	3.0
TVST 260	History of Television	3.0

One of the following courses: 3.0

TVST 261	History of TV Journalism	
TVST 361	Art of TV Comedy	
TVST 362	Art of TV Drama	

Three of the following courses: 9.0

EAM 211	Strategic Management for Entertainment and Arts Management	
EAM 365	Media and Entertainment Business	
EAM 391 [WI (p. 576)]	Promotion, Press and Publicity	
FMVD 110	Basic Shooting and Lighting	
FMVD 115	Basic Editing	
FMVD 120	Basic Sound	
SCRP 270 [WI (p. 576)]	Screenwriting I	
TVIE 365	Special Topics: TVIE	
TVPR 100	TV Studio: Basic Operations	
TVPR 200	TV Studio: Live Directing	
TVPR 201	TV Studio: Comedy	
TVPR 202	TV Studio: Drama	
TVPR 205	TV Studio: Advanced Live Directing	
TVPR 240	Producing for Television	

Total Credits **27.0**

Minor in TV Production & Media Management

Students with a 3.0 or higher G.P.A. may apply for the TV Production & Media Management minor program. Once accepted, they take 21.0 credits of required courses that provide a basic foundation in the technical, historical, and creative elements of television production. The remaining 6.0 credits of study provide students the opportunity to have more hands-on production experience and/or to delve more deeply into the academic study of a specific area of interest.

Required Courses

FMVD 110	Basic Shooting and Lighting	3.0
FMVD 115	Basic Editing	3.0
FMVD 120	Basic Sound	3.0
SCRP 270 [WI (p. 577)]	Screenwriting I	3.0
TVPR 100	TV Studio: Basic Operations	3.0
TVPR 212	TV Commercials and Promos	3.0
TVST 260	History of Television	3.0
Two of the following courses:		6.0
SCRP 241	Writing TV Comedy	
SCRP 242	Writing TV Drama	
TVPR 200	TV Studio: Live Directing	
TVPR 201	TV Studio: Comedy	
TVPR 202	TV Studio: Drama	
TVPR 205	TV Studio: Advanced Live Directing	
TVPR 220	TV News Writing	
TVPR 221	TV News Production	
TVPR 230	Scripted TV Production	
TVPR 232	TV Field: Industrials	
TVPR 236	Reality TV Production	
TVPR 240	Producing for Television	
TVPR 242	TV On-Camera Performance	
TVPR 365	Special Topics: TVPR	
TVST 361	Art of TV Comedy	
TVST 362	Art of TV Drama	
TVST 365	Special Topics: TVST	

Total Credits **27.0**

Minor in Theatre

The minor in theatre consists of two distinct, yet closely integrated components: academics and performance. The intertwining of foundation studies and practical application empowers students to discover and develop their own voice and style in their art.

Required Courses

THTR 121 [WI (p. 577)]	Dramatic Analysis	3.0
THTR 221 [WI (p. 577)]	Theatre History I	3.0
THTR 222 [WI (p. 577)]	Theatre History II	3.0
Select three of the following:		3.0

THTR 130	Introduction to Theater Production Practicum	
THTR 131	Theatre Performance Practicum	
THTR 132	Theatre Production Practicum	
Select 12 credits from the following:		12.0
THTR 110	Voice and Articulation	
THTR 115	Theatrical Experience	
THTR 116	Philadelphia Theatre Let's Go!	
THTR 131	Theatre Performance Practicum	
THTR 132	Theatre Production Practicum	
THTR 209	Improvisation for the Theatre	
THTR 210	Acting: Fundamentals	
THTR 211	Acting: Scene Study	
THTR 212	Sketch Comedy	
THTR 231	Introduction to Musical Theatre	
THTR 232	Contemporary Musical Theatre	
THTR 240	Theatre Production I	
THTR 241	Theatre Production II	
THTR 260	Production Design	
THTR 320	Play Direction	
THTR 360	Lighting Design	
THTR 380	Special Topics in Theatre	
THTR 495	Directed Studies in Theatre	

Total Credits **24.0**

Dance Studies

Professional Dance Certificate Program

Certificate Level: Undergraduate

Admission Requirements: High school diploma or GED equivalency

Certificate Type: Certificate

Number of Credits of Completion: 18.0

Instructional Delivery: Campus

Calendar Type: Quarter

Maximum Time Frame: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 50.0399

Standard Occupational Classification (SOC) Code: 27-2031

The certificate in dance studies is a 1-year option for any qualified professional dancer to assess whether they have the interest and aptitude for entering an undergraduate dance program. The certificate program has no entrance requirement beyond possession of a high school diploma or GED equivalency. All credits earned in the certificate of study in dance will be transferable into the part-time or full time BS degree in Dance (p. 490).

General Requirements

DANC 100	Survey of Dance Studies	3.0
DANC 260	Injury Prevention for Dance	3.0
DANC 201 [WI (p. 577)]	Dance Appreciation	3.0
DANC 210	Introduction to Dance	3.0
DANC 330	Introduction to Laban Movement Analysis	3.0
DANC 355	Rhythmic Study for Dance	3.0

Total Credits **18.0**

Course Descriptions

- Quarter (p. 578)
 - Graduate (<http://catalog.drexel.edu/coursedescriptions/quarter/grad>)
 - Undergraduate (p. 578)
- Semester (p. 582)
 - Graduate (<http://catalog.drexel.edu/coursedescriptions/semester/grad>)
 - Undergraduate (p. 582)

Quarter

- Graduate (<http://catalog.drexel.edu/coursedescriptions/quarter/grad>)
- Undergraduate (p. 578)

Undergraduate

Antoinette Westphal College of Media Arts Design (A)

College of Arts and Sciences (AS)

LeBow College of Business (B)

Close School of Entrepreneurship (C)

College of Computing and Informatics (CI)

Center for Civic Engagement (CV)

College of Engineering (E)

Goodwin College of Professional Studies (GC)

College of Nursing Health Professions (NH)

Pennoni Honors College (PE)

School of Public Health (PH)

School of Biomedical Engineering, Science Health Systems (R)

Center for Hospitality and Sport Management (SH)

School of Education (T)

University Courses (X)

Accounting

Advertising Design

Africana Studies

Anatomy

Animation

Anthropology

Arabic

Architectural Engineering

Architecture

Art History

Arts & Sciences-Interdisp Stud

Behavioral & Addictions Couns

Biomedical Engineering & Sci

Biomedical Engineering Tech

Bioscience & Biotechnology

Business Statistics

Cardiovascular Perfusion

Chemical Engineering

Chemical Engineering Chemistry

Chemistry

Chinese

Civic Engagement

Civil & Arch Engineering

Civil Engineering

Civil, Arch & Envr Engr

Common Exams

Communication

**Communications & Applied Tech
Complementary and Integrative
Therapies
Computer Science
Computing Technology
Computing and Informatics
Construction Management
Cooperative Education
Creativity Studies
Criminal Justice
Criminology & Justice Studies
Culinary Arts
Custom-Designed Major
Customer Operations
Dance
Design & Merchandising
Digital Media
Economics
Electrical & Computer
Engineering
Electrical & Computer
Engineering - Power Engineering
Electrical & Computer
Engineering - Computers
Electrical & Computer
Engineering - Electroph
Electrical & Computer
Engineering - Systems**

**Electrical Engineering Lab
Electrical Engineering Technology
Emergency Management
Emergency Medical Services
Engineering Management
Engineering, General
English
English as a Second Language
Entertainment & Arts Management
Entrepreneurship and Innovation
Environmental Engineering
Environmental Graphic Design
Environmental Policy
Environmental Science
Environmental Studies &
Sustainability
Fashion Design
Film & Video
Film Studies
Finance
Food Science
French
Game Art & Production
General Business
General Design Arts
General Studies**

Geography Education

Geoscience

German

Graphic Design

Greek

Health & Society

Health Sciences

Health Services Administration

Hebrew

History

Homeland Security Management

Honors Program

Hotel & Restaurant Management

Human Resource Management

Humanities, General

Industrial Engineering

Information Science & Systems

Interactive Digital Media

Interior Design

International Area Studies

International Business

International Studies

International Studies Abroad

**Invasive Cardiovascular
Technology**

Italian

Japanese

Judiac Studies

Korean

Language

Leadership

Legal Studies

Linguistics

Management

Management Information Systems

**Manufacturing Engineering
Technology**

Marketing

Materials Engineering

Mathematics

Mathematics Education

**Mechanical Engineering &
Mechanics**

**Mechanical Engineering
Technology**

Medical Billing & Coding

Military Science

Music

The Music Program at Drexel offers students of every major the opportunity to participate in numerous ensembles, take appreciation-type courses, or study music in depth. Ensembles range in their musical style and make-up. Most perform concerts several times per year and offer students high caliber performance experiences. Courses range from appreciation-type classes to in-depth advanced musical analysis and composition. Students can take one class as an elective, or complete one of our four different music minors.

Music Industry Program

University - Wide Courses

University - Wide Courses

Visual Studies

WEST Studies

Web & Motion Graphic Design

Web Development

Women's and General Studies

Women's Studies

Writing

Semester

- Graduate (<http://catalog.drexel.edu/coursedescriptions/semester/grad>)
- Undergraduate (p. 582)

Undergraduate

College of Medicine (MS)

**COM School of Biomedical Sciences
Professional Studies (QQ)**

Biochemistry

Emergency Medicine

Family Medicine

Medical Science Perparatory

Medicine

Neurology

Obstetrics & Gynecology

Office of Medical Education

Orthopedics

Otolaryngology

Pathology

Pediatrics

Pre-Medical

Psychiatry

Surgery

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