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The College of Arts and Sciences Graduate Programs

The College of Arts and Sciences

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 and the sciences in a fast-changing, challenging, and diverse world.

About the College of Arts and Sciences
The College of Arts and Sciences was established on July 1, 1990, with the merger of the College of Sciences and the College of Humanities and Social Sciences. The educational objectives of the college encompass a wide range of goals: to provide general educational courses for the University's undergraduates; to provide disciplinary 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; and to improve the quality of life for the University's community through co-curricular programming in the arts and sciences.

For additional information, visit the The College of Arts and Sciences web site.

The English Language Center

As part of the College of Arts and Sciences, Drexel's English Language Center offers an intensive English program throughout the year. Besides classes in academic skills such as essay writing and oral presentations, the center offers courses in business English, English for academic purposes, computer skills in English, TOEFL preparation, and other subjects. Many graduate students begin their studies at Drexel in the English Language Center, particularly if they do not meet minimum TOEFL requirements (see the Special Language Enhancement Program, described below).

Interested applicants may call the English Language Center at 215-895-2022; fax: 215-895-6775; e-mail:elc@ drexel.edu.

The Special Language Enhancement Program
Students who have good academic qualifications but whose TOEFL scores are below the minimum required by their department may be accepted to Drexel through the Special Language Enhancement Program (SLEP). SLEP students will be provided a program that includes English language study, Drexel courses, and academic advising.

Master of Science Program in Biological Sciences

Requirements
Forty-five credits are required for the MS in Biological Sciences. Soon after matriculation the student completes a plan of study with the advisor, outlining his or her specific program. Both thesis and non-thesis options are available. Conducting formal research necessary for the thesis is dependent upon the student finding a faculty member whom will serve as their Faculty Advisor and supervise a mutually agreed upon research project.

Students wishing to pursue PhD candidacy are encouraged to elect the MS with thesis. After all other requirements are completed, the research MS student defends the thesis at a final oral examination. The nonthesis student takes a comprehensive examination.

Requirements for the MS Curriculum with Thesis		**45.0 Credits**
BIO 500	**Biochemistry**	3.0
BIO 532	**Advanced Cell Biology**	3.0
BIO 540	**Readings in Molecular and Cellular Biology**	3.0
BIO 635	**Advanced Genetics & Molecular Biology**	3.0
BIO 679	**Issues in Scientific Research**	3.0
BIO 997	**Research in Bioscience**	9.0
ENVS 506	**Biostatistics**	3.0
NFS 601	**Research Methods**	3.0
	Bioscience (BI0) or Environmental Science (ENVS) electives	15.0

Requirements for the Non-thesis MS Curriculum		**45.0 Credits**
BIO 500	**Biochemistry**	3.0
BIO 532	**Advanced Cell Biology**	3.0
BIO 635	**Advanced Genetics & Molecular Biology**	3.0
BIO 679	**Issues in Scientific Research**	3.0
ENVS 506	**Biostatistics**	3.0
	Bioscience (BI0) or Environmental Science (ENVS) electives*	30.0

*Non-thesis students may elect to take up to 4 credits of BIO 997 **Research in Bioscience.**

Bioscience electives include:		
BIO 530	**Microbial Genetics**	5.0
BIO 566	**Endocrinology**	4.0
BIO 610	**Biochemistry of Metabolism**	3.0
BIO 615	**Proteins**	3.0
BIO 620	**Biomembranes**	3.0

BIO 625	**Nucleic Acids**	3.0
BIO 631	**Bioinformatics I**	3.0
BIO 644	**Human Genetics**	3.0
BIO 646	**Stem Cell Research**	3.0
BIO 649	**Recombinant DNA Laboratory**	5.0
BIO 650	**Virology**	3.0
BIO 663	**Molecular Mechanics of Neurodegeneration**	3.0
BIO 670	**Medical Microbiology**	3.0
BIO 675	**Advanced Immunology**	3.0
BIO 680	**Special Topics: Parasitology**	3.0
BIO 680	**Special Topics: Biology of Neuron Function**	3.0

Doctoral Program in Biological Sciences

The Doctor of Philosophy in Biological Sciences is conferred in recognition of breadth of scholarship and scientific attainment plus demonstrated ability to complete original research.

The following general requirements must be satisfied in order to complete the PhD in Biological Sciences:

- 90 (post-bac) or 45 (post-MS) credit hours total
- establishing a plan of study
- 7 core courses
- additional courses dependent on advisor or committee recommendations
- candidacy exam/approval of dissertation proposal
- dissertation/thesis
- defense of dissertation/thesis
- a graduate research seminar presentation once a year for second, third, and fourth-year students.

Thesis Advisor/Plan of Study
For students admitted without an identified Thesis Advisor, the Thesis Advisor must be selected by the end of Winter term in the first year.All students are asked to submit a Plan of Study (that has been agreed upon by Thesis Advisor and student) by the end of Winter term first year. It is anticipated that the graduate coursework will be completed during the first two years or less.

Curriculum

Students take the following seven (7) core requirement courses:		**21.0 Credits**
BIO 500	**Biochemistry I**	3.0
BIO 532	**Advanced Cell Biology**	3.0
BIO 540	**Readings in Molecular & Cellular Biology**	3.0
BIO 601	**Research Methods**	3.0
BIO 635	**Advanced Genetics**	3.0
BIO 679	**Issues in Scientific Research**	3.0
ENVS 506	**Biostatistics**	3.0

For a list of electives, visit the Graduate Biology course descriptions.

Candidacy Examination
The function of the Candidacy Examination is to test the breadth and the depth of the student's capabilities in their chosen area of study. The graduate student becomes a PhD Candidate only after successfully completing the Candidacy Examination and completing 15 or 45 credits (for post-master's or post-bachelor's degree students, respectively). The candidacy exam is comprised of three parts whose order will be determined by the Candidacy Committee: written examination, dissertation research proposal, and oral examination.
Students entering the program with a Master's degree are expected to complete the candidacy examination by the end of the summer quarter of their first year.

Students entering the PhD program with a Bachelor's degree are expected to complete this examination by the end of the summer quarter of their second year.

Thesis /Dissertation and Defense of Thesis/Dissertation

The student will finalize their Dissertation only after approval to write is granted by the Dissertation Research Committee. Approval is based upon an evaluation of the breadth and depth of original research being conducted by the student. The dissertation must follow the format specifications set forth in the Drexel's Office of Research and Graduate Studies. Research conducted for the Dissertation must be presented in a lecture open to the public and then defended, privately, before the student's Dissertation Research Committee.

Sample Sequence/Sample Plan of Study

First Year

Fall		**Credits**
BIO 500	**Biochemistry I**	3.0
BIO 532	**Advanced Cell Biology**	3.0
Winter		
BIO 540	**Readings in Molecular & Cellular Biology**	3.0
BIO 635	**Advanced Genetics**	3.0
Spring		
BIO 601	**Research Methods**	3.0
ENVS 506	**Biostatistics**	3.0

Second Year

Fall		
BIO 679	**Issues in Scientific Research**	3.0
	Elective	3.0
Winter and Spring		
BIO 620	**Electives and/or research determined by advisor or committee**	

Contact the Department of Biology at (215) 895-2624 for more information.

Chemistry

General Information
The Chemistry Department offers graduate programs in analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry, educational chemistry, and polymer chemistry. The department also encourages interdisciplinary activities. Faculty members are active participants in the environmental engineering and science and biomedical science and engineering programs; others work with physicists and biologists in areas such as atmospheric science, biochemistry, and biophysical chemistry.

The chemistry faculty wants graduate students to understand the purpose of, and need for, fundamental research while working on problems of practical interest and application to the challenges facing mankind in the modern world. Areas of research include the use of digital electronic methods to analyze trace constituents of air and water, a study of the molecules of living systems, the effects of toxic chemicals and carcinogens, synthesis and characterization of compounds of medicinal and industrial interest, methods for studying macromolecules, and characterization of transient species using lasers.

The Chemistry Department strives to maintain a community of research scholars (faculty, postdoctoral fellows, and graduate and undergraduate students) that is large enough to provide a variety of experiences within chemistry, yet small enough to give each student individual attention. Both full- and part-time study are available.

Master of Science Program in Chemistry

General Requirements
The MS degree is awarded after satisfactory completion of a minimum of 45 credit hours in chemistry and related fields, at least 30 credits of which must be taken at Drexel. Both thesis and nonthesis options are available.

Course Requirements
The course requirements for both thesis and nonthesis options are one complete sequence in the major area of interest; one of the sequence courses from each of analytical, organic, polymer, and inorganic chemistry; and two courses in physical chemistry. The remaining credits may be chosen from graduate courses within the department or from other departments offering courses related to the student's major areas.

Major sequence (choose one of the following):		**9.0 Credits**
CHEM 521	**Inorganic Chemistry I**	3.0
CHEM 522	**Inorganic Chemistry II**	3.0
CHEM 523	**Inorganic Chemistry III**	3.0
or		
CHEM 530	**Analytical Chemistry I**	3.0
CHEM 531	**Analytical Chemistry II**	3.0
CHEM 755	**Mass Spectrometry**	3.0
or		
CHEM 541	**Organic Chemistry I**	3.0
CHEM 542	**Organic Chemistry II**	3.0
CHEM 543	**Organic Chemistry III**	3.0
or		
CHEM 557	**Physical Chemistry I**	3.0
CHEM 558	**Physical Chemistry II**	3.0
CHEM 555	**Quantum Chemistry I**	3.0
or		
CHEM 561	**Polymer Chemistry I**	3.0
CHEM 562	**Polymer Chemistry II**	3.0
CHEM 563	**Polymer Chemistry III**	3.0
	Additional sequence courses*	**15.0**
	Electives	**21.0**

*One of which must be chosen from the following: CHEM 555 (Quantum Chemistry I) or CHEM 557 (Physical Chemistry I).

Thesis Option
Up to 9 credits of coursework may be replaced by either CHEM 997 or by sections of CHEM 680 involving laboratory research. No later than the spring term of the first year of coursework, a student should choose a research advisor with whom to work

in carrying out an original investigation in chemistry. The results will be written up in thesis form and submitted to an MS thesis committee consisting of the research advisor and two other departmental faculty appointed by the advisor. The acceptance by this committee of the MS thesis completes the thesis option requirements for the MS degree. Students in the MS program receiving financial aid from the department must elect the thesis option if they do not pursue the PhD program at Drexel.

Doctoral Program in Chemistry

The PhD degree is awarded in any of six main areas of chemistry: analytical, inorganic, organic, physical, educational or polymer chemistry. The degree recipient must demonstrate scholastic breadth in chemistry and contribute significantly to scientific advancement in a chosen major area. Requirements of the program include coursework, candidacy examinations, a chemical information retrieval or technical writing course, and successful completion of a publishable PhD thesis.

Course Requirements

Ninety credits of graduate-level work must be completed for the PhD degree. The Chemistry Department requires 30 credits of coursework in chemistry (outlined in the Course Requirements section of the MS program). The balance can be made up of advanced special topics courses and research credits.

Candidacy Requirements

To become a candidate for the PhD in chemistry at Drexel, a student must pass a prescribed set of cumulative examinations.

Cumulative Examinations

Written examinations designed to test a student's background in his or her major area are given monthly during the academic year and occasionally during the summer at the discretion of the faculty. Students should begin taking these examinations after having completed three courses in the major area (usually the main sequence courses), though beginning these exams earlier is possible for well-prepared students. Students normally begin taking these examinations in the fall term of their second year.

Research Seminar

The literature review seminar is designed to help the student conduct his/her research more efficiently by (i) promoting a greater fundamental understanding about the student's own specific research project and (ii) providing context and perspective about previous accomplishments in the field by other research groups as well as her/his own. The subject of the seminar will be related to but broader than that of the thesis research. The examination at which the research seminar is defended is held no later than the end of the ***winter*** term of the ***second*** year for ***full-time*** students or the end of the ***spring*** term of the ***second*** year for ***part-time*** students. A written report is submitted to the committee no later than two weeks before the examination. A passing grade on this examination is required for continuation in the PhD program.

Thesis

A PhD thesis — the heart of the PhD degree — must be written, accepted by the research supervisor, presented to a PhD Thesis Examining Committee, and defended orally to the satisfaction of the Examining Committee. It is the responsibility of the student, not the research supervisor, to submit an acceptable thesis. It is expected that the students will have at least one peer-reviewed research article accepted for publication by the time of the thesis defense.

Master of Science Program in Communication

Drexel's Master of Science in Communication prepares students for careers in a wide range of professional activities. The program specializes in three areas: technical communication, science communication, and public communication. Technical communication is for those seeking employment as technical writers, computer documentation specialists, and training specialists. Science communication has much to offer those who aspire to medical, science, and pharmaceutical writing. A concentration in public communication leads to careers in journalism and public relations. In addition, the program provides a strong foundation in theoretical approaches to communication. This theoretical basis is designed to ensure that, as the field changes, students will continue to have an intellectual framework for evaluating and implementing new technology and changing media.

Students can attend full time or part time, they can begin the program in any academic quarter, and they can complete all coursework in the evening. The program emphasizes flexibility, encouraging each student, in consultation with a faculty advisor, to fashion a particular course of study.

The program accommodates students from widely varying educational backgrounds: Many have backgrounds in science and mathematics; an equal number come from humanities-related areas. Some students pursue their degrees while already at work at demanding jobs in technical or scientific fields; others are new to the field.

General Requirements
The MS degree requires 45 credits of coursework, a professional portfolio of three to five items developed by the student, and six months of internship for those who lack significant experience in communication related fields.

Portfolio
As a final graduation requirement, each student must submit a professional exit portfolio. Based on coursework and professional assignments, the portfolio undergoes a rigorous process of review by faculty members and by a professional outside the university.

Internship
Students who need professional experience consult with their advisors and the program director to develop a suitable internship. Normally, this placement begins after the student has completed at least half the required coursework. Students who already have the equivalent of six months of professional experience or who gain the equivalent by working part time during their course of study can request exemption from this requirement.

Curriculum
Students may use electives to increase communication skills, to broaden theoretical backgrounds, or to develop areas of specialization. Any appropriate graduate course offered in the University can serve as an elective if the student has sufficient background to take the course. In addition, the program offers its own elective courses including special topics (COM 690). Qualified students may also pursue independent study for elective credit in special cases.

Core Courses		Credits
COM 500	**Persuasive Writing and Reading in Communication**	3.0
COM 610	**Theories of Communication and Persuasion**	3.0

Concentrations

Technical Communication

COM 510	**Technical Writing**	3.0
COM 570	**Technical and Science Editing**	3.0
COM 620	**Message Design and Evaluation**	3.0
COM 630	**Developing Software Documentation**	3.0
COM 875	**Ethics in Technical and Science Communication**	3.0
	Electives	24.0

Science Communication

COM 520	**Science Writing**	3.0
COM 570	**Technical and Science Editing**	3.0
COM 620	**Message Design and Evaluation**	3.0
COM 670	**Medical Writing**	3.0
COM 875	**Ethics in Technical and Science Communication**	3.0
	Electives	24.0

Public Communication

COM 635	**Electronic Publishing**	3.0
COM 650	**Telecommunications Policy**	3.0
COM 660	**Investigative Journalism**	3.0
COM 680	**Public Relations Strategies**	3.0
COM 880	**Seminar: Ethics for Public Communication**	3.0
	Electives	24.0

PhD in Culture & Communication

90.0 credits.

Degree Requirements

The PhD requires a minimum of 90.0 credits beyond a Bachelor's degree, including 45.0 credit hours of coursework prior to taking qualifying exams, 15.0 credit hours of coursework after exams, and 30.0 hours of research credits.

The PhD coursework is structured around a set of required core courses, a set of required seminars with rotating topics, and electives in graduate communication lecture courses, independent study work, and dissertation credit.

All students in the program take five common core courses. They then take no less than five courses chosen from the Culture and Communications (COM) seminar offerings. Students are encouraged to take additional seminars after meeting that requirement, since seminar courses enable collaborative relationships with professors and introduce students to the scholarly community.

After completing the core requirements and a sequence of seminars, students are expected to take a minimum of 10 additional courses from existing graduate level lecture courses (depending on their interests and research needs). Students may take up to two graduate courses (six credits) outside the department. Additional credits to meet the 90.0 credit requirements will come from independent study and dissertation credits.

Student advising will include appointments with both graduate director and an assigned mentor during the first two weeks of fall courses, where an individualized plan of study (University form D1) will be completed and approved by the program director.

Core Courses		**15.0 Credits**
COM 701	**Contemporary Social Theory**	3.0
COM 702	**Communication Theory I**	3.0
COM 703	**Communication Theory II**	3.0
COM 704	**Research Methods in Communication**	3.0
COM 705	**Statistical Data Analysis in Communication**	3.0

Seminars		**15.0 Credits**

There are five categories of seminar: one in which students learn advanced work and influences on a specific theorist or theoretical school; one in which students learn about theories of language, discourse and the sign; one that teaches the paradigm of structural dynamics central to social sciences theory and research; one in which students study a research methods approach; and one that deals with approaches to research ethics. Students must take a seminar in each area (COM 801 through 805). Seminars can be repeated, with a maximum of three courses taken in each area, as long as the subject covered is different each time:

COM 801	**Seminar in Contemporary Theory**	3.0

COM 802	**Seminar in Discourse and Semiotics**	3.0
COM 803	**Seminar in Structural and Cultural Dynamics**	3.0
COM 804	**Seminar in Research Methods**	3.0
COM 805	**Seminar in Communication Ethics**	3.0

Communication Lecture Electives **30.0 Credits**

Ten courses are required, for a total of 30.0 credit hours of electives. These may be chosen from COM 500 to 800 level courses, including 800 level seminars that are a different topic from earlier courses taken.

Dissertation Credits//Additional Electives* **30.0 Credits**

*Students may take up to two graduate-level courses outside of the Department of Culture and Communication.

COM 799	**Independent Study**

For the dissertation, students work with a principal advisor, one of the Culture and Communication Department faculty, and no less than two additional faculty from within the department. Students must find one additional outside reader, and students may bring in up to two outside readers.

Qualifying Examinations

After students have completed 45.0 credits, which will usually be at the end of their 6th term, they will be required to take a qualifying examination. The qualifying exam will be offered at the end of June and will be composed of three parts, theory, methods and a content area. Students will be given the grade of fail, pass or high pass on the exam. A grade of pass in all three sections of the exam will be required to qualify for the PhD Students who do not pass one out of three sections of the exam on the first attempt may retake the section that they failed one time to qualify for the PhD If they do not pass the second time they take the failed section of the exam they will be dismissed from the program. When a student passes all three sections of the exam, the proper paperwork will be filed with the university graduate office and they will be advanced to candidacy.

Sample Curriculum Sequence

First Year

	Fall Term	
COM 701	**Contemporary Social Theory**	3.0
COM 704	**Research Methods in Communication**	3.0

	Winter Term	
COM 702	**Communication Theory I**	3.0
COM 705	**Statistical Data Analysis in Communication**	3.0

	Spring Term	
COM 703	**Communication Theory II**	3.0
COM 805	**Seminar in Communication Ethics**	3.0

	Summer Term	
COM 803	**Seminar in Structural and Cultural Dynamics**	3.0
COM 804	**Seminar in Research Methods**	3.0

Second Year

	Fall Term	
COM 803	**Seminar in Structural and Cultural Dynamics**	3.0
COM 802	**Seminar in Discourse and Semiotics**	3.0

	Winter Term	
COM 801	**Seminar in Contemporary Theory**	3.0
	Electives	6.0

	Spring Term	
COM 804	**Seminar in Research Methods**	3.0
	Elective	3.0

June of Second Year: Qualifying Exams (after a minimum of 45.0 credit hours and prior to a maximum of 54.0 credit hours)

Third Year

	Fall Term	
COM 803	**Seminar in Structural and Cultural Dynamics**	3.0
	Electives	6.0

	Winter Term	
	Electives	9.0

	Spring Term	
COM 799	**Independent Study**	3.0
	Electives	6.0

	Summer Term	
COM 799	**Independent Study**	3.0
	Elective	3.0

Fourth Year

	Fall Term	
COM 799	**Independent Study**	6.0
	Elective	3.0

	Winter Term	
COM 799	**Independent Study**	6.0

Dissertation Proposal Defense

Fifth Year

	Dissertation credits

Dissertation Defense: Students should defend the dissertation and graduate towards the end of their fifth year, during either the spring or summer quarters.

Master of Science in Environmental Policy

The graduate program in Environmental Policy prepares students for careers as policy analysts who have a strong commitment to environmental values, are scientifically and methodologically competent, and can work effectively in the democracy policy process with the various groups and institutions engaged in environmental issues.

To meet these requirements, students must complete a range of coursework designed to teach:

- knowledge of how policies are developed and implemented
- scientific and engineering basis of effective environmental policies
- an understanding of who the key players are in environmental politics, and how to work with them to accomplish environmental improvements.

For more information about this program, visit the MS in Environmental Policy web page.

Master of Science in Environmental Policy (MSEP)

Curriculum

Core Courses		9.0 Credits
ENVS 501	**Chemistry of the Environment**	3.0
ENVS 506	**Biostatistics**	3.0
ENVS 511	**Evolutionary Ecology**	3.0
or		
ENVS 521	**Environmental Health**	3.0

Required Specialization Courses in Environmental Policy		27.0 Credits
ENVP 522	**Environmental Law**	3.0
ENVP 523	**Environmental Regulations**	3.0
ENVP 650	**Resource and Environmental Economics**	3.0
ENVP 720	**Environmental Cost Benefit Analysis and Valuation**	3.0
ENVP 760	**Social Change & Environmental Movements**	3.0
ENVP 771	**Theory and Practice of Environmental Policy Analysis**	3.0
ENVP 772	**Methods of Environmental Policy Analysis**	3.0
ENVP 773	**Practicum in Environmental Policy Analysis**	3.0
ENVP 774	**Economic Analysis of Environmental Policy**	3.0

Recommended Electives		9.0 Credits
ENVP 570	**International Environmental Policy**	3.0
ENVP 880	**Environment and Society**	3.0
ENVP 865	**Special Topics in Environmental Policy**	3.0

Plan of Study
Within the first quarter of study, a student must meet with an assigned advisor and work out a plan of study. An example plan of study form can be viewed on the Master of Science in Environmental Policy web page.

Graduate Study in Environmental Science

General Information
Environmental science is a multidisciplinary field in which we try to understand environmental problems and find solutions to them. This field requires understanding of a number of disciplines, including biology, chemistry, hydrology and climatology.
The environmental science program was created to focus on the need for scientists to aid in the development of local, national, and international environmental policy.

MS areas of concentration include: ecology, environmental assessment, environmental biotechnology, environmental risk management, paleoecology-geology, and toxicology and industrial hygiene. A student may alternatively craft a specialized plan of study outside of these strength areas under the guidance of an academic advisor.

The master's degree may be completed with either a thesis or non-thesis option. Those choosing to prepare a thesis must complete 45 credits (including 6 - 9 credits awarded for the thesis). Students choosing the non-thesis option must complete coursework totaling 48 credits. Most courses carry three credits.

Susan Cole is the Graduate Coordinator for Environmental Science. Susan Cole can be reached by telephone at 215-895-2905 or e-mail at coless@drexel.edu. Her office is located in Room 109 of Disque Hall.

Master of Science in Environmental Science (MSES)

Curriculum
The MSES degree requires three core courses that form the basis for further specialization. Students choose to complete the remainder of the program with an area of specialization and/or elective course options. Areas of specialization allow students to gain more depth in a particular area of interest. If student interest is not specifically addressed in any one area of specialization, elective courses may be used to build up an individualized plan of study. The program requires a total of 48 credits for non-thesis students and 45 credits for thesis students.

Core Courses		**9.0 Credits**
ENVS 501	**Chemistry of the Environment**	3.0
ENVS 506	**Biostatistics**	3.0
ENVS 511	**Evolutionary Ecology**	3.0

Areas of Specialization and Electives

Students may choose an area of specialization in ecology, environmental assessment, paleoecology-geology or design a unique plan of study in consultation with faculty combining one or more areas of interest. Students interested in applying their background in environmental science to environmental regulation or economics may also take electives in Environmental Policy

Certificate Program (offered online)
The Certificate in Toxicology and Industrial Hygiene may be built into the MS program in Environmental Science.

ENVS 531	**Industrial Hygiene I**	3.0
ENVS 532	**Industrial Hygiene II**	3.0
ENVS 636	**Principles of Toxicology I**	3.0
ENVS 637	**Principles of Toxicology II**	3.0

Doctoral Program in Environmental Science

The following general requirements must be satisfied in order to complete the PhD in Environmental Science:

- 90 (post-bac) or 45 (post-MS) credit hours total
- qualifying exam
- establishing a plan of study
- 3 core courses recommended, not required
- additional courses dependent on advisor or committee recommendations
- candidacy exam/approval of dissertation proposal
- dissertation/thesis
- defense of dissertation/thesis
- a graduate research seminar presentation once a year for second, third, and fourth-year students.

Thesis Advisor/Plan of Study
For students admitted without an identified Thesis Advisor, the Thesis Advisor must be selected by the end of Winter term in the first year. All students are asked to submit a Plan of Study (that has been agreed upon by Thesis Advisor and student) by the end of Winter term first year. It is anticipated that the graduate coursework will be completed during the first two years or less. Generally there is no prescribed coursework -- students must take courses needed to complete their research under guidance of an faculty advisor.

Curriculum

The following courses are recommended, but not required:

ENVS 501	**Chemistry of the Environment**	3.0
ENVS 506	**Biostatistics**	3.0
ENVS 511	**Evolutionary Ecology**	3.0

For a list of electives, visit the Graduate Environmental Science course descriptions.

Candidacy Examination
The function of the Candidacy Examination is to test the breadth and the depth of the student's capabilities in their chosen area of study. The graduate student becomes a PhD *Candidate* only after successfully completing the Candidacy Examination and completing 15 or 45 credits (for post-master's or post-bachelor's degree students, respectively). The candidacy exam is comprised of three parts whose order will be determined by the Candidacy Committee: written examination (or qualifying exam), dissertation research proposal, and oral examination.

Students entering the program with a Master's degree are expected to complete the candidacy examination by the end of the summer quarter of their first year. Students entering the PhD program with a Bachelor's degree are expected to complete this examination by the end of the summer quarter of their second year.

Thesis /Dissertation and Defense of Thesis/Dissertation
The student will finalize their Dissertation only after approval to write is granted by the Dissertation Research Committee. Approval is based upon an evaluation of the breadth and depth of original research being conducted by the student. The dissertation must follow the format specifications set forth in the Drexel's Office of Research and Graduate Studies. Research conducted for the Dissertation must be presented in a lecture open to the public and then defended, privately, before the student's Dissertation Research Committee.

Sample Sequence/Sample Plan of Study

First Year

Fall		**Credits**
ENVS 501	**Chemistry of the Environment (If applicable)**	3.0
	ENVS elective	3.0
Winter		
ENVS 511	**Evolutionary Ecology (if applicable)**	3.0
	ENVS elective	3.0
Spring		
ENVS 506	**Biostatistics (if applicable)**	3.0
	ENVS elective	3.0

Second Year

	Electives and/or research as determined by Thesis Advisor and committee.

Contact the Department of Biology at (215) 895-2624 for more information.

Certificate in Toxicology and Industrial Hygiene

12.0 credits

This online certificate program is specifically designed for students at the post-baccalaureate level in industrial or governmental settings. The curriculum provides a strong foundation in both toxicology and industrial hygiene to enhance the student's on-the-job performance in the areas of health and safety.

Visit the Drexel University e-Learning site for additional information about the Certificate in Toxicology and Industrial Hygiene program.

Required courses		
ENVS 531	**Industrial Hygiene I**	3.0
ENVS 532	**Industrial Hygiene II**	3.0
ENVS 636	**Principles of Toxicology I**	3.0
ENVS 637	**Principles of Toxicology II**	3.0

Mathematics

The Department of Mathematics is a broadly based academic unit offering instructional programs and carrying on research activities in mathematics. Doctor of Philosophy and Master of Science degrees are offered.

Areas of research specialty among the faculty include applied mathematics, algebraic combinatorics, biomathematics, discrete mathematics, optics, analysis, number theory, numerical analysis, probability and statistics, matrix and operator theory, fluid mechanics, and partial differential equations.

Master of Science Program in Mathematics

General Requirements
Students must complete a minimum of 45 graduate credits for the MS degree. Of these 15 courses, the following five are required:

Required courses		
MATH 504	**Linear Algebra and Analysis**	3.0
MATH 505	**Principles of Analysis I**	3.0
MATH 506	**Principles of Analysis II**	3.0
MATH 533	**Abstract Algebra I**	3.0
MATH 630	**Complex Variables I**	3.0

The remaining 10 courses may be any graduate mathematics courses. In some cases, course substitutions may be made with courses from other departments. Elective courses taken outside the department must receive prior departmental approval in order to be counted toward the degree.

There are no thesis, language, or special examination requirements for the master's degree.

Students seeking a dual MS must satisfy core requirements for both degree programs.

Students should note that some departmental courses, such as Advanced Engineering Mathematics, are foundation courses and do not contribute to the departmental requirements for the degree. They do count toward the University requirements for a degree.

For additional information, contact the Department of Mathematics' Graduate Program.

PhD Program in Mathematics

General Requirements
Students must complete a minimum of 45 graduate credits for the PhD degree. Of these 15 courses, the following five are required:

Required courses		Credits
MATH 504	**Linear Algebra and Analysis**	3.0
MATH 505	**Principles of Analysis I**	3.0
MATH 506	**Principles of Analysis II**	3.0
MATH 533	**Abstract Algebra I**	3.0
MATH 630	**Complex Variables I**	3.0

The remaining 10 courses may be any graduate mathematics courses. In some cases, course substitutions may be made with courses from other departments. Elective courses taken outside the department must receive prior departmental approval in order to be counted toward the degree.

The student must pass a written qualifying exam. The student is allowed two attempts. Students must take exam at the end of their first year, and have a second opportunity in September of their second year.

Students must take a PhD candidacy exam at the end of their second year. Students should note that some departmental courses, such as Advanced Engineering Mathematics, are foundation courses and do not contribute to the departmental requirements for the degree. They do count toward the University requirements for a degree.

Further details about the doctoral program are available on the Department of Mathematics' Graduate Programs web page.

Physics

General Information
The Department of Physics offers opportunities for students to study with leading researchers in astrophysics, biophysics, nonlinear dynamics, particle physics, and solid state physics, as well as to participate in international collaborations. Coursework for the MS and PhD degrees includes advanced training in core areas of physics and in the topics of current research. PhD students begin research early in the program, commencing thesis work in their second year of study.

To learn more about the graduate program in Physics visit http://www.physics.drexel.edu/.

Master of Science Program in Physics

General Requirements
Students who wish to complete only the master's degree are welcomed, and will find that the learning environment will allow them to broaden their professional understanding by exploring current topics and trends of physics in an interdisciplinary setting.

The requirement for the master's degree in physics is 45 graduate credits, with at least 30 credits taken in Mathematical Physics (PHYS 501 and PHYS 502), Dynamics I (PHYS 506), Electromagnetic Theory (PHYS 511 and PHYS 512), Quantum Mechanics (PHYS 516, PHYS 517, and PHYS 518), and Statistical Mechanics (PHYS 521 and PHYS 522). There are no thesis, language, or special examination requirements for the master's degree.

Doctoral Program in Physics

90.0 credits

The Department of Physics offers opportunities for students to study with leading researchers in astrophysics, biophysics, nonlinear dynamics, particle physics, and solid state physics, as well as to participate in international collaborations. Coursework for the PhD degree includes advanced training in core areas of physics and topics of current research. PhD students begin research early in the program, commencing thesis work in their second year of study.

The usual schedule for physics graduate students consists of two years of coursework, qualifying exams, and research training, followed by dissertation research. All PhD students follow a common set of ten core courses during their first two years of study. In addition to these core courses, students also take four special topics courses.

PhD students Admitted with Post-Master's Status

Students who are admitted for PhD study with “post-masters” status must take 15 credits of graduate coursework with a minimum GPA of 3.0 to become doctoral candidates. Courses are to be chosen in consultation with the Director of Graduate Studies. Post-masters students are expected to pass the written and oral qualifying exams by the end of the Spring quarter of their first year of study. Ordinarily, this means taking the written qualifying exam in September before the start of classes. To be prepared for the oral exam, post-masters students should begin research as soon as possible.

Program Requirements

Doctoral candidates are required to complete a minimum of 45 credits of coursework and research work beyond the master’s requirement of 45 credits while maintaining a minimum of 3.0 GPA.

Core Courses		**42.0 Credits**
First Year		
PHYS 501	**Mathematical Physics I**	3.0
PHYS 506	**Dynamics I**	3.0
PHYS 502	**Mathematical Physics II**	3.0
PHYS 516	**Quantum Mechanics I**	3.0
PHYS 521	**Statistical Mechanics I**	3.0
PHYS 517	**Quantum Mechanics II**	3.0
Second Year		
PHYS 522	**Statistical Mechanics II**	3.0
PHYS 518	**Quantum Mechanics III**	3.0
PHYS 511	**Electromagnetic Theory I**	3.0
PHYS 512	**Electromagnetic Theory II**	3.0
Students choose a minimum of four (4) special topics courses from the following:		

PHYS 531	**Galactic Dynamics**	3.0
PHYS 532	**Cosmology**	3.0
PHYS 533	**Nanoscience**	3.0
PHYS 561	**Biophysics**	3.0
PHYS 562	**Computational Biophysics**	3.0
PHYS 563	**Single Molecular Methods**	3.0
PHYS 571	**Nonlinear Dynamics**	3.0
PHYS 576	**Nuclear and Particle Physics**	3.0
PHYS 626	**Solid State Physics**	3.0
PHYS 750	**Special Topics in Physics: Quantum Field Theory**	3.0

Research Training
Students begin research in the first year with two small projects. In the spring quarter, this project culminates in a talk presented to the other students and Director of Graduate Studies. In the summer quarter, the project requires a written report to the research advisor. Research during the second year is toward the oral qualifying exam, described below.

Candidacy Examination
PhD candidates must pass a Candidacy Examination, which consist of two parts: written and oral:

- The written portion of the qualifying examination is given twice a year, during the week before the fall quarter begins and during the first week of classes of the winter term. Students must pass the written qualifying examination no later than the winter quarter of their second year. At most two attempts may be made at passing the exam. The qualifying examination covers four general areas at the advanced undergraduate level: classical mechanics, electricity and magnetism, quantum mechanics, and statistical physics.
- The oral portion of the qualifying exam is based on original research performed by the student, which consists in an oral presentation and a written report of no less than 15 pages, submitted to the examination committee and the Director of Graduate Studies at least one week prior to the exam. Immediately after the public presentation, the Examination Committee will privately conduct an oral examination. This exam must be passed by the end of the second year of study.

Dissertation Defense
This dissertation defense includes a final public presentation and defense of the dissertation. The dissertation must be submitted to the Examination Committee at least two weeks prior to the oral defense. The oral presentation involves a public 45-60 minute presentation by the candidate followed by an unspecified period during which the Examination Committee will ask questions. All doctoral dissertations, in addition to originality and scholarly content, must conform to University format requirements.

Plan of Study
The following sample plan of study contains the required courses for full-time PhD students entering without a previous Master's degree. Post-master's students should consult the Director of Graduate Studies.

Sample Plan of Study

First Year

	Fall	
PHYS 501	**Mathematical Physics I**	3.0
PHYS 506	**Dynamics I**	3.0
	Special topics course	3.0

	Winter	
PHYS 502	**Mathematical Physics II**	3.0
PHYS 516	**Quantum Mechanics I**	3.0
	Special topics course	3.0
	Spring	
PHYS 521	**Statistical Mechanics I**	3.0
PHYS 517	**Quantum Mechanics II**	3.0

Second Year

	Fall	
PHYS 522	**Statistical Mechanics II**	3.0
PHYS 518	**Quantum Mechanics III**	3.0
	Special topics course	3.0
	Winter	
PHYS 511	**Electromagnetic Theory I**	3.0
	Special topics course	3.0
	Spring	
PHYS 512	**Electromagnetic Theory II**	3.0
PHYS 997	**Research**	var.

Special Topics Course Schedule

Special topics courses are an introduction to current topics of experimental and theoretical interest. They are offered in alternate years.

Academic Year 2009/2010 (odd)

	Fall	
PHYS 531	**Galactic Dynamics**	3.0
PHYS 561	**Biophysics**	3.0
	Winter	
PHYS 532	**Cosmology**	3.0
PHYS 562	**Computational Biophysics**	3.0
	Spring	
PHYS 563	**Single Molecular Methods**	3.0
PHYS 750	**Special Topics in Physics: Quantum Field Theory**	3.0

Academic Year 2010/2011 (even)

	Fall	
PHYS 626	**Solid State Physics**	3.0
PHYS 576	**Nuclear and Particle Physics**	3.0
	Winter	
PHYS 533	**Nanoscience**	3.0
PHYS 571	**Nonlinear Dynamics**	3.0
	Spring	
	To be announced.	

Additional information for graduate students is available at the Department of Physics.

MS in Psychology

General Information
The Master of Science degree in the Department of Psychology, College of Arts & Sciences, is ideal for students interested in pursuing an advanced education in scientific psychology and research methods.

The program is an opportunity for students to take their first step into graduate education, and to begin a path toward further educational and career opportunities. These opportunities include further graduate-level training leading to a PhD, a career in research, or other educational and administrative opportunities. The curriculum is focused on training in a range of research experience in neurocognitive and behavioral sciences. In addition to required coursework, students are required to complete a minimum of 8 hours per week with a research mentor in laboratory activities. These activities culminate with the successful completion of an empirical thesis.

For more information, visit the Department of Psychology.

Master of Science in Psychology

Degree Requirements
The general requirements for earning the MS degree in psychology are as follows:

- Completion of all required coursework with a minimum grade point average of 3.0, with no grade lower than a B in any required (non-elective) course and no more than two course grades of C or lower.
- Successful completion of a minimum of 45.0 course credits.
- Successful completion of required research laboratory hours.
- Completion of an empirical thesis.
- Research laboratory: 8 hours/week for two years; 6 credits of independent study will pertain to the student's laboratory research.

For more information on specific requirements, consult the Master of Science in Psychology Program Handbook available from the Department of Psychology web site.

Required courses		
PSY 510	**Research Methods I**	3.0
PSY 511	**Research Methods II**	3.0
PSY 512	**Cognitive Psychology**	3.0
PSY 530	**Principles of Neuroscience**	3.0
PSY 610	**Data Analysis in Psychology**	3.0
PSY 624	**Behavior Analysis**	3.0
PSY 690	**MS Research I**	3.0
PSY 691	**MS Research II**	3.0
PSY 692	**MS Research III**	3.0

Many additional electives are available to enhance individual plans of study.

PhD in Psychology: Clinical Psychology

Drexel University offers the doctorate program with a specialization in Clinical Psychology with the primary goal of training clinical psychologists in the scientist-practitioner model. This model places equal emphasis on clinical research and the application of scientific principles. Students receive an appropriate, broad education in preparation for entry-level practice in professional psychology. This education includes training in intervention and assessment, as well as an introduction to the science and practice of clinical psychology. The program is accredited by the American Psychological Association.

For additional information about the PhD in Clinical Psychology, view the Department of Psychology's web site.

PhD in Psychology: Clinical Psychology

Curriculum

The program in Clinical Psychology curriculum follows the scientist-practitioner model and APA guidelines on accreditation of doctoral clinical psychology programs. It also considers state licensing guidelines and various publications that have been written on the topic of doctoral education, training, and credentialing in clinical psychology, as well as the specialty areas of cognitive-behavior therapy, forensic psychology, health psychology, and neuropsychology.
The following section outlines the courses required for graduation for entering Bachelor's-level students. The PhD program curriculum requires the student to earn a minimum of 90 credits. Typically, students enroll in 27 credits during the first year, 22 credits during the second and third years, 12 credits in the fourth year, and 8 credits during the fifth/final internship year. Drexel University operates on a calendar of four eleven-week terms. Students in the program do not take courses during Summer Term in order to complete research projects and continue clinical practicum training.

All coursework can be divided into two major components: (1) Foundations of Psychology, which is the evolving body of knowledge in the discipline of psychology, and (2) Clinical and Professional Training, which focuses on the application of theory and empirical research to the practice of psychology. Listed below are all required and elective courses offered within the Drexel psychology curriculum followed by specific requirements for each concentration. Credit levels listed are set at the minimum required.

Foundations of Psychology

History and Systems

Required		**3.0 Credits**
PSY 712	**History and Systems of Psychology**	3.0

Statistics/Research Methods

Required		**19.0 Credits**
PSY 510	**Research Methods in Psychology I**	3.0
PSY 610	**Data Analysis in Psychology**	3.0
PSY 710	**Multivariate Methods in Psychology**	3.0
PSY 711	**Data Analysis III: Advanced Topics**	3.0
PSY 898	**Thesis in Psychology**	3.0
PSY 998	**Dissertation in Psychology**	4.0

Electives		
PSY 511	**Research Methods in Psychology II**	3.0

Biological Bases of Behavior

Required		6.0 Credits
PSY 530	**Principles of Neuroscience**	3.0
PSY 630	**Psychopharmacology**	3.0

Electives		3.0 Credits
PSY 812	**Cognitive Neuroscience**	3.0

Cognitive/Affective Bases of Behavior

Required		6.0 Credits
PSY 512	**Cognitive Psychology**	3.0
PSY 514	**Learning Foundations of Behavioral Assessment**	3.0

At least one of the following electives		
PSY 516	**Developmental Psychology**	3.0
PSY 612	**Psychology of Human-Computer Interaction**	3.0
PSY 614	**Problem-Solving and Creativity**	3.0
PSY 616	**Empirical Foundations of Unconscious Processes**	3.0
PSY 840	**Models of Memory**	3.0

Social Bases of Behavior

Required		6.0 Credits
PSY 550	**Multicultural Perspectives**	3.0
PSY 517	**Social Cognition in Clinical Psychology**	3.0

Clinical and Professional Training

General Foundations of Practice

Required		9.0 Credits
PSY 560	**Teaching in Psychology**	3.0
PSY 520	**Psychopathology**	3.0
PSY 524	**Professional Issues and Ethics**	3.0

Foundations of Psychological Evaluation/Measurement

Required		12.0 Credits
PSY 522	**Psychological & Intellectual Assessment**	3.0
PSY 620	**Personality Assessment**	3.0
PSY 514	**Learning Foundations of Behavioral Assessment**	3.0
PSY 515	**Behavioral Assessment II**	3.0

Electives		
PSY 542	**Neuropsychological Assessment**	3.0
PSY 642	**Neuropsychological Case Analysis/Integration**	3.0
PSY 648	**Forensic Psychology/Forensic Assessment I**	3.0
PSY 649	**Forensic Assessment II**	3.0

Foundations of Intervention

Required		15.0 Credits
PSY 721	**Principles of Psychotherapy**	3.0
PSY 722	**Psychotherapy Theories**	3.0
PSY 897	**Clinical Psychology Practicum Seminar**	3.0
PSY 899	**Practicum**	2.0
PSY 999	**Internship**	4.0

At least one of the following electives:		
PSY 540	**Principles of Neuropsychology**	3.0
PSY 648	**Forensic Psychology/Forensic Assessment I**	3.0
PSY 650	**Childhood Psychopathology and its Treatment**	3.0
PSY 819	**Health Psychology**	3.0
PSY 820	**Cognitive-Behavior Therapy**	3.0
PSY 830	**Advanced Topics in Health Psychology**	3.0

Advanced Professional Training

Elective Courses		12.0 Credits
PSY 526	**Childhood Psychopathology**	3.0
PSY 730	**Criminal Law and Psychology**	3.0
PSY 746	**Neuropsychological Evaluation and Intervention: Children and Adolescents**	3.0
PSY 750	**Autism Spectrum Disorders**	3.0
PSY 821	**Family and Group Therapy**	3.0
PSY 822	**Pediatric Psychology**	3.0
PSY 823	**Substance Abuse**	3.0
PSY 824	**Eating and its Disorders**	3.0
PSY 825	**Seminar in Mind/Body Studies**	3.0
PSY 826	**Social Problem-solving and Psychopathology**	3.0
PSY 827	**Behavioral Stress Management**	3.0
PSY 830	**Advanced Topics in Health Psychology**	3.0
PSY 840	**Models of Memory**	3.0
PSY 845	**Neuropsychological Evaluation and Intervention: The Elderly**	3.0
PSY 854	**Psychology of Rehabilitation**	3.0
PSY 840	**Models of Memory**	3.0
PSY 865	**Psychopathy**	3.0
	Developmental Disabilities	3.0
	EEG	3.0
	Special Education and the Law	3.0
	Technologies in Psychology	3.0

Specific Concentration Requirements

Clinical Neuropsychology Concentration

The clinical neuropsychology concentration includes courses, research, and clinical experiences designed to train the students for professional practice in neuropsychology. Clinical neuropsychology involves the application of psychological assessment and intervention to the problems encountered by people with brain injury or illness. The knowledge of brain-behavior functioning and the incorporation of neuropsychological conceptualizations with traditional clinical conceptualizations of functioning are aimed at providing the student with a wider perspective regarding the range of human functioning and disability. The student is able to pursue specific interests in geriatrics, pediatrics, traumatic brain injury, and rehabilitation.
In addition to the core curriculum:

- One neuropsychology practicum (800 hours)
- A neuropsychology-focused thesis and dissertation

- Required classes: Principles of Neuropsychology, Principles of Neuroscience, Neuropsychological Assessment, Case Analysis and Integration
- At least two neuropsychology electives: Models of Memory, Rehabilitation Psychology, Advanced Neuropsychology Assessment and Intervention: Children and Adolescents, Advanced Neuropsychology Assessment and Intervention: The Elderly.

Forensic Psychology Concentration
Forensic psychology involves the application of assessment and intervention techniques to informing legal decision-makers and attorneys on questions in criminal, civil, and family law. Those who concentrate in forensic psychology will be trained in relevant law, behavioral science research, and assessment and intervention approaches with a particular focus on juvenile and criminal issues.
In addition to the core curriculum:

- One forensic psychology practicum (800 hours)
- A forensic psychology-focused thesis and dissertation
- At least two years of research in an area related to forensic psychology
- Required classes: Forensic Assessment I and II, Law and Mental Health
- At least two forensic psychology electives.

Health Psychology Concentration
Health psychology adopts a broad-based, biopsychosocial perspective in order to: (1) better understand the interplay among behavioral, emotional, cognitive, social, and biological factors regarding health, wellness, and physical disease; (2) promote and maintain wellness and positive physical health; (3) prevent, treat, and rehabilitate illness and disability, and (4) improve the health care delivery system. The health psychology concentration aims to provide specialty training in order to prepare graduate students for academic and/or clinical positions where the primary focus is on physical health problems.
In addition to the core curriculum:

- One health psychology practicum (800 hours)
- A health psychology-focused thesis and dissertation
- Required classes: Health Psychology, Behavioral Stress Management
- At least three Health Psychology electives

CBT Concentration
Cognitive behavior therapy (CBT) represents a broad family of psychological interventions that are grounded in scientific theories and principles derived from psychology and related disciplines, and that stress the empirical validation of intervention methods. Various theories, principles, models, and techniques fall under the general rubric of CBT, and these approaches have been applied to the full range of human experience, from the assessment and treatment of severe psychopathology and profound developmental delays to primary prevention efforts to enhancing peak performance among athletes.

Common features of the various CBT approaches include a focus primarily on the present rather than the past, an emphasis on parsimony in theoretical explanations, grounding in learning principles (including principles related to how we interpret the world and/or how we related to our own experience), and the emphasis on epistemological empiricism. The CBT concentration aims to provide pre-specialty training in order to prepare graduate students for academic and/or clinical positions in which CBT is a primary focus.

Additional concentration requirements beyond the core curriculum include:

- One CBT-oriented practicum (800 hours)
- A CBT-focused thesis and/or dissertation
- Required classes: Cognitive Behavior Therapy, Behavioral Stress Management (taken in second year with Personality Assessment taken in third year)
- At least two CBT electives: Child Psychopathology and its Treatment, Seminar in Mind/Body Studies, pediatric Psychology, Eating and its Disorders, Substance Abuse, and others as offered and approved by the Concentration Head.

For more information on the PhD program requirements, consult the PhD Program Handbook available from the Clinical Psychology PhD Program web site.

Doctoral Program in Psychology: Applied Cognitive and Brain Science (ACBS)

The purpose of the human experimental psychology PhD concentration in Applied Cognitive and Brain Science (ACBS) in the Department of Psychology is to educate and train students to be researchers with the broad goal of *extending or enhancing human ability and performance through applied cognitive and brain science*.

This PhD concentration is planned to involve students in conducting both basic and applied empirical research using one or more of a variety of approaches, such as behavioral experimentation, brain imaging, psychophysiology, cognitive modeling, and cognitive engineering. Faculty, students, and graduates of the concentration are part of a rapidly growing national community interested in applying empirical research methods to the design, development and deployment of technologies to complement, augment and enhance human abilities. Given this focus, the ACBS PhD concentration is sharply defined and is designed for students who wish to pursue an experimentally oriented research-based career rather than a career in clinical practice or clinical research. Thus students in ACBS the concentration will take many of the non-clinical courses currently offered by the department but they will not participate in any clinical courses or clinical training activities such as internship, practicum, and so on.

Doctoral Program in Psychology: Applied Cognitive and Brain Science (ACBS)

Curriculum
The PhD program curriculum requires student to earn a minimum of 90 credits. Students completing the concentration in Applied Cognitive and Brain Science take all or most of their core courses within the first two years. The third and fourth years, following the receipt of the master's degree, successful passing of the qualifying examinations, and advancement to doctoral candidacy, will be spent in enrichment or specialization courses negotiated with their research supervisor and in research activities.

The following section outlines the courses required for graduation for entering Bachelor's-level students.

Requirements

First Year

Fall		**Credits**
PSY 530	**Principles of Neuroscience**	3.0
PSY 610	**Data Analysis in Psychology**	3.0
PSY 560	**Teaching in Psychology**	1.0
Winter		
PSY 617	**Empirical Foundations of Unconscious Processes**	3.0
or		
PSY 865	**Special Topics in Psychology: EEG**	
PSY 710	**Data Analysis II: Multivariate Methods**	3.0
PSY 712	**History and Systems of Psychology**	3.0
Spring		
PSY 510	**Research Methods in Psychology**	3.0
PSY 517	**Social Psychology**	3.0
or		
PSY 518	**Social Cognition in Clinical Psychology**	
PSY 711	**Data Analysis III: Advanced Topics**	3.0

Second Year

Fall		
PSY 512	**Cognitive Psychology**	3.0
PSY 516	**Developmental Psychology**	3.0
or		
PSY 812	**Cognitive Neuroscience**	
	Advanced elective	3.0
Winter		

PSY 511	**Research Methods in Psychology I**	3.0
PSY 898	**Master's Thesis in Psychology**	3.0
	Advanced elective	3.0

Spring

PSY 614	**Problem-Solving and Creativity**	3.0
or		
PSY 630	**Psychopharmacology**	
PSY 898	**Master's Thesis in Psychology**	3.0
	Advanced elective	3.0

Sample Advanced Electives*

PSY 516	**Developmental Psychology**	3.0
PSY 517	**Social Psychology**	3.0
PSY 518	**Social Cognition in Clinical Psychology**	3.0
PSY 562	**Consciousness**	3.0
PSY 612	**Psychology of Human-Computer Interaction**	3.0
PSY 614	**Problem-Solving and Creativity**	3.0
PSY 616	**Motivation and Emotion**	3.0
PSY 617	**Empirical Foundations of Unconscious Processes**	3.0
PSY 621	**Theories of Personality**	3.0
PSY 630	**Psychopharmacology**	3.0
PSY 632	**Sensory and Motor Systems**	3.0
PSY 648	**Forensic Psychology/Forensic Assessment I**	3.0
PSY 649	**Forensic Assessment II**	3.0
PSY 720	**Health Psychology**	3.0
PSY 730	**Criminal Law and Psychology**	3.0
PSY 746	**Neuropsychological Evaluation: Children and Adolescents**	3.0
PSY 812	**Cognitive Neuroscience**	3.0
PSY 840	**Models of Memory**	3.0
PSY 865	**Special Topics in Psychology: Technologies in Psychology**	3.0
PSY 865	**Special Topics in Psychology: Law and Mental Health**	3.0
PSY 865	**Special Topics in Psychology: Autistic Spectrum Disorders**	3.0
PSY 865	**Special Topics in Psychology: EEG**	

For more information on the PhD program requirements, consult Department of Psychology's web site.

Joint JD/PhD Law-Psychology Program

The Earle Mack School of Law and the Department of Psychology in the College of Arts and Sciences offer a joint and integrated JD /PhD Program in Law and Psychology. The program melds two already ongoing successful endeavors, the JD degree in the School of Law and the PhD in clinical psychology in the Department of Psychology.

Students in the program complete all 85 credits required for graduation from the law school and all 91 credits required to complete the doctorate. The program allows those students who wish to pursue professional degrees in both law and psychology a more efficient plan of study. The program is designed to be completed in seven (7) years, including required psychology practica, a year's internship in an American Psychological Association accredited predoctoral mental health/forensic setting, a masters thesis, a doctoral dissertation, and 20 hours per week of cooperative training and 50 hours of pro bono service in law.

Students who are accepted into the JD/PhD program will receive full tuition remission for all psychology coursework, plus a guaranteed annual stipend that is currently at least $9,000 per year for all six years they are at the university prior to completing the clinical internship. Students with outstanding LSAT scores may be eligible for full tuition remission from the Earle Mack School of Law.

For information on the Admissions process, visit the JD/PhD Application Instructions page.

Philosophy
The program bridges the gap between legal and psychological training. By and large, lawyers and social scientists come from different cultures, with different interests, different cognitive approaches to solving problems, different research methodologies, and different attitudes toward confrontation and argument. Each profession arrives at the "truth" in different ways, and its members are exposed to different styles of education during their post-baccalaureate training. Legal education develops an understanding of case analysis, statutory interpretation, the evolution of legal traditions, and methods for resolving disputes. Education in psychology develops research and clinical skills and understanding of behavioral theories, techniques, and statistical methods. Law, which has special rules concerning evidence and proof, relies heavily on precedent and the application of legal principles to specific facts toward the goal of settling conflicts that need immediate resolution. By contrast, psychology looks at problems through an empirical lens, using psychometrically-based tools and techniques to systematically evaluate questions, but rarely ending in a "final verdict. " Because the limits of evidence and the meaning of "proof" in psychological research may differ sharply from the limits of evidence and proof in law, conflict may result when the two disciplines interact.

Goals
Within the broad framework of the program's philosophy, the JD/PhD Program in Law & Psychology has three specific goals:

1. Develop scientist-practitioners who will produce legally sophisticated social science research to aid the legal system to make better empirically-based

decisions;
2. Produce lawyer-psychologists who will participate in the development of more empirically and theoretically sophisticated mental health policy by legislatures, administrative tribunals, and the courts; and
3. Educate highly trained clinicians who can contribute to the advancement of forensic psychology in such areas as criminal law, domestic relations, and civil commitment.

In fulfilling these goals, the program trains students in an integrated and conceptually unified curriculum so they acquire a mature understanding of the interaction between the two disciplines.

Curriculum
Students attend the School of Law and the Department of Psychology simultaneously for six years, integrating course work in both disciplines each year. Students maintain continuous contact with the faculties of both schools and the developments in both disciplines over the course of each year.

In the seventh year, after obtaining the JD, students undertake a year-long supervised internship in clinical and forensic psychology and complete their doctoral dissertation. They are awarded the PhD at the end of their seventh year.
Training consists of seven elements:

1. The required existing core program in law and psychology at both schools;
2. Interdisciplinary courses; e.g. , Law and Mental Health, Behavioral Science and the Law, Seminar in Advanced Problems in Mental Health Law, Law and the Mind Sciences, and Research in Law & Psychology;
3. Supervised psycholegal research experience on teams of students' faculty mentors;
4. Legal clinics and psychology practica and internships that combine knowledge from both fields in a practical setting;
5. Electives in both fields, e.g. , bioethics, education law, health law, health psychology, employment discrimination, neuropsychology;
6. Cooperative experience and pro bono service in legal settings; and
7. Employment for at least one summer in a legal setting, e.g. , public interest law firm, governmental agency, private law firm, nonprofit association.

Requirements
Only the first year law school curriculum has set required course (which encompass the first two years for students in the joint program). The courses and seminars listed below for the third through sixth years in the law school curriculum, with some required exceptions, are recommended but subject to students' preferences

Sample Plan of Study

First Year Law Courses

Fall Semester

LAW 550S	**Torts**	4.0
LAW 554S	**Civil Procedure**	4.0
LAW 565S	**Legal Methods I**	3.0

***"J Term"* (After the New Year)**

LAW 568S	**Introduction to Interviewing, Negotiation & Counseling**	1.0

Spring Semester

LAW 556S	**Property**	4.0
LAW 558S	**Criminal Law**	4.0
LAW 560S	**Constitution Law**	4.0
LAW 566S	**Legal Methods II**	3.0

First Year Psychology Courses

	Fall Term	
PSY 721	**Principles of Psychotherapy**	3.0
	Winter Term	
PSY 520	**Psychopathology**	3.0
	Spring Term	
PSY 510	**Research Methods in Psychology I**	3.0

Second Year Law Courses

	Fall Semester	
LAW 552S	**Contracts**	4.0
	Spring Semester	
LAW 604S	**Advanced Constitutional Law***	4.0

*This course is a suggested elective and not required.

Second Year Psychology Courses

	Fall Term	
PSY 514	**Learning Foundations of Behavioral Assessment**	3.0
PSY 610	**Data Analysis in Psychology**	3.0
PSY 865	**Special Topics in Psychology: Teaching in Psychology**	3.0
	Winter Term	
PSY 522	**Intellectual Assessment**	3.0
PSY 710	**Data Analysis II**	3.0
	Spring Term	
PSY 515	**Behavioral Assessment II**	3.0
PSY 711	**Data Analysis III: Advanced Topics**	3.0

Third Year Law Courses

	Fall Semester	
LAW 634S	**Evidence**	3.0
LAW 670S	**Criminal Procedure: Investigations**	3.0
TBA	**Mental Health Law**	2.0
	Spring Semester	
LAW 644S	**Family Law**	3.0
LAW 671S	**Criminal Procedure: Prosecution & Adjudication**	3.0
TBA	**Advanced Problems in Mental Health**	2.0

Third Year Psychology Courses

	Fall Term	
PSY 512	**Cognitive Psychology**	3.0

PSY 530	**Principles of Neuroscience**	3.0
PSY 865	**Special Topics in Psychology: Mental Health Law**	2.0

	Winter Term	
PSY 620	**Personality Assessment**	3.0
PSY 712	**History and Systems of Psychology**	3.0
PSY 865	**Special Topics in Psychology: Advanced Problems in Mental Health Law**	2.0

	Spring Term	
PSY 648	**Forensic Psychology/Forensic Assessment I**	3.0
PSY 550	**Multicultural Perspectives**	3.0

Fourth Year Law Courses

	Fall Semester	
LAW 643S	**Children and the Law**	2.0
LAW 830S	**Professional Responsibility**	3.0
TBA	**Behavioral Science and the Law**	

	Spring Semester	
LAW 622S	**Employment Discrimination**	3.0
LAW 642S	**Special Education Law**	2.0

Fourth Year Psychology Courses

	Fall Term	
PSY 524	**Professional Issues and Ethics**	3.0
PSY 649	**Forensic Assessment II**	3.0
TBA	**Behavioral Science and the Law**	3.0

	Winter Term	
PSY 722	**Psychotherapy Theories**	3.0
PSY 898	**Thesis in Psychology**	3.0

	Spring Term	
PSY 517	**Social Cognition in Clinical Psychology**	3.0

Fifth Year Law Courses

	Fall Term	
LAW 931S	**Co-Op**	7.0
LAW 783S	**Bioethics**	2.0

	Spring Term	
LAW 788S	**Medical Malpractice**	3.0
LAW 678S	**Juvenile Justice Law**	4.0
TBA	**Law and the Mind Sciences**	2.0

Fifth Year Psychology Courses

	Fall Term	
PSY 897	**Practicum Seminar**	3.0

	Spring Term	
PSY 820	**Cognitive-Behavior Therapy**	3.0
PSY 899	**Practicum Fieldwork**	1.0

Sixth Year Law Courses

	Fall Term	
LAW 621S	**Federal Courts**	3.0
LAW 680S	**Death Penalty Law**	2.0

	Spring Term	
LAW 614S	**Supreme Court**	3.0
or		
LAW 606S	**Civil Rights law**	2.0

JD Awarded

Sixth Year Psychology Courses

	Fall Term	
PSY 865	**Forensic Neuropsychological Assessment**	3.0

	Spring Term	
PSY 630	**Psychopharmacology**	3.0

Seventh Year

PSY 998	**PhD Dissertation Psychology**	4.0
PSY 999	**Full Year APA-accredited psychology internship**	4.0

PhD Awarded

Master of Science in Public Policy

The Master of Science in Public Policy has a required core curriculum of nine courses, specifically designed for students to:

- develop an understanding of the social, political and ethical context of policy research, and how this understanding can be applied to an applied practice of policy analysis;
- conceptionalize, design and conduct social research for policy purposes, as well as comprehensively analyze existing social research data;
- recognize the history of public policy institutions in America and the management and governance of nonprofit organizations; and
- understand the concept of sustainability as it relates to policy planning, design, and implementation.

In addition to the core courses, the program has a focus on case study research as a unifying element of the curriculum. The curriculum reinforces coursework with a series of accompanying 1-credit, online, Case Study Research co-requisites. Students are required to choose a specific case that they will work on for the duration of the core curriculum. In each subsequent Case Study Research course, students apply the content of each accompanying core course to further research and writing on their case studies. Thus by the end of the program students will have produced a polished, in-depth analysis of a specific case that they can use to demonstrate expertise in a given policy area.

With the approval and support of the program director, students can craft a specialized course of study with their three electives, or they can take courses in one of three tracks:

1. Environmental Policy
2. Science and Technology Policy
3. Urban Systems Management

The degree can be completed part-time in two years. Select students will also be able to apply for an intensive full-time track in which they complete the degree in a single year (an option that will be available starting in Fall 2010).

For additional information, view the Center for Public Policy page on the College of Arts and Sciences' website.

Master of Science Public Policy

45.0 credits

Degree Requirements

Graduation from the program requires the successful completion of 45 credits of graduate coursework. The degree consists of nine required core courses, nine accompanying Case Study Research co-requisites, and three elective courses. With the approval and support of the Center of Public Policy Director, students can craft a specialized course of study with their three electives, or they can take courses in one of three tracks: Environmental Policy; Science and Technology Policy; or Urban Systems Management.

Required courses		**27.0 Credits**
BUSN 502	**Essentials of Economics**	3.0
ECON 616	**Public Finance and Cost-Benefit Analysis**	3.0
COM 705	**Statistical Data Analysis in Communication**	3.0
INFO 530	**Foundations of Information Systems**	3.0
PLCY 503	**Theory and Practice of Policy Analysis**	3.0
PLCY 504	**Methods of Policy Analysis**	3.0
PLCY 506	**Institutional Dynamics of the Policy Process**	3.0
PLCY 507	**Nonprofit Organizations**	3.0
PLCY 509	**Sustainability and Public Policy**	3.0

Case Study courses **9.0 Credits**

The curriculum reinforces coursework with a series of accompanying 1-credit, online, Case Study Research co-requisites. In the first, students are introduced to case study methodology and practice, and required to choose a specific case that they will work on for the duration of the core curriculum. In each subsequent Case Study Research course, students apply the content of each accompanying core course to further research and writing on their case studies. Thus by the end of the program students have produced a polished, in-depth analysis of a specific case that they can use to demonstrate expertise in a given policy area.

PLCY 501	**Introduction to Case Study Research**	1.0
PLCY 502	**Case Study Research***	1.0

*Can be repeated for credit a maximum of 8 times, for 8.0 credits. .

Elective courses **9.0 Credits**

Elective courses are taught under the PLCY 590: Special Topics in Public Policy, or one of the participating departments.

Master of Science in Publication Management

Students enter the Publication Management program from diverse undergraduate backgrounds, including liberal arts, business administration, journalism, communications, technical writing, and information studies. The program builds on the individual's undergraduate content base by providing knowledge about the key elements of the publishing process needed by a publishing executive. The program also serves the needs of individuals already employed in the printing or publishing industry who are seeking to update or broaden their knowledge.

Students completing the program may find career opportunities in the management of traditional publishing companies as well as in corporate communication areas of a broad range of business and education. Entrepreneurial opportunities provide another area of career development.
All courses in the program are offered in the evening on a part-time or full-time basis. The curriculum comprises courses in technical and science writing and editing, product acquisition, design, production, and printing technology offered through the College of Arts and Sciences and business management and marketing courses offered through the LeBow College of Business.

Master of Science Program in Publication Management

45.0 credits

General Requirements

Graduation from the program requires the successful completion of all program pre- and co-requisites and 45 credits of graduate coursework.

Curriculum

Required courses		**30.0 Credits**
COM 510	**Technical Writing**	3.0
COM 570	**Technical and Science Editing**	3.0
PMGT 630	**Publishing Environment**	3.0
PMGT 631	**Page Design and Production**	3.0
PMGT 635	**Periodicals Publishing**	3.0
PMGT 730	**Book Publishing**	3.0
PMGT 745	**Electronic Publishing**	3.0
PMGT 735	**Publication Budgeting and Estimating**	3.0
PMGT 740	**Publications Marketing**	3.0
PMGT 800	**Independent Study**	3.0
or		
PMGT 801	**Independent Project**	3.0

Elective courses		**15.0 Credits**

Students select five additional courses for 15 elective credits.

One course (3 credits) must be a COM elective.

Electives may include, but are not limited to the following:		
COM 500	**Persuasive Writing and Reading in Communication**	3.0
COM 520	**Science Writing**	3.0
COM 530	**Technical and Science Photography**	3.0
COM 540	**Technical and Science Graphics**	3.0
COM 610	**Theories of Communication and Persuasion**	3.0
COM 620	**Message Design and Evaluation**	3.0
COM 630	**Developing Software Documentation**	3.0
COM 640	**Desktop Publishing**	3.0
COM 645	**Strategy and Design for Multimedia**	3.0
COM 650	**Telecommunications Policy**	3.0
COM 655	**Telecommunication Policy in the Information Age**	3.0
COM 660	**Investigative Journalism**	3.0
COM 665	**Journalists, Courts and the Law**	3.0

COM 670	**Medical Writing**	3.0
COM 675	**Grant Writing: Arts/Humanities**	3.0
COM 680	**Public Relations Strategies**	3.0
COM 690	**Special Topics in Communication**	3.0
COM 865	**Interconnections: Science and Technology, Literature and the Arts**	3.0
COM 875	**Ethics for Technical and Scientific Communication**	3.0
COM 880	**Ethics for Public Communication**	3.0
ORGB 625	**Leadership and Professional Development**	3.0
MKTG 601	**Marketing Strategy and Planning**	3.0
MKTG 630	**Global Marketing**	3.0

Master of Science in Science, Technology, and Society

General Information
The increasingly complex nature of modern life has steadily eroded the distinctions traditionally made between social and technical issues. Leaders among scientists, engineers, policy-makers, managers, investors, and educators must base their decisions on a diverse array of data, new tools for gathering and evaluating this data, integrated systems of information, and interdisciplinary approaches to problem-solving. In an era of expanding global investment and complex regulation, opportunities will accrue to those who can identify potential problems early and formulate multifaceted, long-term, and viable solutions.

The graduate program in Science, Technology, and Society (STS) targets this new leadership cadre. STS at Drexel integrates the study of history, science and technology, public policy, and contemporary social and political issues. It combines core courses in the history of science and technology with classes that focus on gender and race, democratic institutions, ethics, and future challenges to industry and government. The program also provides a unique international orientation, which recognizes the crucial context of globalization in the advancement of science and technology and the broad implications of scientific research and innovation in the politics and history of the modern world.

Prospective students for the MS in STS see this educational opportunity as an essential factor in their skill enhancement and career advancement. They are recent college graduates in the social sciences, humanities, natural sciences, and engineering; middle and high school teachers; and professionals in businesses, city and state government offices, and area hospitals. Students can attend full time or part time and complete all coursework in the evening.
For additional information, visit the Masters Program in Science, Technology, and Society web page.

Master of Science in Science, Technology, and Society

Curriculum
The MS degree in STS requires 45 credits of coursework. At least 36 credits must be in the Department of History & Politics. Required courses total 27 credits (including a 3-credit research seminar, a 3-credit practicum, and 6 credits of research and writing for the thesis, which may be tied to the practicum). Remaining credits are chosen from a list of electives.

Basic requirements		**15.0 Credits**
HIST 501	**Introduction to Science, Technology, and Society**	3.0
HIST 585	**Technology in Historical Perspective**	3.0
HIST 586	**Gender and Technology**	3.0
or		
PSCI 573	**Gender, Race, and Science**	3.0
PSCI 555	**International Political Economy**	3.0
One of the following courses:		
PSCI 571	**Science and Technology Public Policy**	3.0
PSCI 557	**Globalization and Transition**	3.0
PSCI 541	**Technology in Developing Countries**	3.0
PSCI 570	**International Environmental Policy**	3.0

Advanced requirements		**12.0 Credits**
HIST 696	**Seminar in Science, Technology, and Society**	3.0
or		
PSCI 696	**Seminar in Science, Technology, and Society**	3.0
HIST 697	**Practicum: Science and Technology in Action**	3.0
HIST 698	**MS Thesis**	6.0
or		
PSCI 698	**MS Thesis**	6.0

Suggested Electives (select at least three of the following)		**9.0 Credits**
HIST 541	**Technology in Developing Countries**	3.0
HIST 555	**International Political Economy and Technology**	3.0
HIST 557	**Globalization and Transition**	3.0
HIST 583	**History of Medicine and Disease**	3.0
HIST 586	**Gender and Technology**	3.0
HIST 590	**Themes in the History of Science**	3.0
HIST 591	**Themes in the History of Technology**	3.0
PSCI 541	**Technology in Developing Nations**	3.0
PSCI 555	**International Political Economy**	3.0
PSCI 557	**Globalization and Transition**	3.0
PSCI 570	**International Environmental Policy**	3.0
PSCI 573	**Gender, Race, and Science**	3.0
PSCI 574	**Alternative Policy Perspectives**	3.0
PSCI 575	**Appropriate Technology and Development**	3.0

COM 650	**Telecommunications Policy**	3.0
COM 690	**Grant Writing**	3.0
MGMT 602	**Management and Technology**	3.0
PSY 612	**Human-Computer Interaction**	3.0

Remaining electives	**9.0 Credits**
Any remaining electives may be taken in the Department of History & Politics or other departments and colleges in the university, chosen in consultation with the STS faculty.	