



DREXEL UNIVERSITY  
College of  
Arts and Sciences

# CATALOG

2020-2021

**GRADUATE**



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# The College of Arts and Sciences

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## About the College

By pursuing excellence in research and scholarship, we train our graduate students to become ethical professionals with expertise in particular areas of inquiry and an appreciation for the fundamental interactions among disciplines in a fast-changing, challenging, and diverse world.

## Graduate Programs

Drexel University's College of Arts and Sciences (<http://www.drexel.edu/coas/>) recognizes that our ever-evolving, fast-paced world requires a new approach to graduate education, one that understands that change begins with by minds inspired to lead. Innovation requires more than ambition—it requires versatility. Our graduate programs train students to be not only experts in their chosen fields, but also agile enough to engage in the cross-disciplinary work needed to address modern problems on a global scale. Our faculty members challenge students to see past their own perspectives and establish a deeper understanding of humanity's needs. Students partner with faculty mentors to conduct cutting-edge research that affects the world now. Internships and co-op programs insert students within a professional culture, offering hands-on practical training and application of coursework to the real world.

## Majors

- Biological Sciences (MS, PhD) (p. 2)
- Chemistry (MS, PhD) (p. 5)
- Communication (MS) (p. 10)
- Communication, Culture and Media (MS, PhD) (p. 13)
- Creative Writing (MFA) (p. 15)
- Environmental Policy (MSEP) (p. 16)
- Environmental Science (MSES, PhD) (p. 18)
- Mathematics (MS, PhD) (p. 20)
- Physics (MS, PhD) (p. 22)
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## Minors

- Communication (p. 38)
- Communication, Culture, and Media (p. 38)
- **NEW:** Interdisciplinary Team-Oriented Creativity

## Certificates

- **NEW:** Public Relations

## 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 language of STEM (Science, Technology, Engineering, and Math), Language of Media and Design, Global Business English program (GLOBE), English for academic purposes, TOEFL and IELTS preparation, ESL Teaching enhancement programs, and other subjects.

## Graduate Preparation and Resources

Many graduate students begin their studies at Drexel in the English Language Center and the Drexel Graduate Preparation ([https://drexel.edu/elc/elc\\_programs/drexel-graduate-prep/](https://drexel.edu/elc/elc_programs/drexel-graduate-prep/)) (GradPrep) summer program 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 US classroom. All Drexel international students have access to tutoring and other academic skills workshops throughout the academic year.

Some graduate programs within the College of Arts and Sciences may accept students who are academically admissible but need further English language study and refer them to the GradPrep program. Please contact Graduate Admissions to find out if your desired program of study accepts GradPrep.

## Additional Information

For more information, see the ELC website (<https://drexel.edu/elc/>) 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](mailto:elc@drexel.edu)

## Biological Sciences

*Major: Biological Sciences*

*Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0 (MS) or 90.0 (post-bachelor's) or 45.0 (post-master's)*

*Co-op Option: Available for full-time on-campus master's-level students*

*Classification of Instructional Programs (CIP) code: 26.0101*

*Standard Occupational Classification (SOC) code: 19-1029*

## About the Program

The Department of Biology (<http://drexel.edu/coas/academics/departments-centers/biology/>) offers graduate programs in biological sciences leading to the doctorate degree and to the thesis or non-thesis Master of Science degree. The curricula and research programs are designed to help students achieve success in their degree programs and pursue positions of leadership in their respective fields of research.

The intellectual life of the department relies heavily on the participation, creativity, and the energy of graduate students; therefore the department expects students to be vigorously involved in courses, seminars, journal clubs, research, informal discussions, and departmental functions.

## Additional Information

For more information, contact the Department of Biology (<https://drexel.edu/coas/academics/departments-centers/biology/>) at 215-895-2624.

## Degree Requirements (MS)

Soon after matriculation, the student completes a plan of study with the advisor outlining their 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 registering for an MS with graduate co-op will gain 6 months of work experience in the summer/fall term (year 1/year 2). The Steinbright Career Development Center (<http://drexel.edu/scdc/>) will provide students with an overview of professionalism, resume writing, and the job search process. Students will not earn academic credit for the co-op but will earn 9.0 non-academic co-op units per term.

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. Alternatively, all non-thesis students must pass a comprehensive examination as a condition of their degree completion.

## Program Requirements

### Requirements for the MS Curriculum with Thesis

BIO 500	Biochemistry I	3.0
BIO 540	Readings in Molecular and Cellular Bioscience and Biotechnology	3.0
BIO 601	Research Methods	3.0
BIO 632	Advanced Cell Biology	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0
BIO 997	Research in Bioscience	12.0
ENVS 506	Biostatistics	3.0
Bioscience electives		15.0
RCRG 600	An Introduction to the Responsible Conduct of Research	0.0
<b>Total Credits</b>		<b>45.0</b>

### Requirements for the Non-Thesis MS with Graduate Co-op

BIO 500	Biochemistry I	3.0
BIO 632	Advanced Cell Biology	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0
COOP 500	Career Management and Professional Development for Master's Degree Students	1.0
ENVS 506	Biostatistics	3.0
Bioscience electives*		32.0
<b>Total Credits</b>		<b>45.0</b>

### Requirements for the Non-thesis MS Curriculum

BIO 500	Biochemistry I	3.0
BIO 632	Advanced Cell Biology	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0
ENVS 506	Biostatistics	3.0
Bioscience electives *		33.0
<b>Total Credits</b>		<b>45.0</b>

\* \*Non-thesis students may elect to take up to 4.0 credits of BIO 997 Research in Bioscience.

### Bioscience Electives Include:

BIO 534	Bioinformatics I	3.0
BIO 535	Bioinformatics II	3.0
BIO 610	Biochemistry of Metabolism	3.0
BIO 613	Genomics	3.0
BIO 614	Behavioral Genetics	3.0
BIO 615	Proteins	3.0
BIO 616	Biochemistry of Major Diseases	3.0
BIO 620	Biomembranes	3.0
BIO 630	Cell Biology of Disease	3.0
BIO 644	Human Genetics	3.0
BIO 646	Stem Cell Research	3.0
BIO 650	Virology	3.0
BIO 661	Neurobiology of Autism Disorders	3.0
BIO 662	Biology of Neuron Function	3.0
BIO 663	Molecular Mechanisms of Neurodegeneration	3.0
BIO 664	Neurobiology of Disease	3.0

## Degree Requirements (PhD)

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 program in Biological Sciences:

- 90.0 (post-bac) or 45.0 (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 students in their third year and beyond.

## 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 by the end of the first year winter quarter. It is anticipated that the graduate coursework will be completed during the first two years or less. Students should check with the department for a list of available electives.

## Program Requirements

### Cell Molecular Genetics Track

#### Core Requirement Courses

BIO 540	Readings in Molecular and Cellular Bioscience and Biotechnology	3.0
BIO 601	Research Methods	3.0
RCRG 600	An Introduction to the Responsible Conduct of Research	0.0

#### Distribution Required Courses: Must take all 3

BIO 500	Biochemistry I	3.0
BIO 632	Advanced Cell Biology	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0

#### Statistics Requirement Course

ENVS 506	Biostatistics *	3.0
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#### Required Elective Courses: Must take 1

Research and Research Seminars **		69.0
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BIO 864	Graduate Research Seminar	
BIO 997	Research in Bioscience	
<b>Total Credits</b>		<b>90.0</b>

\* Or approved substitute course.

\*\* BIO 864 and BIO 997 are taken multiple times to reach 90.0 credits.

**Ecology Evolution Track**

**Core Requirement Courses**

BIO 540	Readings in Molecular and Cellular Bioscience and Biotechnology	3.0
BIO 601	Research Methods	3.0
RCRG 600	An Introduction to the Responsible Conduct of Research	0.0

**Distribution Required Courses: Must take 2 9.0-10.0**

BIO 636	Population Genetics *	
ENVS 526	Molecular Ecology *	
ENVS 528	Conservation Biology	

**Statistics Requirement Course**

ENVS 506	Biostatistics **	3.0
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**Required Elective Courses: Must take 2 6.0**

**Research and Research Seminars \*\*\* 66.0**

BIO 864	Graduate Research Seminar	
BIO 997	Research in Bioscience	

<b>Total Credits</b>		<b>90.0-91.0</b>
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\* Offered every other year.

\*\* Or approved substitute course.

\*\*\* BIO 864 and BIO 997 are taken multiple times to reach 90.0 credits.

### Sample Plan of Study (MS)

#### Thesis - MS Sample Plan of Study

**First Year**

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
BIO 500	3.0 BIO 635	3.0 BIO 632	3.0 VACATION	
BIO 540	3.0 BIO 997 (OR Bioscience Electives)	6.0 ENVS 506	3.0	
Bioscience elective	3.0 RCRG 600	0.0 Bioscience elective or Research	3.0	
				<b>0</b>
			<b>9</b>	<b>9</b>

**Second Year**

Fall	Credits Winter	Credits
BIO 601	3.0 BIO 997	3.0
BIO 997	3.0 Bioscience electives	6.0
Bioscience electives	3.0	
		<b>9</b>

**Total Credits 45**

#### Non-Thesis with Graduate Co-op - MS Sample Plan of Study

**First Year**

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
BIO 500	3.0 BIO 635	3.0 BIO 632	3.0 COOP EXPERIENCE	
COOP 500	1.0 Bioscience electives	6.0 ENVS 506	3.0	

Bioscience electives	6.0	Bioscience elective	3.0
<b>10</b>		<b>9</b>	<b>9</b>

**Second Year**

Fall	Credits Winter	Credits Spring	Credits
COOP EXPERIENCE	Bioscience electives	9.0 Bioscience electives	8.0
<b>0</b>		<b>9</b>	<b>8</b>

**Total Credits 45**

### Non-Thesis - MS Sample Plan of Study

**First Year**

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
BIO 500	3.0 BIO 635	3.0 BIO 632	3.0 VACATION	
Bioscience electives	6.0 Bioscience electives	6.0 ENVS 506	3.0	
			Bioscience electives	3.0
		<b>9</b>	<b>9</b>	<b>0</b>

**Second Year**

Fall	Credits Winter	Credits
Bioscience electives	9.0 Bioscience electives	9.0
		<b>9</b>

**Total Credits 45**

### Biological Sciences Faculty

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

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

Valerie Bracchi-Ricard, PhD (*University Joseph Fourier, Grenoble, France*). Research Assistant Professor. Role of TNF and TNF receptors in neuroinflammation and remyelination following spinal cord injury.

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

Felice Elephant, PhD (*Temple University*) Director of the Biology Graduate Program. Professor. Understanding the roles of two classes of chromatin regulatory proteins termed histone acetyltransferases(HATs)and histone de-methylases.

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

Tali Gidalevitz, PhD (*University of Chicago*). Associate 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*) Department Head, Director, Bioko Biodiversity Protection Program Co-Founder, Central African Biodiversity Alliance. 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.

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

Kari Lenhart, PhD (*Princeton University*). Assistant Professor. Coordination of stem cell behavior and regulation of stem cell cytokinesis in the young and aged niche.

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.

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

Sean O'Donnell, PhD (*University of Wisconsin-Madison*). Professor. Climate ecology, focusing on geographic variation and species differences in thermal physiology; Behavior and ecology of army ant/bird interactions; Neurobiology, focusing on brain plasticity and brain evolution in social insects.

Ryan Petrie, PhD (*McGill University*). Assistant Professor. Mechanisms of cell movement through three-dimensional extracellular matrix.

Jerome Ricard, PhD (*University Joseph Fourier, Grenoble, France*). Research Assistant Professor. Inflammation and cell death after spinal cord injury. Regulation of cell death by Eph receptors.

Jacob Russell, PhD (*University of Arizona*). Professor. Microbiomes and metagenomics; ecology and evolution of symbiosis.

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*) Executive Vice Provost for Research, Director of the RNAi Resource Center. Professor. Identification and characterization of genes and proteins involved in Alzheimer's disease.

Kevin P.W. Smith, PhD (*Drexel University*). Associate Teaching Professor. Linking behavioral ecology and organismal diversity, neonate behavior in herpetological models, STEM education.

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

Jennifer Stanford, PhD (*Harvard University*). Associate Professor. Evaluating and improving approaches to teach STEM content in higher education environments to promote student learning, engagement in STEM courses, and STEM student retention.

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.

## Emeritus Faculty

Joseph Bentz, PhD (*State University of New York [SUNY] at Buffalo*). Professor Emeritus. Biophysics, biochemistry and biopharmaceutics,

focused on the molecular basis of biological membrane transport and fusion.

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

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

## Chemistry

Major: Chemistry

Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)

Calendar Type: Quarter

Total Credit Hours: 45.0 (MS); 90.0 (PhD)

Co-op Option: None

Classification of Instructional Programs (CIP) code: 40.0501

Standard Occupational Classification (SOC) code: 19-2031

## About the Program

The Department of Chemistry (<http://drexel.edu/coas/academics/departments-centers/chemistry/>) offers graduate programs in analytical chemistry, atmospheric chemistry, inorganic chemistry, organic chemistry, materials chemistry, physical chemistry, educational chemistry, and polymer chemistry. The curriculum is designed to prepare students for the research and practical application of chemistry to challenges facing mankind. 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 Department of Chemistry 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.

## Admission/Financial Assistance

### Requirements for Admission

For admission to graduate study, the department requires a BS in chemistry or the equivalent. This requirement applies to full-time and part-time students working toward either the MS or PhD. Generally, in order to be considered for admission, a successful applicant should have taken two semester courses of organic, analytical and physical chemistry with corresponding laboratory courses. In addition, they should have taken an upper-level inorganic chemistry course. All entering MS and PhD students are required to take a series of two-hour exams in analytical, inorganic, organic, and physical chemistry to help assess their preparation

for graduate work in chemistry. The scores obtained on these exams are used as a basis for course selection.

Applicants for admission to PhD level graduate studies must submit Graduate Record Examination (GRE) results with their application. GRE scores are helpful to the Chemistry Department and the Office of Admissions, and are required for those students requesting financial support, i.e., a teaching assistantship (TA) and/or would like to be considered for a Dean's Scholarship or a Provost's Fellowship. Applicants for admission to MS level graduate studies are also encouraged to submit their GRE results with their application.

## Financial Assistance

Graduate students at Drexel can obtain two main types of financial support: teaching assistantships and research assistantships. Teaching assistantships are available on a competitive basis to incoming students and are normally renewable for several years. All those requesting financial assistance must submit GRE scores.

Forms, details about requirements, and information about application deadlines are all available on the Chemistry (<http://www.drexel.edu/grad/programs/coas/chemistry/>) page of Drexel's Graduate Admissions website.

## Master of Science in Chemistry

### Degree Requirements

The MS degree is awarded after satisfactory completion of a minimum of 45.0 credit hours in chemistry and related fields, at least 30.0 credits of which must be taken at Drexel. Both thesis and nonthesis options are available.

### Course Requirements

The course requirements for both thesis and non-thesis 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.

### Program Requirements

<b>Major Sequence</b>	9.0
Select one of the following sequences:	
<b>Inorganic Chemistry</b>	
CHEM 521	Inorganic Chemistry I
CHEM 522	Inorganic Chemistry II
CHEM 523	Inorganic Chemistry III
<b>Analytical Chemistry</b>	
CHEM 530	Analytical Chemistry I
CHEM 531	Analytical Chemistry II
CHEM 755	Mass Spectrometry
<b>Organic Chemistry</b>	
CHEM 541	Organic Chemistry I
CHEM 542	Organic Chemistry II
CHEM 543	Organic Chemistry III
<b>Physical Chemistry</b> *	
CHEM 557	Physical Chemistry I
CHEM 558	Physical Chemistry II
CHEM 555	Quantum Chemistry Of Molecules I
<b>Polymer Chemistry</b>	
CHEM 561	Polymer Chemistry I

CHEM 562	Polymer Chemistry II	
CHEM 563	Polymer Chemistry III	
Additional Sequence Courses		12.0
Electives**		24.0
<b>Total Credits</b>		<b>45.0</b>

\* Each of these courses can be replaced by CHEM 554 or CHEM 752.

\*\* The remaining 24 credits may be satisfied by any graduate Chemistry 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.

Graduate cooperative education placement is available for this major. Register for COOP 500 for 1.0 credit. The credit will count toward student's elective credits.

## Thesis Option

Up to 9.0 credits of CHEM 997 *Graduate Research* may be counted towards a master's thesis. 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 are generally required to elect the thesis option if they do not pursue the PhD program at Drexel.

## PhD in Chemistry

### Degree Requirements

The PhD degree is awarded in any of eight main areas of chemistry: analytical, atmospheric, inorganic, organic, materials, 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 30.0 credits of coursework in chemistry (outlined in the Course Requirements (p. 6) 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 their 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.

### Thesis Proposal and Candidacy Examination

The thesis proposal is designed to help the student to conduct their 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 their own. The proposal should contain a literature review and a description of the student's research project including results of experiments and investigations already conducted as well as future work. The examination at which the thesis proposal is presented and where the student's knowledge of the proposal related chemistry should be scrutinized. The exam should be held no later than the end of the **spring** term of the **second** year for **full-time** students or the end of the **summer** term of the **second** year for **part-time** students. The scheduling of the oral exam is contingent on the acceptance of the candidate's proposal by their committee. Details of the proposal review conducted by the committee are provided in the Graduate Handbook. The acceptance of the proposal and a passing grade on this examination are required for continuation in the PhD program.

### Thesis

A PhD thesis—the heart of the PhD degree—must be written, accepted by the research advisor, 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 advisor, to submit an acceptable thesis. It is expected that the student will have at least one peer-reviewed research article accepted for publication by the time of the thesis defense. The student must be the first author on this paper.

## Sample Plan of Study

### Without Co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CHEM 521, 530, 541, 557, or 561	3.0 CHEM 522, 522, 531, 542, 558, or 562	3.0 CHEM 523, 755, 543, 555, or 563	3.0 VACATION	
Two Graduate CHEM Courses**	6.0 Two Graduate CHEM Courses**	6.0 Two Graduate CHEM Courses**	6.0	
	9	9	9	0
Second Year				
Fall	Credits Winter	Credits Spring	Credits	
Two Graduate CHEM Courses**	6.0 Two Graduate CHEM Courses**	6.0 Two Graduate CHEM Courses**	6.0	
	6	6	6	
<b>Total Credits 45</b>				

\* In the Fall quarter, complete one course in one of the major areas: Analytical, Inorganic, Organic, Physical, or Polymer Chemistry. In Winter and Spring quarters, complete two other sequence courses in the major area. For the Physical Chemistry major area, CHEM 554 OR CHEM 752 can replace CHEM 557, CHEM 558 or CHEM 555.

\*\* SUGGESTED OPTIONS: major area electives and non-major area sequence electives not previously taken, CHEM 767 (*Chemical Information Retrieval*, 3.0 credits, fall term only), CHEM 997 (*Research*, up to 9.0 credits), CHEM 865 (*Chemistry Research Seminar*, 3.0 credits).

At least one sequence course from each of the major areas, a total of 12.0 credits, should be completed as part of the required CHEM electives.

### With Co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CHEM 521, 530, 541, 557, or 561	3.0 CHEM 522, 531, 542, 558, or 562	3.0 CHEM 523, 755, 543, 555, or 563	3.0 GRADUATE COOP EXPERIENCE	
COOP 500	1.0 Two Graduate CHEM Courses**	6.0 Two Graduate CHEM Courses**	6.0	
Two Graduate CHEM Courses**	6.0			
	10	9	9	0
Second Year				
Fall	Credits Winter	Credits Spring	Credits	
GRADUATE COOP EXPERIENCE	Three Graduate CHEM Courses**	8.0 Three Graduate CHEM Courses**	9.0	
	0	8	9	
<b>Total Credits 45</b>				

\* In the Fall quarter, complete one course in one of the major areas: Analytical, Inorganic, Organic, Physical, or Polymer Chemistry. In Winter and Spring quarters, complete two other sequence courses in the major area. For the Physical Chemistry major area, CHEM 554 OR CHEM 752 can replace CHEM 557, CHEM 558 or CHEM 555.

\*\* SUGGESTED OPTIONS: major area electives and non-major area sequence electives not previously taken, CHEM 767 (*Chemical Information Retrieval*, 3.0 credits, fall term only), CHEM 997 (*Research*, up to 9.0 credits), CHEM 865 (*Chemistry Research Seminar*, 3.0 credits).

At least one sequence course from each of the major areas, a total of 12.0 credits, should be completed as part of the required CHEM electives.

### Facilities

There are seven undergraduate teaching laboratories in the department: three freshman Chemistry Laboratories, two advanced Organic Chemistry Laboratories, a Physical Chemistry Laboratory, an Analytical Instrumentation Laboratory, and a combined Analytical/Inorganic Chemistry Laboratory.

### Mass Spectrometry Laboratory

The Chemistry Department maintains a professionally staffed mass spectrometry facility available to all members of the University community. Current operating instrumentation is listed below.



- Bruker Autoflex III matrix-assisted laser desorption ionization time-of-flight mass spectrometer (MALDI TOFMS NSF CRIF-MU #0840273)
- Thermo-Electron LTQ-FT 7T Fourier transform ion cyclotron resonance (FT-ICR) spectrometer with both atmospheric pressure chemical ionization (APCI) and electrospray ionization (ESI) sources interfaced with a Thermo-Finnigan Surveyor high-performance liquid chromatography (HPLC) system
- Micromass AutoSpec M high-resolution magnetic sector MS with fast atom bombardment, desorption chemical ionization and electron impact capability
- Sciex API3000 triple quadrupole mass spectrometer also equipped with both ESI and APCI sources interfaced to a Perkin-Elmer series 200 HPLC system
- Varian Saturn 2000 gas chromatograph/ion-trap mass spectrometer system with both electron impact and chemical ionization capability

## Nuclear Magnetic Resonance Facility (NMR)

- 500MHz Varian Unity Inova NMR with multi-nuclear capability, a cryogenically cooled triple resonance model ( $^1\text{H}$   $\{^{13}\text{C}/^{15}\text{N}\}$ ) probe suitable for protein analysis.
- 400 MHz Varian Mercury (2 RF channels) with double resonance auto-switchable broadband probe ( $^1\text{H}/^{19}\text{F}/^{13}\text{C}/^{31}\text{P}$ ,  $^1\text{H}/^{19}\text{F}\{^{15}\text{N}-^{31}\text{P}\}$ )
- 90MHz Anasazi Eft-90 MHz NMR
- Varian E-12 X-band CW Electron Paramagnetic Resonance spectrometer (with 77 K cryogenic capability)

Analytical Instrumentation Laboratory

## Mass Spectrometry

- Bruker Autoflex III matrix-assisted laser desorption ionization time-of-flight mass spectrometer (MALDI TOFMS NSF CRIF-MU #0840273)
- Thermo-Electron LTQ-FT 7T Fourier transform ion cyclotron resonance (FT-ICR) spectrometer with both atmospheric pressure chemical ionization (APCI) and electrospray ionization (ESI) source interfaced with a Thermo-Finnigan Surveyor high-performance liquid chromatography (HPLC) system
- Micromass AutoSpec M high-resolution magnetic sector Mass Spectrometer with fast atom bombardment, desorption chemical ionization and electron impact capability
- Varian Saturn 2000 gas chromatograph/ion-trap mass spectrometer system with both electron impact and chemical ionization capability
- Shimadzu 2030 Gas Chromatography Mass Spectrometry (GC/MS) capable of Liquid, Headspace, and Solid Phase Micro Extraction (SPME)
- Shimadzu 8050 triple quadrupole mass spectrometer (MS) with atmospheric pressure chemical ionization (APCI), electrospray ionization (ESI), and Dual Ionization (DUIS) sources interfaced to a Shimadzu Prominence high-performance liquid chromatography (HPLC) system with additional Diode Array Detector (DAD).
- Shimadzu 8020 Benchtop Linear matrix-assisted laser desorption ionization time-of-flight mass spectrometer (MALDI-TOF)

- PerkinElmer Clarus 500 Gas Chromatography Mass Spectrometer (GC/MS)

## Chromatography (Liquid and Gas)

- Shimadzu 2030 Gas Chromatography with both Flame Ionization (FID) and Barrier Discharge Ionization (BID) detectors
- PerkinElmer Clarus 500 GC with both Flame Ionization (FID) and thermal conductivity (TCD) detectors
- Shimadzu iSeries high-performance liquid chromatography (HPLC) system with diode array (DAD) and refractive index (RI) detectors
- Shimadzu Nexera ultra high-performance liquid chromatography system (UHPLC) with diode array (DAD), and evaporative light scattering (ELSD) detectors. This system is additionally interfaced to a Shimadzu Fraction Collector.
- SciEX PAC/E MDQ Plus Capillary Electrophoresis with single wavelength UV/Vis, and Diode Array detectors (DAD)

## Absorbance Spectroscopy

- Thermo NanoDrop One UV/Vis Spectrometer
- Shimadzu UV1900 UV/Vis Spectrometer with temp. control
- Shimadzu UV2600 UV/Vis Spectrometer with temp. control
- Shimadzu UV3600Plus NIR/UV/Vis Spectrometer with temp. control and can additionally be interfaced with a 150mm integrating sphere
- Jasco J-1500 Spectropolarimeter (Circular Dichroism) with Temp. control
- Shimadzu AA-2000 atomic absorption spectrometer capable of Flame, Graphite Furnace, or Hydride Vapor Generator

## Infra-Red Spectroscopy

- Shimadzu Tracer-100 FTIR spectrometer can be interfaced with Transmission, ATR, HATR, or Diffuse/Specular Reflectance accessories
- Shimadzu Tracer-100 interfaced with the AIM-9000 IR Microscope capable of measurements in the Near, Mid and Far IR region of the spectrum
- PerkinElmer Spectrum One FTIR can be interfaced with ATR, Transmission, or Diffuse/Specular Reflectance accessories
- PerkinElmer Spectrum 2 FTIR can be interfaced with ATR, Transmission accessories

## Fluorescence Spectroscopy

- Shimadzu RF-6000 Fluorescence Spectrometer can be interfaced with sample temp. controller
- ISS Chronos DFD Digital Frequency and Time Domain Spectrometer capable of SteadyState and picosecond Lifetime measurements, can also be interfaced with sample temp. controller
- PerkinElmer LS-55 Luminescence Spectrometer
- Kin-Tek SF-2004 Stopped Flow Fluorescence Spectrometer, also interfaced with diode array absorbance detector
- Promega Qubit 4 Fluorimeter (470nm and 635nm LED excitation sources – for biological and protein applications)

## Raman Spectroscopy

- Renishaw RM-2000 Vis Raman Spectrometer
- Renishaw RM-2000 UV Raman Spectrometer (Currently NOT operational)

### Microscopy

- Veeco diNanoScope 3D Multimode Atomic Force Microscope
- Leica Inverted Fluorescence Microscope
- Zeiss Epi-Fluorescence Microscope
- Camaag TLC Plate Imager

### Physical Measurements

- Shimadzu SALD 7500Nano Particle Size Analyzer equipped with a wet measurement, small volume and high concentration accessories
- Shimadzu TGA-50 Thermogravimetric analysis
- Brookfield DV-II+ Viscometer and Rheometer can be equipped with spindle, or cone/plate attachments
- Horiba LB-550 Dynamic Light Scattering

### Electrochemistry

- BASi Epsilon Eclipse (Potentiostat | Galvanostat | Biopotentiostat) with Rotating Disk Electrode and C-3 cell stand accessories
- BASi PalmSens4 portable (Potentiostat | Galvanostat | Impedance Analyzer)

### Synthesis

- CEM MARS6 Microwave Digestion System
- UCT Positive Pressure Manifold for Solid Phase Extraction (SPE)
- BioTage TurboVap LP Evaporator

### Electronics Tools

- National Instruments ELVIS III with Complete Labview system
- Quanser Analog Electronics Lab interface Board for the ELVIS system
- Keysight InfiniiVision X-series Oscilloscope 4 channel 100MHz, with 20MHz arbitrary waveform generator, and 3-digit multimeter

### Atomic Force Microscopy

The department has a Veeco multimode Atomic force microscopy (AFM) for research and education. AFM, also called scanning force microscopy (SFM), is one of the foremost tools for imaging, measuring, and manipulating matter at the nanoscale. It is when a fine tip is scanned across a surface the tip-surface force is measured to provide topographic, frictional, and adhesion information of a surface. With the ability to perform non-invasive, high-resolution surface imaging and force measurement, AFM has become an essential characterization tool in multiple disciplines in life science, biomedical engineering, nanoengineering, chemistry, materials science, and other related fields.

### 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 620 computers running Hyperchem v 8.0. Research laboratories for each of the department faculty members

are located in Disque and Stratton Halls as well as in the Bossone Research Center. Instrumentation available in the research laboratories is described on individual faculty web pages. Additional full-time support includes two instrument specialists (for NMR, the Analytical Instrumentation Laboratory and the Mass Spectrometry facility).

## Chemistry Faculty

Reza Farasat, PhD (*University of Alabama*). Assistant Teaching Professor. Modification of polymers for diverse applications; utilizing Thermoanalysis techniques to study polymeric and non-polymeric materials; nanotechnology; applying Multi-detector Size Exclusion Chromatography for characterization of polymers; creating composites to improve materials' properties.

Fraser Fleming, PhD (*University of British Columbia (Canada)*). Professor. Nitriles, Isonitriles, Stereochemistry, Organometallics

Joe P. Foley, PhD (*University of Florida*) *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*). Associate Teaching Professor. Bioorganic chemistry and chemical biology; bioinorganic chemistry and biochemistry.

Haifeng Frank Ji, PhD (*Chinese Academy of Sciences*). Professor. Micromechanical sensors for biological and environmental applications; Nanomechanical drug screening technology.

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.

Jamie Ludwig, PhD (*UT Southwestern Medical Center*). Discovery and optimization of biocatalytic transformations for use inorganic synthesis.

Dionicio Martinez-Solaro, PhD (*University of Alabama*). Assistant Professor. Total synthesis of complex biologically active natural products serving as inspirational platforms for the discovery and development of new reactions and synthetic methods.

Craig McClure, PhD (*University of Michigan*). Associate Teaching Professor. Promotion of quantitative literacy in introductory courses; development of guided inquiry activities for introductory chemistry; outreach programs in STEM fields.

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.

Susan A. Rutkowsky, PhD (*Drexel University*) Associate Department Head. Associate Teaching Professor. Development of labs and lecture demonstrations for general and organic chemistry courses; STEM outreach programs.

Jeremiah Scepaniak, PhD (*New Mexico State University*). Assistant Professor. Design transition metal-based contrast agents for MRI & synthesis of bimetallic complexes to activate small molecules.

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.

Anthony Wambsgans, PhD (*Rice University*). Associate Teaching Professor.

Ezra Wood, PhD (*University of California-Berkeley*). Associate Professor. Radical chemistry and formation of secondary pollutants in urban and forest environments, impacts of biomass burning on air pollution and climate change, pollutant emissions, and design and deployment of novel instrumentation for field studies.

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

Anthony W. Addison, PhD (*University of Kent at Canterbury, England*). Professor Emeritus. 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.

Amar Nath, PhD (*Moscow State University, Moscow USSR*). Professor Emeritus.

Peter A. Wade, PhD (*Purdue University*). Professor Emeritus. Exploration of a newly discovered [3,3]-sigmatropic rearrangement in which O-allyl nitronic esters are thermally converted to #,#-unsaturated nitro compounds; development and exploitation of a carbon-based hemiacetal

mimic; and exploration of cycloaddition reactions involving nitroethylene derivatives and novel nitrile oxides.

## Communication

*Major: Communication*

*Degree Awarded: Master of Science (MS)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0 (MS)*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 09.0900*

*Standard Occupational Classification (SOC) code: 11-2011; 11-2031; 25-1122*

## About the Program

Drexel's Master of Science in Communication program prepares students for careers in a wide range of professional activities. The program specializes in three areas:

- Public communication
- Technical communication
- Science and health communication

## Public Communication

Public Communication has much to offer those looking to work in journalism, public relations, and nonprofit organizations. Students can choose from courses such as Strategic Social Media Communication, Event Planning, Journalism and News Writing, Public Relations Writing and Campaign Planning, and Nonprofit Communication.

## Technical Communication

Technical Communication provides skills in technical writing, editing, and computer documentation, and trains students for careers in a wide range of industries from social networking to publishing to health insurance. Students choose from courses such as Technical Writing, Digital Publishing, Technical & Science Editing, and Technical Documentation & Software.

## Science and Health Communication

Science and Health Communication leads to careers in medical, science, and pharmaceutical communication. Students can choose from courses such as Science Writing, Medical Journalism, Campaigns in Health & Environment, and Communicating Health and Risk in a 'Fake News' World.

In addition, the program provides a strong foundation in ethics and 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.

The program emphasizes flexibility, encouraging each student, in consultation with an academic advisor, to craft a particular course of study. Throughout the curriculum, students may use electives to increase communication skills or to further develop areas of specialization.

Students can attend classes on campus or online, full-time or part-time, begin the program in any academic quarter, and can complete all required coursework in the evening or online. The degree requires 45.0 credits of

graduate coursework and can be completed part-time in approximately three years or full-time in five quarters (just over a year).

The program accommodates students from widely varying educational backgrounds ranging from technical and science areas to humanities-related disciplines. Some students pursue their degrees while already working in demanding jobs.

## Additional Information

For more information, visit the MS in Communication (<http://drexel.edu/coas/academics/graduate-programs/communication/>) webpage.

## Admission Requirements

Applicants must meet the general requirements for admission to graduate studies. Prospective students must also submit:

- A 750-1,000 word statement explaining why they want to enter the program. The statement will be reviewed to evaluate each applicant's writing skills and sense of purpose.
- Two letters of recommendation from either academic instructors or professional supervisors
- Transcripts of all college-level coursework
- A current resume

GRE scores are not required but are recommended for applicants with an undergraduate GPA of less than 3.0. GRE scores are evaluated based on the applicant's performance in the verbal reasoning and analytical writing sections. If GRE scores are not available, you are still encouraged to apply as applications will be looked at holistically with consideration to the applicant's writing skills, relevant professional experience, and academic aptitude.

For international students where English is not the official language, a TOEFL score of 100 (iBT) or equivalent IELTS score is required. For more information regarding international applications, please see the International Students Admissions Information (<http://drexel.edu/grad/resources/international/>) page.

Visit the Graduate Admissions (<http://drexel.edu/grad/>) website for more information about requirements and deadlines, as well as instructions for applying online.

## Degree Requirements

The MS degree requires 45.0 credits of coursework and six months of internship for those who lack significant experience in communication related fields.

## Internship

An internship is required and may be completed at any time during the student's tenure at Drexel. Students who already have the equivalent of six months of professional experience may waive this requirement at the discretion of the department's graduate director.

## Program Requirements

### Required Courses

COM 500	Reading & Research in Communication	3.0
COM 610	Theories of Communication and Persuasion	3.0
COM 698	Managing Communication Professional Identities in a Digital Age	3.0

Electives *	21.0
<b>Required Concentration Courses</b>	<b>15.0</b>

Students must select and complete one of the following concentration options:

### Technical Communication

COM 612	Ethics for Technical, Science and Health Communication
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Choose four of the following:

COM 510	Technical Writing
COM 525	Document Design and Usability
COM 535	Digital Publishing
COM 567	Technical Documentation and Software
COM 570	Technical, Science and Health Editing
INFO 532	Software Development
INFO 540	Perspectives on Information Systems

### Science and Health Communication

COM 612	Ethics for Technical, Science and Health Communication
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Choose four of the following:

CHP 672	Theory and Practice in Health Communication
COM 516	Campaigns for Health and Environment
COM 520	Science Writing
COM 570	Technical, Science and Health Editing
COM 670	Medical Writing
	or COM 673 Medical Journalism

### Public Communication

COM 613	Ethics for Professional Communication
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Choose four of the following:

COM 533	Modern Desktop Publishing
COM 535	Digital Publishing
COM 536	Strategic Social Media Communication
COM 541	Foundations of Public Relations
COM 542	Public Relations Writing **
COM 543	Public Relations Planning **
COM 561	Fundamentals of Journalism & Newswriting
COM 563	Event Planning
COM 575	Grant Writing
COM 576	Nonprofit Communications
COM 650	Telecommunications Regulation and Policy
COM 660	Investigative Journalism

<b>Total Credits</b>	<b>45.0</b>
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\* 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 T680 (p. 13)). Qualified students may also pursue independent study for elective credit in special cases.

\*\* To enroll in this class you must first earn a grade of "B" or better in COM 541 *Foundations of Public Relations* or get permission from the MS COM advisor to waive this requirement.

## Sample Plan of Study

### Public Communication

#### First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
COM 500	3.0 COM 610	3.0 COM 535	3.0 INTERNSHIP *	
COM 563	3.0 COM 613	3.0 COM 543	3.0	
COM 650	3.0 Elective	3.0 Elective	3.0	
	<b>9</b>	<b>9</b>	<b>9</b>	<b>0</b>

#### Second Year

Fall	Credits Winter	Credits Spring	Credits
INTERNSHIP *	COM 698	3.0 Electives	9.0

Electives	6.0	
<b>0</b>	<b>9</b>	<b>9</b>

**Total Credits 45**

\* Internships are required but are non-credit bearing. Some students complete two 3-month internships; other students complete 12 months part time. Six months of full-time experience is required. The terms in which internships are taken will vary depending on the student's plan of study. Students who come in to the program with relevant prior professional experience can get the internship waived.

## Science and Health Communication

### First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
COM 500	3.0 COM 610	3.0 CHP 672	3.0 INTERNSHIP*	
COM 612	3.0 COM 670 or 673	3.0 COM 520	3.0	
Elective	3.0 Elective	3.0 COM 570	3.0	
	<b>9</b>	<b>9</b>	<b>9</b>	<b>0</b>

### Second Year

Fall	Credits Winter	Credits Spring	Credits
INTERNSHIP*	COM 698	3.0 Electives	9.0
	Electives	6.0	
	<b>0</b>	<b>9</b>	<b>9</b>

**Total Credits 45**

\* Internships are required but are non-credit bearing. Some students complete two 3-month internships; other students complete 12 months part time. Six months of full-time experience is required. The terms in which internships are taken will vary depending on the student's plan of study. Students who come in to the program with relevant prior professional experience can get the internship waived.

## Technical Communication

### First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
COM 500	3.0 COM 510	3.0 COM 525	3.0 INTERNSHIP*	
COM 612	3.0 COM 610	3.0 COM 535	3.0	
Elective	3.0 Elective	3.0 COM 570	3.0	
	<b>9</b>	<b>9</b>	<b>9</b>	<b>0</b>

### Second Year

Fall	Credits Winter	Credits Spring	Credits
INTERNSHIP*	COM 698	3.0 Electives	9.0
	Electives	6.0	
	<b>0</b>	<b>9</b>	<b>9</b>

**Total Credits 45**

\* Internships are required but are non-credit bearing. Some students complete two 3-month internships; other students complete 12 months part time. Six months of full-time experience is required. The terms in which internships are taken will vary depending on the student's plan of study. Students who come in to the program with relevant prior professional experience can get the internship waived.

## 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.

Karen Cristiano, MS (*Temple University*) Assistant Department Head of *Communication*. Teaching Professor. Journalism, medical writing, feature writing, copy editing, mass media and society.

Richard Forney Assistant Teaching Professor. Broadcast journalism technology and the effects of new technologies on personal and corporate communication skills.

Ernest A. Hakanen, PhD (*Temple University*) Director, *Graduate Programs in Communication, Culture & Media*. Professor. Telecommunications policy, adolescent media use, communication theory and history, global media, and semiotics.

Barbara Hoekje, PhD (*University of Pennsylvania*). Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

Alexander Jenkins, PhD (*Drexel University*). Assistant Teaching Professor. Digital games, video games, emotion, morality, online fan communities, emerging media, convergence.

Hyunmin Lee, PhD (*University of Missouri*) Director, *Undergraduate Programs in Communication*. Associate Professor. Social media strategies for relationship and reputation management in public relations; media messages of public health issues and its psychological and behavioral effects on the public.

Susan Magee, MFA Director *Online Teaching*. Instructor. Digital Publishing, Content creation, Blogging, Strategic Social Media, Public Relations, Business and Technical Communication

Julia May, PhD (*Drexel University*) Director, *Strategic and Digital Communication MS Program*. Associate Teaching Professor. Political communication; international politics and its news coverage; public opinion; transatlantic relations; war, torture and human rights; debate in the public sphere.

Alexander Nikolaev, PhD (*Florida State University*). Associate Professor. Public relations, political communication, organizational communication, mass communication, international communications and negotiations, communications theory.

Rakhmiel Peltz, PhD (*University of Pennsylvania*). Professor. Judaic studies, Yiddish culture and linguistics, ethnography of communication, immigrant cultural studies.

Douglas V. Porpora, PhD (*Temple University*). Professor. War, genocide, torture, and human rights; macro-moral reasoning in public sphere debate; contemporary social theory moral and political communication; religion.

Rachel R. Reynolds, PhD (*University of Illinois*). Associate Professor. Sociolinguistics, ethnography of communication and discourse analysis; violence against women in mass media; political economy of migration; semiotics including the textual, the visual and multimodal.

Rosemary Rys, MA (*Rowan University*). Assistant Teaching Professor. Public relations and marketing.

Wesley Shumar, PhD (*University of Pennsylvania*). Professor. Digital media and learning; culture of higher education; entrepreneurship education; craft culture; semiotic of consumer culture.

Allan Stegeman, MA (*University of Houston*). Teaching Professor. Communication, technology and mass media, video.

Scott Tattar, BA (*York College of Pennsylvania*) Faculty Advisor, *Drexel PRSSA, Communication Department Recruitment Liaison*. Instructor. Public relations

Hilde Van den Bulck, PhD (*Katholieke Universiteit Leuven*) Department Head of Communication. Professor. Political economy of media structures; media policies for digitized media ecologies; stakeholders and coalitions in media policies; digitization; convergence and legacy media; public (service) media; celebrity culture and industry; fandom and anti-fandom.

Asta Zelenkauskaitė, PhD (*Indiana University*). Associate 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.

## Emeritus Faculty

Alexander Friedlander, PhD (*Carnegie Mellon University*). Associate Professor. Rhetorical theory and practice, document design, writing and technology.

Lawrence Souder, PhD (*Temple University*) Director, *Drexel Edits*. Teaching Professor. Science and technical writing, communication ethics, nonprofit communication.

## Communication, Culture and Media

*Major: Communication, Culture and Media*

*Degrees Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0 (Master's); 90.0 (PhD Post-Bachelor's) or 45.0*

*(PhD Post-Master's)*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 09.0102*

*Standard Occupational Classification (SOC) code: 25-1122*

## About the Program

### MS in Communication, Culture & Media

The master's program (MS) in Communication, Culture & Media is a great choice for academically oriented students who wish to learn the basics of research and theory in communication and media studies, possibly to test the waters for further study, or to explore a personal fascination with mass media, mediated communication, cultural studies, social change, and media. The program also encourages interdisciplinary approaches to the study of communication and media through faculty strengths in anthropology, communication, linguistics, and sociology.

The MS degree requires 45.0 credits of graduate-level coursework and the review by two faculty members of a major research or critical paper that has come out of the student's work while in the program.

The program can be completed part time in approximately three years, or full time in five terms (just under a year and a half).

### PhD in Communication, Culture & Media

The PhD program in Communication, Culture & Media develops innovative scholar-teachers who know how to impart theories and studies on the interaction of social forces and communication. Our graduates

are trained as committed researchers in quantitative and qualitative approaches to communication study. The program also encourages interdisciplinary approaches to the study of communication and media through faculty strengths in anthropology, communication, linguistics, and sociology.

For more information, please visit the graduate programs in Communication, Culture and Media (<https://drexel.edu/coas/academics/graduate-programs/communication-culture-media/>) page.

## Admission Requirements

### MS program admission requirements

Applicants to the MS program will be evaluated based on:

- A 1,000 word statement of purpose
- Two letters of recommendation
- Transcripts of all college-level coursework
- GRE scores are recommended (especially for students whose GPAs are below 3.2)
- For international students where English is not the official language, a TOEFL score of 100 (iBT) or equivalent score in IELTS, or Cambridge CPE

### PhD program admission requirements

Applicants to the PhD program will be evaluated by the Department's Graduate Committee for admission to the program. Prospective students must submit with their application:

- A 1,500 word statement of purpose
- Three letters of recommendation
- Transcripts of all college-level coursework
- GRE scores
- For international students where English is not the official language, TOEFL or other English language proficiency scores are also required. For more information regarding international applicant requirements, view the International Students Admissions Information (<http://drexel.edu/grad/resources/international/>) page.

Minimum criteria include:

- Completion of a BA or BS degree in an appropriate field
- GPA of 3.0 or higher (preferred GPA 3.5 for courses in the major)
- For international students, a TOEFL score of 100 (iBT) or equivalent score in IELTS, or Cambridge CPE

Students entering the program with a master's degree or with some graduate credit will be evaluated by the Graduate Committee as to how many of their courses could possibly be counted toward the PhD. Students entering with an MS in an appropriate field are required by the university to take a minimum of 15 credit hours in the PhD program before being eligible to take qualifying exams.

For additional information on how to apply, visit the Drexel University Requirements for Admissions (<http://www.drexel.edu/grad/programs/coas/>) page.

## Degree Requirements

### Core Requirements

COM 610	Theories of Communication and Persuasion	3.0
CCM 704	Research Methods in Communication, Culture and Media	3.0

<b>Required Electives. Choose three of the following:</b>	<b>9.0</b>
CCM 710 Mass Communication and American Social Thought	
CCM 715 Media, Advocacy and Public Spaces	
CCM 725 Political Communication	
CCM 740 Consumer Culture	
CCM 745 Digital Subjectivities	
CCM 750 Political Economy of Media	
<b>Additional Electives *</b>	
Three courses from the CCM rubric at 500 level or above	9.0
<b>Free Electives **</b>	
Seven Additional Graduate Level Electives	21.0
<b>Total Credits</b>	<b>45.0</b>

- \* There are several possible electives in CCM, including special seminars at the 800 level.
- \*\* Any appropriate graduate course offered in the University can serve as an elective if the student has sufficient background to take the course. Suggested courses for free electives might also include: CCM, COM, STS, PLCY, AADM, TVMN, and ENVP.

## 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 CCM 800 level 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. In addition to coursework, students will be assigned required teaching and research duties in the fall, winter, and spring terms.

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 the 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.

<b>Core Courses</b>		
CCM 701	Contemporary Social Theory	3.0
CCM 702	Communication Theory I: Persuasion and Media Effects	3.0
CCM 703	Communication Theory II: Discourse and Semiotics	3.0
CCM 704	Research Methods in Communication, Culture and Media	3.0
CCM 705	Data Analysis in Communication	3.0
<b>Seminars</b>		
Students select 15 credits from the five categories of seminars *		15.0
CCM 801	Seminar in Contemporary Theory	
CCM 802	Seminar in Discourse and Semiotics	
CCM 803	Seminar in Structural and Cultural Dynamics	

CCM 804	Seminar in Research Methodology	
CCM 805	Seminar in Communication Ethics	
<b>Communication, Culture &amp; Media Electives</b>		<b>30.0</b>
Ten courses are required, for a total of 30.0 credit hours of electives. These may be chosen from CCM 500 to CCM 800 level courses, including 800 level seminars that are a different topic from earlier courses taken.		
<b>Dissertation Credits/Additional Electives **</b>		<b>30.0</b>
CCM 998	PhD Dissertation Research in Communication, Culture & Media	1.0-12.0
For the dissertation, students work with a principal advisor, one of the Communication, Culture and Media Program grad 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.		
<b>Total Credits</b>		<b>91.0-102.0</b>

- \* 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 (CCM 801, CCM 802, CCM 803, CCM 804, CCM 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.
- \*\* Students may take up to six graduate-level courses outside of the Communication, Culture and Media program rubric.

## Qualifying Examinations

After students have completed 45.0 credits, which will usually be at the end of their sixth term, they will be required to take a qualifying examination. The qualifying exam includes 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.

## Dissertation Defense

Students should defend the dissertation and graduate towards the end of their fourth or fifth year, depending on whether they entered the program with a master's degree.

Visit the graduate programs in Communication, Culture, and Media (<https://drexel.edu/coas/academics/graduate-programs/communication-culture-media/>) website for more information.

## Sample Plan of Study

<b>First Year</b>				
<b>Fall</b>	<b>Credits Winter</b>	<b>Credits Spring</b>	<b>Credits Summer</b>	<b>Credits</b>
CCM 704	3.0 COM 610	3.0 CCM 740	3.0 VACATION	
CCM 745	3.0 CCM 750	3.0 Graduate Level Electives	6.0	
Graduate Level Elective	3.0 Graduate Level Elective	3.0		
<b>9</b>		<b>9</b>		<b>0</b>

**Second Year**

Fall	Credits Winter	Credits
Graduate	9.0 Graduate	9.0
Level	Level	
Electives	Electives	
	9	9

Total Credits 45

## Communication, Culture and Media 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.

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.

Ernest A. Hakanen, PhD (*Temple University*) Director, *Graduate Programs in Communication, Culture & Media*. Professor.

Telecommunications policy, adolescent media use, communication theory and history, global media, and semiotics.

Barbara Hoekje, PhD (*University of Pennsylvania*). Associate Professor. Sociolinguistic theory, discourse analysis, applied linguistics (language teaching, learning, and testing).

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.

Hyunmin Lee, PhD (*University of Missouri*) Director, *Undergraduate Programs in Communication*. Associate Professor. Social media strategies for relationship and reputation management in public relations; media messages of public health issues and its psychological and behavioral effects on the public.

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

Rakhmiel Peltz, PhD (*University of Pennsylvania*). Professor. Judaic studies, Yiddish culture and linguistics, ethnography of communication, immigrant cultural studies.

Douglas V. Porpora, PhD (*Temple University*). Professor. War, genocide, torture, and human rights; macro-moral reasoning in public sphere debate; contemporary social theory moral and political communication; religion.

Rachel R. Reynolds, PhD (*University of Illinois*). Associate Professor. Sociolinguistics, ethnography of communication and discourse analysis; violence against women in mass media; political economy of migration; semiotics including the textual, the visual and multimodal.

Wesley Shumar, PhD (*University of Pennsylvania*). Professor. Digital media and learning; culture of higher education; entrepreneurship education; craft culture; semiotic of consumer culture.

Hilde Van den Bulck, PhD (*Katholieke Universiteit Leuven*) Department Head of *Communication*. Professor. Political economy of media structures; media policies for digitized media ecologies; stakeholders and coalitions in media policies; digitization; convergence and legacy media; public (service) media; celebrity culture and industry; fandom and anti-fandom.

Asta Zelenkauskaite, PhD (*Indiana University*). Associate 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.

## Creative Writing

Major: *Creative Writing*

Degree Awarded: *Master of Fine Arts (MFA)*

Calendar Type: *Quarter*

Total Credit Hours: *45.0*

Co-op Option: *None*

Classification of Instructional Programs (CIP) code: *23.1302*

Standard Occupational Classification (SOC) code: *27-3043*

## About the Program

With a dual focus on writing for production (screen-writing) and writing for publication (fiction), the new Drexel M.F.A. is the only low-residency M.F.A. located in the city of Philadelphia. The Drexel M.F.A. combines the teaching of craft with hands-on exposure to the professional machinery of industry. As a leader in experiential education, Drexel is uniquely positioned to offer students this experiential MFA in which students are encouraged to engage with the world in order to best reflect upon it, write stories worth telling, and embark upon successful careers.

M.F.A. students undertake an intensive two-year process of story creation, critique, revision, and career preparation. Students take part in online workshops, reading tutorials, and one-on-one packet exchanges with notable published writers. Three times during the M.F.A. students gather with professors in intensive residences. Fiction writers convene in New York to meet with publishers, agents, and editors. Screenwriters gather in L.A. to meet with agents, directors, and producers. Accomplished authors and screenwriters lead workshops and give craft talks at all residencies. Writers of both genres will gather in craft retreats in a distinctive location and a culminating graduation residency on campus.

This degree actively provides students with tools and skills needed to forge professional ties and rewarding careers in creative writing, thus leveraging Drexel's historical approach to education, which is experiential and career focused. To this end, the Drexel M.F.A. provides students with opportunities to learn teaching pedagogy and to take part in one-of-a-kind, community-based learning experience designed to spark creativity, make a positive impact in the world, and put tools in students' hands for post-M.F.A. employment.

Graduates will be equipped to create and market their own books and screenplays. Graduates will also be prepared to seek work in television and theater production, literary magazines, literary marketplace publications and conference organizers, publishing houses, literary retreat centers, community-based writing organizations, and in literary agencies.



Drexel's Creative Writing M.F.A. sets forth as a founding principle that art and industry are essential partners when it comes to improving the human condition.

## Additional Information

For more information, contact:

Nomi Eve  
 Assistant Teaching Professor  
 Department of English and Philosophy  
 nae28@drexel.edu

## Admission Requirements

### Admissions Criteria

- A bachelor's degree from a regionally accredited college or university

### Required Documents

- A completed application
- Official transcripts (<https://www.online.drexel.edu/support/supporting-documents/transcripts.aspx>) from all universities or colleges and other post-secondary educational institutions (including trade schools) attended
- Personal statement (250-500 words) addressing:
  - Your experience with creative writing thus far
  - Why you are seeking an MFA
- Writing sample - Please provide 20-25 double-spaced pages, in Word or PDF file, of one of the following:
  - Completed short story
  - Collection of flash fiction
  - Novel-in-progress
  - Screenplay
- Additional requirements for international students (<https://www.online.drexel.edu/support/international-students.aspx>)

### Optional Documents for Teaching Fellowships

If you are interested in pursuing an optional teaching fellowship while in the M.F.A program, please send the following to Nomi Eve, Program Director, at nae28@drexel.edu by the application deadline:

- One letter of recommendation addressing the applicant's suitability to teaching
- 2-5 page persuasive or informative essay or a published article that demonstrates your excellence in expository writing
  - Document must be double spaced, in MLA format, and sent as a Word or PDF file

*An in-person or virtual interview will be requested once all materials are received.*

## Degree Requirements

### Required Courses

CW 500	Reading as a Writer (Fiction)	3.0
CW 501	Reading as a Writer (Genre Authors)	3.0
CW 550	Fiction Writing Workshop	3.0
or CW 655	Fiction Writing Workshop II	
CW 600	Creative Writing Craft Residency	3.0
CW 602	MFA Creative Writing Graduation Residency	3.0

CW 690	Thesis Development	1.0
SCRP 500	Reading as a Screenwriter	3.0
SCRP 550	Screenwriting Workshop	3.0
<b>Track - Choose One</b>		<b>17.0</b>
Fiction Writers		
CW 555	Fiction Writing Packet Exchange I	
CW 556	Fiction Writing Packet Exchange II	
CW 601	Professional Residency in New York	
CW 691	Thesis Packet Exchange I	
CW 692	Thesis Packet Exchange II	
Screenwriters		
SCRP 555	Screenwriting Packet Exchange I	
SCRP 556	Screenwriting Packet Exchange II	
SCRP 601	Professional Residency in Los Angeles	
SCRP 691	Thesis in Screenwriting I	
SCRP 692	Thesis in Screenwriting II	
<b>Electives</b>		<b>6.0</b>
Select two of the following:		
CW 653	Creative Writing Intensive Course Abroad	
CW 654	Writing Pedagogy	
CW I599	Independent Study in Creative Writing	
CW I699	Independent Study in Creative Writing	
CW I799	Community Based Learning Independent Study	
CW T580	Special Topics in Creative Writing	
CW T680	Special Topics in Creative Writing	
PUB 730	Book Publishing	
PUB 750	Small Press Development	
PUB T680	Special Topics in Publishing	
SCRP 670	Writing for Television	
SCRP I599	Independent Study In Screenwriting	
SCRP I699	Independent Study In Screenwriting	
SCRP T580	Special Topics in Screenwriting	
SCRP T680	Special Topics in Screenwriting	
<b>Total Credits</b>		<b>45.0</b>

## Sample Plan of Study

Term	Credits	Term	Credits	Term	Credits	Term	Credits	Term	Credits				
1	2	3	4	5	6	7							
CW 550	3.0	SCRP 500	3.0	CW 500	3.0	CW 601	3.0	CW 690	1.0	CW 691	4.0	CW 692	4.0
						or				or		or	
						SCRP				SCRP		SCRP	
						601				691		692	
CW 600	3.0	SCRP 550	3.0	CW 555	3.0	CW 556	3.0	CW 501	3.0	Elective	3.0	CW 602	3.0
						or							
						SCRP							
						555							
						556							
Elective	3.0												
<b>Total Credits</b>		<b>45</b>		<b>6</b>		<b>6</b>		<b>6</b>		<b>4</b>		<b>7</b>	

## Environmental Policy

*Major: Environmental Policy*  
*Degree Awarded: Master of Science in Environmental Policy (MSEP)*  
*Calendar Type: Quarter*  
*Total Credit Hours: 45.0*  
*Co-op Option: None*  
*Classification of Instructional Programs (CIP) code: 44.0599*  
*Standard Occupational Classification (SOC) code: 19-1031*

## About the Program

The Master of Science in Environmental Policy spans the disciplines of law, political science, economics, engineering, business, public health, and more. Students in this program take core courses in Public Policy, Environmental Policy, and Economics and tracked courses in Environmental Science, Environmental and Occupational Health, or Environmental Engineering. Students can conduct real-world research writing through a case study thesis, select elective courses tailored to their interests, or complete their degree with research experience. MS in Environmental Policy candidates receive personalized advising, which helps students find the classes and opportunities that will best serve their professional goals.

## Additional Information

For more information about this program, visit the MS in Environmental Policy (<http://drexel.edu/coas/academics/graduate-programs/environmental-policy/>) page.

## Admission Requirements

Applications are accepted year-round and applicants can expect a decision within one month. Entering students may begin study fall, winter, or spring quarter. Full-time students can complete the program in two years. Part-time students can complete the degree at their own pace.

For additional information on how to apply, visit Drexel's Admissions page for Environmental Policy (<http://www.drexel.edu/grad/programs/coas/environmental-policy/>).

## Degree Requirements

Students take 27.0 credits of core classes made up of four Public Policy courses, three Environmental Core courses, and two Economics Core courses. They also take either an Environmental Science, Occupational Health, or Environmental Engineering Track (two 3.0 credit classes). Students may use the remaining 12.0 credits to complete approved electives or research experience. Students wishing to delve deeper into a subject can choose to complete a 9.0 credit case study as part of their 45.0 required credits which they should begin in the first or second quarter.

## Program Requirements

<b>Public Policy Core Courses</b>	<b>12.0</b>
PLCY 503 Theory and Practice of Policy Analysis	
PLCY 504 Methods of Policy Analysis	
PLCY 506 Institutional Dynamics of the Policy Process	
PLCY 507 Nonprofit Organizations	
<b>Environmental Core Courses</b>	<b>9.0</b>
ENVP 522 Environmental Law	
ENVP 572 Environmental Policy	
ENVS 506 Biostatistics	
<b>Environmental Science or Environmental and Occupational Health Track</b>	<b>6.0</b>
Environmental Science Track- 2 of the following courses:	
ENVS 501 Chemistry of the Environment	
ENVS 528 Conservation Biology	
ENVS 538 Biodiversity	
Environmental and Occupational Health Track- EOH 510 and one of the following 600-level EOH courses:	
EOH 510 Principles and Practice of Environmental and Occupational Health	
EOH 605 Evidence Evaluation for Identification of Environmental Hazards	

EOH 610	Environmental and Occupational Toxicology	
EOH 615	Environmental and Occupational Health Policy	
EOH 630	Environmental Health Risk and Impact Assessment	
EOH 665	Quantitative Risk Analysis for Environmental Health	
<b>Economics Core</b>		<b>6.0</b>
BUSN 502	Essentials of Economics or ECON 601 Managerial Economics	
ECON 616	Public Finance and Cost Benefit Analysis	
<b>Research Experience and/or Approved Courses in Environmental Policy</b>		
Case Study Sequence (optional)		9.0
Approved Electives: The remaining 3-12 courses may be any graduate ENVP or PLCY 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.		3.0
<b>Total Credits</b>		<b>45.0</b>

\* Within the first quarter of study, a student must meet with an assigned advisor and work out a plan of study.

## Sample Plan of Study

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
ENVP 572	3.0 BUSN 502	3.0 ECON 616	3.0 VACATION	
EOH 510	3.0 ENVP 522	3.0 ENVS 506	3.0	
PLCY 504	3.0 PLCY 507	3.0 PLCY 503	3.0	
	<b>9</b>	<b>9</b>	<b>9</b>	<b>0</b>
Second Year				
Fall	Credits Winter	Credits		
ENVP 522	3.0 ENVP 552	3.0		
EOH 665	3.0 ENVP 875	3.0		
PLCY 506	3.0 EOH 605	3.0		
	<b>9</b>	<b>9</b>		
<b>Total Credits 45</b>				

## Environmental Policy Faculty

Richardson Dilworth, PhD (*Johns Hopkins University*) Director, Center for Public Policy. Professor. American political development, urban politics, public policy.

Christian Hunold, PhD (*University of Pittsburgh*). Professor. Environmental policy; comparative politics; urban wildlife; political theory.

Alison Kenner, PhD (*Rensselaer Polytechnic Institute*). Associate Professor. Science, technology, and health; environmental health problems; cities and place; feminist theory; medical anthropology; digital humanities

Gwen Ottinger, PhD (*University of California, Berkeley*). Associate Professor. Social studies of science and technology, environmental justice, environmental political theory, citizen science, science and engineering ethics.

Diane Sicotte, PhD (*Arizona State University*). Associate Professor. Sociology of environmental justice; inequalities in the citing of environmental hazards; community-based research in neighborhoods dealing with industrial hazards; sociology of the environment; urban sociology; social inequalities.

Chloe Silverman, PhD (*University of Pennsylvania*) Director, Center for Science, Technology & Society. Associate Professor. Parent advocacy for autism, neurodiversity, and pollinator health research.

## Emeritus Faculty

Robert J. Brulle, PhD (*George Washington University*). Professor Emeritus. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

## Environmental Science

*Major: Environmental Science*

*Degree Awarded: Master of Science in Environmental Science (MSES) or Doctor of Philosophy (PhD)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0 (MSES); 90.0 (PhD)*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 03.0104*

*Standard Occupational Classification (SOC) code: 19-2041*

## About the Program

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.

The program's areas of focus include ecology, biodiversity, conservation, environmental chemistry and assessment, and paleoecology-geology. 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 45.0 credits (up to 12.0 credits may be research). Students choosing the non-thesis option must complete coursework totaling 45.0 credits (6.0 of which may be research). Most courses carry 3.0 credits.

## Part-time Study

The MS degree may be completed on a part-time basis. Most courses are scheduled in the late afternoon and evening, usually on a rotating basis from year to year. Part-time students should plan to take courses in the appropriate sequence to comply with the necessary prerequisites. Scheduling of courses is dependent on student demand and faculty resources; however, most prescribed courses are offered at least once every other year (schedules are published each term). Required courses should be taken at the first opportunity.

## Additional Information

For more information, visit the Department of Biodiversity, Earth & Environmental Science (<http://drexel.edu/coas/academics/departments-centers/bees/>) website.

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](mailto:coless@drexel.edu).

## Admission Requirements

In addition to the general entrance requirements for all applicants, entrance to the MS Program in Environmental Science requires a BS degree in science, mathematics, or engineering. Minimally, students must have completed a year each of general biology and general chemistry, and one semester of calculus. Organic chemistry and physics preferred depending on student interest.

## PhD Program

Applicants to the doctoral program are judged on the basis of academic excellence and the alignment of their research interests with those of the faculty in the department. Prospective PhD students are welcome to contact the program to discuss their research interests.

## Additional Information

More information about how to apply is available on the Graduate Admissions at Drexel University (<http://www.drexel.edu/grad/programs/coas/environmental-science/>) website.

## Degree Requirements: MS in Environmental Science

The Master of Science in Environmental Science (MSES) program requires three core courses that form the basis for further specialization. Students choose to complete the remainder of the program with elective courses based on interest. 45.0 total credits are required for program completion.

## Program Requirements

Core Courses		
ENVS 501	Chemistry of the Environment	3.0
ENVS 506	Biostatistics	3.0
ENVS 511	Evolutionary Ecology	3.0
ENVS electives		36.0
<b>Total Credits</b>		<b>45.0</b>

## Elective Areas

Please see course descriptions for a list of Environmental Science (ENVS) electives. Students may also take Environmental Policy (ENVP) and Environmental Engineering (ENVE) courses with prerequisites. Other departmental courses require approval.

## Degree Requirements: PhD in Environmental Science

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

- 90.0 (post-bachelor's) or 45.0 (post-master's) quarter credits
- 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 in the 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 a faculty advisor.

## Curriculum

The following courses are recommended, but not required:

ENVS 501 Chemistry of the Environment

ENVS 506 Biostatistics

ENVS 511 Evolutionary Ecology

## 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 15.0 or 45.0 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 Drexel's Office of Research and the Graduate College (<http://drexel.edu/graduatecollege/>). 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.

## Facilities

Facilities include fully equipped research laboratories in microbiology, ecology, hydrology, and chemistry. Field ecology research augments lab facilities with field-specific equipment, including two boats (14- and 25-foot) and vans with towing capacity. A full range of sampling equipment exists in the department from seine nets, sediment dredges and coring devices, water sampling bottles, flow meters, and acoustic tracking devices. Some additional research facilities in environmental biotechnology, chemistry, and atmospheric engineering are located in other locations on Drexel's campus.

Among the equipment available for student research are atomic absorption spectrophotometers, UV-visible spectrophotometers, gas-liquid chromatographs, ion chromatograph, ICP-Mass Spectrometer, GC-Mass Spectrometer, high performance liquid chromatographs, total organic carbon analyzer, elemental analyzer for carbon and nitrogen, stable isotope mass spectrometer, high-speed refrigerated centrifuge, nutrient analyzers, and UV photochemical reactor. In addition, the department and University have various microscopes, including a scanning electron microscope (SEM). Within the department and in the Department of

Biology, there is a large capacity for genomics, including preparatory equipment for DNA extraction and enhancement.

Drexel University is a national leader in the use of computers for educational and research functions. Several facilities on campus are available for student use.

## Environmental Science Faculty

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.

Danielle Kreeger, PhD (*Oregon State University*). Research Associate Professor. Trophic interactions in aquatic ecosystems.

Stefanie Kroll, PhD (*SUNY College of Environmental Science and Forestry*) *Watershed Ecology Section Leader, Academy of Natural Sciences*. Assistant Research Professor. Aquatic macroinvertebrate ecology, bioindicators of human stressors on aquatic ecosystems, monitoring the effects of watershed conversation, management and restoration.

Marie J. Kurz, PhD (*University of Florida*) *Biogeochemistry Section Leader, Academy of Natural Sciences*. Assistant Research Professor. Interactions between geochemical, ecological & hydrologic processes in freshwater systems. Availability, transport and cycling of stream solutes; Stream ecosystem structure & function; Groundwater-surface water interactions; Adaptive management & restoration of water resources & 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.

Amanda Lough, PhD (*Washington University in St. Louis*). Assistant Professor. Volcanic seismicity and the relation to magma plumbing systems; glacial seismicity and the seismicity of Antarctica; intraplate seismicity.

Richard McCourt, PhD (*University of Arizona*) *Curator of Botany, Academy of Natural Sciences of Drexel University; 2010-2012: Program Director, Division of Graduate Education, National Science Foundation*. Professor. Evolution, ecology, systematics of green algae..

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

Sean O'Donnell, PhD (*University of Wisconsin-Madison*). Professor. Climate ecology, focusing on geographic variation and species differences in thermal physiology; Behavior and ecology of army ant/bird interactions; Neurobiology, focusing on brain plasticity and brain evolution in social insects.

Marina Potapova, PhD (*Russian Academy of Sciences*) *Associate Curator of Diatoms: Academy of Natural Sciences*. . Assistant Professor. Taxonomy, ecology, and biogeography of freshwater and coastal diatoms.

Gary Rosenberg, PhD (*Harvard University*) *Pilsbry Chair of Malacology*. Professor. Magnitude and origin of species-level diversity in the Mollusca. Biodiversity informatics

Jacob Russell, PhD (*University of Arizona*). Professor. Microbiomes and metagenomics; ecology and evolution of symbiosis.

Jocelyn A. Sessa, PhD (*Penn State University*) *Assistant Curator of Invertebrate Paleontology: Academy of Natural Sciences*. Assistant Professor. Paleoecology; paleobiology; extinction recovery dynamics; climate change; isotope geochemistry; fossil and modern mollusks

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.

Dane Ward, PhD (*Drexel University*). Assistant Teaching Professor. Urban agriculture and sustainability both in Philadelphia and Cienfuegos, Cuba, as well as insect community structure and population ecology of reptiles and amphibians in the New Jersey Pine Barrens.

Elizabeth B. Watson, PhD (*University of California, Berkeley*). Associate 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.

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

Susan S. Kilham, PhD (*Duke University*). Professor Emeritus. Aquatic ecology: phytoplankton; physiological ecology, especially of diatoms in freshwater and marine systems; large lakes; food webs; biogeochemistry.

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).

James R. Spotila, PhD (*University of Arkansas*) *L. D. Betz Chair Professor*. Professor Emeritus. Physiological and biophysical ecology, thermoregulation of aquatic vertebrates, biology of sea turtles.

## Mathematics

*Major: Mathematics*

*Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0 (MS) or 90.0 (PhD)*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 27.0101*

*Standard Occupational Classification (SOC) code: 15-2021; 15-2041*

## About the Program

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.

## Additional Information

For more information about these graduate programs, visit Department of Mathematics (<http://drexel.edu/coas/academics/graduate-programs/mathematics/>) website.

## Admission Requirements

Applicants should hold a BS degree in mathematics or the equivalent and meet the University's graduate admission standards. In particular, the student should have had intensive exposure to proof oriented courses, such as real analysis and abstract algebra. Students requesting financial aid are required to take the Graduate Record Examination General Test. Because many of the core courses are two- or three-term sequences beginning in the fall, new students are typically admitted to the programs only in the fall term. Admissions standards for the MS and PhD programs are equivalent.

For additional information on how to apply, visit Drexel University's Graduate Admissions (<http://www.drexel.edu/grad/programs/coas/mathematics/>) website.

## Master of Science in Mathematics

Students must complete a minimum of 45.0 graduate credits for the MS degree. Of these 15 courses, the following six are required:

Required Courses		
MATH 504	Linear Algebra & Matrix 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
MATH 633	Real Variables I	3.0

The remaining 9 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.

## PhD in Mathematics

Students must complete a minimum of 45 graduate credits for the PhD degree, in addition to the 45.0 required by the MS program for a total of 90.0 credits. Of the 45.0 credits of MS program courses, the following six are required:

### Required Courses

MATH 504	Linear Algebra & Matrix 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
MATH 633	Real Variables I	3.0

The remaining 27.0 credits, comprising the MS segment of the PhD program, 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. Additional coursework to reach the 90.0 credits required for the PhD will be agreed upon with the student's graduate advisor. Students should note that some departmental courses, such as MATH 544 *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.

## Facilities

The computing resources of the Mathematics department include servers dedicated to administrative, research, and computation functions. The research server has 4 VCPS's with 8 GB RAM and 40 GB disk space; the computational server pi has the CPU 2.6 GHZ (16 core) AMD Operon with 32 GB RAM and 500 GB disk.

Graduate students and faculty have access to the main Drexel high-performance cluster: Proteus. The University block is available for general purpose computing. Overall, the facility has 2496 computer cores, 9.8 TB RAM (4 GB RAM per core).

In addition to the primary University library, the department itself has a small collection of texts and research books. It is housed in a comfortable room that lends itself to informal research meetings.

## Mathematics Faculty

David M. Ambrose, PhD (*Duke University*) Associate Department Head, *Mathematics*. Professor. Applied analysis and computing for systems of nonlinear partial differential equations, especially free-surface problems in fluid dynamics.

Jason Aran, MS (*Drexel University*). Associate Teaching Professor.

Jonah D. Blasiak, PhD (*University of California at Berkeley*). Associate Professor. Algebraic combinatorics, representation theory, and complexity theory.

Yasmine Boolakee-Pant, MS (*University of Freiburg*). Instructor.

Robert P. Boyer, PhD (*University of Pennsylvania*). Professor. Functional analysis,  $C^*$ -algebras and the theory of group.

Fernando Carreon, PhD (*University of Texas at Austin*). Teaching Professor.

Patrick Clarke, PhD (*University of Miami*). Associate Professor. Homological mirror symmetry, Landau-Ginzburg models, algebraic geometry, symplectic geometry.

Daryl Falco, MS (*Drexel University*). Associate Teaching Professor. Discrete mathematics and automata theory.

Raymond Favocci, MS (*Drexel University*). Associate Teaching Professor.

Darij Grinberg, PhD (*Massachusetts Institute of Technology*). Assistant Professor. Algebraic Combinatorics, Noncommutative Algebra, Symmetric Functions, Hopf Algebras, Enumerative Combinatorics, Invariant Theory

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*). Associate 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.

Jeffrey LaComb, PhD (*Duke University*). Assistant Teaching Professor. Rare Event Simulation, Dynamical Systems, Numerical Analysis and Mathematical Biology

Georgi S. Medvedev, PhD (*Boston University*). Professor. Ordinary and partial differential equations, mathematical neuroscience.

Cecilia Mondaini, PhD (*Federal University of Rio de Janeiro*). Assistant Professor. Analysis of Partial Differential Equations, Fluid Dynamics, Stochastic Processes

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.

Oksana P. Odintsova, PhD (*Omsk State University*). Teaching Professor. Math education; geometrical modeling.

Dimitrios Papadopoulos, MS (*Drexel University*). Assistant Teaching Professor.

Joel Pereira, PhD (*University of North Carolina*). Assistant Teaching Professor. Commutative Algebra

Ronald K. Perline, PhD (*University of California at Berkeley*) Undergraduate Adviser. 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.

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*). Associate Professor. Partial differential equations, scientific computing and applied mathematics.

Xiaoming Song, PhD (*University of Kansas*). Associate Professor. Stochastic Calculus, Large Deviation Theory, Theoretical Statistics, Data Network Modeling and Numerical Analysis.

Jeanne M. Steuber, MS (*Boston University*). Associate Teaching Professor.

Kenneth P. Swartz, PhD (*Harvard University*). Assistant Teaching Professor. Applied statistics, data analysis, calculus, discrete mathematics, biostatistics.

K. Shwetketu Virbhadra, PhD (*Physical Research Laboratory*). 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*) Associate Department Head. Professor. Partial differential equations, specifically nonlinear waves and their interactions.

Dennis G. Yang, PhD (*Cornell University*). Associate 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.

Matthew Ziemke, PhD (*University of South Carolina*). Assistant Teaching Professor. Functional Analysis, Operator Algebras, Semigroups, Mathematical Physics

## Emeritus Faculty

Howard Anton, PhD (*Polytechnic Institute of Brooklyn*). Professor Emeritus.

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.

Patricia Henry Russell, MS (*Drexel University*). Teaching Professor Emerita.

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.

Justin R. Smith, PhD (*Courant Institute, New York University*). Professor Emeritus. Homotopy theory, operad theory, quantum mechanics, quantum computing.

Jet Wimp, PhD (*University of Edinburgh*). Professor Emeritus. Applied mathematics, special factors, approximation theory, numerical techniques, asymptotic analysis.

## Physics

*Major: Physics*

*Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0 (MS); 90.0 (PhD)*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 40.0801*

*Standard Occupational Classification (SOC) code: 19-2010; 19-2012; 11-9121; 25-1054; 25-2031*

## About the Program

The Department of Physics offers opportunities for students to study with leading researchers in astrophysics, biophysics, condensed matter, particle physics, and physics education research, 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 topics of current research. PhD students begin research early in the program, commencing thesis work in their second year of study.

## Additional Information

To learn more about the graduate program, visit the Department of Physics (<http://drexel.edu/coas/academics/graduate-programs/physics/>) webpage.

## Admission Requirements

For admission to the graduate programs, a bachelor's degree in an approved program is required with a minimum undergraduate GPA of 3.0/4.0.

The GRE general exam is required from all applicants (minimum scores 150 Verbal, 150 Quantitative, 3.5 Analytic Writing). The GRE physics exam is recommended, but not required, and no minimum score is used in evaluations.

TOEFL scores are required for international applicants or applicants who earned a degree outside the US (minimum score 100). IELTS scores may be submitted in lieu of TOEFL scores. The minimum IELTS band score is 7.0. TOEFL or IELTS scores below these levels may be considered, but may require an interview.

Visit the Graduate Admissions (<http://www.drexel.edu/grad/programs/coas/physics/>) website for more information about requirements and deadlines, as well as instructions for applying online.

## Degree Requirements (MS)

The Department of Physics offers a Master of Science degree that provides advanced training in core areas of fundamental physics and exposure to the application of physics in areas of current research.

This program is suitable as both a means for professional development and preparation for further graduate study. Students who wish to complete only the MS 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.

Students who intend to pursue the Physics PhD degree should apply directly to that program. The requirements for the Physics PhD include the coursework required for the MS degree, thus PhD students can earn the MS degree during their PhD study. Students should apply to the program that best aligns with their goals. MS students who wish to continue study toward the PhD degree must apply for the PhD program on a competitive basis.

Satisfactory completion of a minimum of 45.0 credits of approved physics courses is required. The student must maintain a cumulative GPA average for all courses of at least 3.0.

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

## Program Requirements

### Core Courses

PHYS 501	Mathematical Physics I	3.0
PHYS 506	Dynamics I	3.0
PHYS 511	Electromagnetic Theory I	3.0
PHYS 512	Electromagnetic Theory II	3.0
PHYS 516	Quantum Mechanics I	3.0
PHYS 517	Quantum Mechanics II	3.0
PHYS 521	Statistical Mechanics I	3.0
PHYS 522	Statistical Mechanics II	3.0

### Topics Courses **21.0**

PHYS 502	Mathematical Physics II
PHYS 518	Quantum Mechanics III
PHYS 531	Galactic Astrophysics
PHYS 532	Cosmology

PHYS 540	Big Data Physics
PHYS 553	Nanoscience
PHYS 561	Biophysics
PHYS 562	Computational Biophysics
PHYS 576	Introduction to Particle Physics
PHYS 626	Solid State Physics I
PHYS 627	Solid State Physics II
PHYS 631	Relativity Theory I
PHYS T780	Special Topics in Physics

### Total Credits

45.0

## Degree Requirements (PhD)

### 90.0 quarter credits

The Department of Physics offers opportunities for students to study with leading researchers in astrophysics, biophysics, condensed matter, particle physics, and physics education research, 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, candidacy exam, and research training, followed by dissertation research. All PhD students follow a common set of eight core courses during their first two years of study. In addition to these core courses, students also take at least four topics courses.

## PhD Students Admitted with Post-master's Status

Students who are admitted for PhD study with "post-master's" status must take 15.0 credits of graduate coursework with a minimum GPA of 3.0 to become doctoral candidates. Courses are to be chosen in consultation with the Graduate Academic Committee. Post-masters students are expected to pass the oral candidacy exam by the end of the spring quarter of their first year of study. To be prepared for the oral exam, post-master's students should begin research as soon as possible.

## Program Requirements

Doctoral candidates are required to complete a minimum of 45.0 credits of coursework and research work beyond the master's requirement of 45.0 credits while maintaining a minimum of 3.0 GPA. Advancement to doctoral candidacy requires a minimum GPA in core courses of 3.0 with no more than two grades below B-.

### Core Courses

PHYS 501	Mathematical Physics I	3.0
PHYS 506	Dynamics I	3.0
PHYS 511	Electromagnetic Theory I	3.0
PHYS 512	Electromagnetic Theory II	3.0
PHYS 516	Quantum Mechanics I	3.0
PHYS 517	Quantum Mechanics II	3.0
PHYS 521	Statistical Mechanics I	3.0
PHYS 522	Statistical Mechanics II	3.0

### Research

PHYS 997	Research	9.0
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### Topics Courses

Select four including a minimum of two outside research specialty: 12.0

PHYS 502	Mathematical Physics II
PHYS 518	Quantum Mechanics III
PHYS 531	Galactic Astrophysics



PHYS 532	Cosmology
PHYS 540	Big Data Physics
PHYS 553	Nanoscience
PHYS 561	Biophysics
PHYS 562	Computational Biophysics
PHYS 576	Introduction to Particle Physics
PHYS 626	Solid State Physics I
PHYS 627	Solid State Physics II
PHYS 631	Relativity Theory I
PHYS T780	Special Topics in Physics
<b>Total Credits</b>	<b>45.0</b>

## Research Training

Students begin research in the spring and summer terms of their first year. The spring project culminates in a poster presented to the department. A two-page proposal for their summer research is also due at the end of the spring term. At the end of the summer, students are required to submit an in-depth written report and give an oral presentation of their summer project. Research during the second year is toward the candidacy exam as described below.

## Candidacy Examination

The candidacy exam is based on original research performed by the student, which consists of an oral presentation and a written report of no less than 15 pages, submitted to the examination committee and the Associate Department Head for 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.

## Sample Plan of Study (MS)

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
PHYS 501	3.0 PHYS 511 or 521	3.0 PHYS 512 or 522	3.0 VACATION	
PHYS 506	3.0 PHYS 516	3.0 PHYS 517	3.0	
Topics Course	3.0 Topics Course	3.0 Topics Course	3.0	
	<b>9</b>	<b>9</b>	<b>9</b>	<b>0</b>
Second Year				
Fall	Credits Winter	Credits Spring	Credits	
Topics Courses	6.0 PHYS 521 or 511	3.0 PHYS 522 or 512	3.0	
	Topics Course	3.0 Topics Course	3.0	
	<b>6</b>	<b>6</b>	<b>6</b>	
<b>Total Credits</b>				<b>45</b>

## Sample Plan of Study (PhD)

The sample plan of study below lists required courses and electives for the first two years of the full-time PhD program, for a minimum of 45.0 credits. During the third year and thereafter, PhD program students must take a minimum of 45.0 additional credits of research (PHYS 998 Dissertation Research).

The following is a sample plan of study that includes all required courses for the first two academic years for full-time PhD students entering without a previous Master's degree. Post-master's students should consult the Graduate Academic Committee. Summer terms may be subject to change.

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
PHYS 501	3.0 PHYS 516	3.0 PHYS 517	3.0 PHYS 997	1.0-9.0
PHYS 506	3.0 PHYS 511 or 521*	3.0 PHYS 512 or 522*	3.0	
Topics Course**	3.0 Topics Course**	3.0 PHYS 997***	3.0	
	<b>9</b>	<b>9</b>	<b>9</b>	<b>1-9</b>
Second Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Topics Course**	3.0 PHYS 521 or 511	3.0 PHYS 522 or 512*	3.0 PHYS 998	1.0-9.0
PHYS 997	6.0 Topics Course**	3.0 PHYS 997	6.0	
	PHYS 997	3.0		
	<b>9</b>	<b>9</b>	<b>9</b>	<b>1-9</b>
<b>Total Credits</b>				<b>56-72</b>

\* Core Course sequences PHYS 511 / PHYS 512 and PHYS 521 / PHYS 522 are offered in alternate years.

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

\*\*\* 3.0 credits of PHYS 997: *Research* must be taken by Spring of the first year.

## Additional Information

More information for graduate students is available at the Department of Physics (<http://drexel.edu/coas/academics/departments-centers/physics/>).

## Facilities

### Astrophysics Facilities:

- The Numerical Astrophysics Facility emphasizes theoretical and numerical studies of stars, star formation, planetary systems, star clusters, galaxy distributions, cosmological modeling, gravitational lensing, and the early universe. The facility employs a high-performance Graphics Processing Unit (GPU) compute cluster, each node containing two 6-core, 2.7 GHz Intel Xeon CPUs and 96 Gbytes of RAM, accelerated by 4-6 Nvidia Fermi/Titan GPUs, and connected by QDR infiniband, affording computational speeds of up to 50 trillion floating point operations per second.
- The Joseph R. Lynch Observatory houses a 16-inch Meade Schmidt-Cassegrain telescope equipped with an SBIG CCD camera.
- Drexel is an institutional member of the Legacy Survey of Space and Time (LSST) that will be conducted with the Simonyi Survey Telescope at the Vera C. Rubin Observatory, currently under construction in Chile as a joint project of the National Science Foundation and Department of Energy. Faculty and students are

developing LSST-related machine learning tools and analyzing simulated LSST data to prepare for "first light" in 2022.

## Biophysics Facilities:

- Bio-manipulation and microscopy laboratories. Four optical tables and six research grade microscopes are configured to perform microscopic spectroscopy and manipulation on solutions and individual cells. A spatial light modulator allows spatial patterns to be encoded on samples and explored; all microscopes are temperature controlled with state of the art cameras, including a 2,000 frame per second high speed system. Each optical table is also equipped with high power lasers for photolysis or fluorescence spectroscopy.
- Wet lab for studies of proteins and biomimetic lipids, and protein purification and characterization. The laboratory has a variety of chromatographic equipment, large and small centrifuges, fume hood, a spectrophotometer and a spectrofluorimeter. In addition, the laboratory houses a small microfluidic fabrication facility.
- The Computational Biophysics facility also includes: (i) a Beowulf cluster with 46 dual Quad-core hyperthreaded Xeon CPU (736 cores) and 12Gb of RAM nodes plus a master with 1Tb of storage and 24Gb of RAM, (ii) a Beowulf cluster with 44 dual-core Xeon CPU (344 cores), (iii) a dual Quad-core hyperthreaded Xeon CPU workstation with 24Gb RAM and 3Tb disk with two Tesla C2050 GPU CUDA-accelerated graphics card, (iv) a dual Quad-core hyperthreaded Xeon CPU workstation with 8Gb RAM and 4Tb disk with an NVIDIA N280 GPU CUDA-accelerated graphics card, (v) a quad 8-core hyperthreaded Xeon CPU workstation with 128Gb RAM and 16Tb total disk, (vi) a 72Tb file server with 12Gb RAM, (vii) a 96Tb quad 6-core file server with 64Gb RAM, (viii) and several Linux workstations connected through a gigabit network.

## Condensed Matter Physics Research Facilities:

- The Energy Materials Research Laboratory includes a Variable Temperature UHV Scanning Probe Microscope for studies of 2D correlated electron materials and quantum systems.
- Ultrafast Structural Dynamics Laboratory includes a transient electron diffraction setup with sub-picosecond temporal resolution used in studies of quantum materials.
- Single crystal growth laboratory utilizes different techniques for growing high quality single crystals of strongly correlated materials including dichalcogenides.
- The Magnetic Material Laboratory conducts research on amorphous magnetic thin films and fiber optical sensors.
- The Surface Science Laboratory has several scanning probe microscopy setups to study surface structure interfaces at the atomic level.
- The Ultra-Low Temperature Laboratory has a cryogenic dilution refrigerator and microwave sources and detectors to study quantum phenomena in nano- and microscale devices, superconducting qubits, nanostructures, and quantum fluids and solids.
- The Mesoscale Materials Laboratory investigates light-matter interactions and the extent and effects of ordering of lattice, charge and spin degrees of freedom on electronic phases and functional properties in solids, with an emphasis on bulk and epitaxial film complex oxides. Facilities include instrumentation for pulsed laser deposition of epitaxial complex oxide films, atomic layer deposition, variable-temperature characterization of carrier transport (DC to 20 GHz), and a laser spectroscopy lab enabling high-resolution Raman

scattering spectroscopy at temperatures to 1.5 K and under magnetic field to 7 T.

- Condensed Matter Physics group has active collaborations with DOE Argonne National Laboratory near Chicago (visiting faculty Dr. Valentyn Novosad) with numerous experimental capabilities available at the Materials Science Division and Center for Nanoscale Materials. Graduates students in experimental condensed matter physics have an opportunity to conduct part or all of their thesis research at Argonne as part of collaborative projects with the research groups there.
- Local high performance computing facility.
- The Experimental Condensed Matter group is actively utilizing local user facilities at Drexel (Core Research Facilities (<http://crf.coe.drexel.edu> (<http://crf.coe.drexel.edu/>)), University of Pennsylvania (Singh Center for Nanotechnology (<https://www.nano.upenn.edu> (<https://www.nano.upenn.edu/>)), and Temple University (Science and Education and Research Center (<https://cst.temple.edu/research/SERC> (<https://cst.temple.edu/research/SERC/>)) to access top of the line instrumentation for nanoscale fabrication and characterization of materials.
- Faculty in Condensed Matter Physics thrust participate in several large-scale collaborations such as Energy Frontier Research Center (DOE EFRC--CCM), detector development for South Pole Telescope Collaboration and others.

## Particle Physics Facilities:

- The Drexel Particle Physics Group researches fundamental neutrino properties with the DUNE long baseline experiment hosted by Fermilab and the PROSPECT short baseline reactor experiment, as well as the planned nEXO neutrinoless double beta decay experiment.
- We are also active in the IceCube neutrino telescope located at the geographic South Pole.
- The Bubble Chamber Laboratory develops superheated-liquid detectors for rare-interaction searches, including the PICO dark matter experiment located at SNOLAB in Canada.

## Laboratory for High-Performance Computational Physics:

- In addition to the department computing cluster (15 Linux workstations), high-performance computing resources include a dual-processor server with two Xeon E5-2650 processors (16 cores), 128 GB of RAM, and two Xeon Phi P5110 co-processor cards (480 cores). Department researchers also have access to a cluster of 18 Dell PowerEdge C6145 servers (AMD Opteron 6378 Piledriver CPU's, 64 cores/server, 256 GB RAM/server) with a total of 1152 cores and 4.5TB RAM.

## Physics Faculty

Eric Brewe, PhD (*Arizona State University*). Associate Professor. Physics Education Research, introductory course reform, network analysis in learning, neuromechanisms of learning.

Luis R. Cruz Cruz, PhD (*MIT*). Associate Professor. Computational studies of confinement effects on the folding of amyloidogenic proteins, spatial correlations of neurons in the brain, firing dynamics of neuronal networks, fluid flow through porous media.

N. John DiNardo, PhD (*University of Pennsylvania*). Professor. Physics education research, surface physics, condensed matter physics, materials science.

Michelle Dolinski, PhD (*University of California, Berkeley*) Associate Dean of Graduate Education. Associate 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, sickle cell testing and diagnostic devices.

David M. Goldberg, PhD (*Princeton University*) Associate Department Head for Undergraduate Studies. Professor. Theoretical and computational cosmology, extragalactic astrophysics, gravitational lensing.

Goran Karapetrov, PhD (*Oregon State University*). Professor. Experimental solid state physics, scanning probe microscopy, nanoscale catalysis, mesoscopic superconductivity.

Rachael M. Kratzer, PhD (*Drexel University*). Associate Teaching Professor. Quasars, active galactic nuclei

Charles Lane, PhD (*California Institute of Technology*). Professor. Experimental tests of invariance principles and conservation laws, neutrino oscillations and properties.

Christina Love, PhD (*Temple University*). Associate 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, star cluster formation, large-scale computations of stellar systems, high-performance special-purpose computers

Naoko Kurahashi Neilson, PhD (*Stanford University*). Associate Professor. Neutrino physics, high energy astro-particle physics.

Russell Neilson, PhD (*Stanford University*). Associate Professor. Dark matter, neutrino physics.

Gordon Richards, PhD (*University of Chicago*). Professor. Quasars, active galactic nuclei, supermassive black holes, galaxy evolution, sky surveys, infrared/X-ray/radio astronomy

Jonathan E. Spanier, PhD (*Columbia University*) Department Head, *Mechanical Engineering and Mechanics*. Professor. Light-matter interactions in electronic materials, including ferroelectric semiconductors, complex oxide thin film science; laser spectroscopy, including Raman scattering.

Somdev Tyagi, PhD (*Brigham Young University*). Professor. Nanobiophysics, Raman spectroscopy, magnetic materials.

Brigita Urbanc, PhD (*University of Ljubljana, Slovenia*) Associate Department Head for Graduate Studies. Professor. Computational and experimental biophysics of protein folding and assembly, relevant to Alzheimer's and Parkinson's disease; discrete molecular dynamics of coarse-grained protein and lipid models.

Jörn Venderbos, PhD (*Leiden University*). Assistant Professor. Theory of quantum materials: topological Insulators, topological semimetals,

materials prediction and design, strongly correlated electron materials, complex electronic ordering phenomena, unconventional superconductors

Michael Vogeley, PhD (*Harvard University*) Associate Department Head for Graduate Studies. Professor. Cosmology; galaxy formation and evolution; statistical analysis of large data sets; active galactic nuclei.

## Emeritus Faculty

Shyamalendu Bose, PhD (*University of Maryland*). Professor Emeritus.

Leonard D. Cohen, PhD (*University of Pennsylvania*). Professor Emeritus.

Leonard X. Finegold, PhD (*University of London*). Professor Emeritus.

Robert Gilmore, PhD (*Massachusetts Institute of Technology*). Professor Emeritus.

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.

Teck-Kah Lim, PhD (*University of Adelaide*). Professor Emeritus.

Arthur E. Lord, PhD (*Columbia University*). Professor Emeritus.

James McCray, PhD (*California Institute of Technology*). Professor Emeritus.

Richard I Steinberg, PhD (*Yale University*). Professor Emeritus.

T. S. Venkataraman, PhD (*Worcester Polytechnic Institute*). Professor Emeritus.

Jian-Min Yuan, PhD (*University of Chicago*). Professor Emeritus.

## Psychology MS

*Major: Psychology*

*Degree Awarded: Master of Science (MS)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0 (MS)*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 42.2799*

*Standard Occupational Classification (SOC) code: 19-3031; 19-3032; 19-3039*

## About the Program

The Master of Science degree in the department of Psychology, College of Arts & Sciences, is ideal for students interested in pursuing graduate education in scientific psychology and research methods. It is designed for students interested in advanced education in scientific psychology in order to obtain further educational or career opportunities.

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 may include further graduate-level training leading to a PhD, a career in research, or other educational and administrative opportunities. The curriculum is focused on providing training in a range of research experiences in the neurocognitive and behavioral sciences. In addition to coursework, students are required to complete a minimum of eight hours per week with a research mentor

in laboratory activities. These activities culminate with the successful completion of a thesis project.

## Additional Information

For more information, visit the Department of Psychology (<http://drexel.edu/coas/academics/departments-centers/psychology/>) website.

## Admission Requirements

Applicants must meet the general University requirements for admission including a minimum 3.0 GPA (on a 4.0 scale) for the last two years of undergraduate study. Applicants to the graduate program in Psychology are also required to submit scores from the Graduate Record Examination (GRE) general tests. Only applications for full-time status are considered.

Various factors are considered in choosing students. These include background in psychology, undergraduate (and, if applicable, graduate) GPA, GRE scores, a personal essay, and letters of recommendation. The minimum expected combined GRE score is 302 with scores 150 on each section (verbal, quantitative) of the GRE.

## Additional Information

For more information on how to apply, visit Drexel's Admissions Requirements for Psychology (<http://www.drexel.edu/grad/programs/coas/psychology/>) website.

## 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. Students take required courses and select additional electives.
- Successful completion of required research laboratory hours (8 hours per week for 2 years)
- Completion of a thesis

## Program Requirements

PSY 510	Research Methods I	3.0
PSY 511	Research Methods II	3.0
PSY 512	Cognitive Psychology	3.0
PSY 610	Data Analysis in Psychology	3.0
PSY 624	Behavior Analysis	3.0
PSY 710	Data Analysis II	3.0
PSY 898	Master's Thesis in Psychology	0.0-3.0
PSY 898	Master's Thesis in Psychology	0.0-3.0
PSY 898	Master's Thesis in Psychology	0.0-3.0
Additional Electives		18.0
<b>Total Credits</b>		<b>36.0-45.0</b>

## Additional Information

For more information on specific requirements, consult the Master of Science in Psychology (<http://drexel.edu/coas/academics/graduate-programs/psychology/>) website.

## Facilities

### Computers

Computer resources for student use include more than 20 personal computers (IBM, Macintosh) available in the library and 10 IBM PCs available in the computer laboratory. Both facilities are near the department. In both locations, word processing and biostatistics software is available.

By using computers from their homes or in the library, students have free access to e-mail and a wide array of online services (e.g., the Internet, World Wide Web, and literature databases such as PsychLit and Medline).

### Library

Psychology books and journals are located at the Moore Campus Library on Henry Avenue, Queen Lane Library on the Queen Lane Campus, and the W. W. Hagerty Library on the University City Campus. The combined holdings represent one of the best psychology libraries on the East Coast.

### Equipment

Testing equipment for classroom instruction is available to psychology graduate students. The program also has videotape and audiotape equipment available for classroom instruction and research activities.

## Psychology Faculty

Meaghan Butryn, PhD (*Drexel University*). Associate Professor. Treatment and prevention of obesity and eating disorders, behavioral treatment, acceptance and commitment therapy.

Dorothy Charbonnier, PhD (*State University of New York at Stony Brook*). Associate Teaching Professor. The nature of the creative process and writing.

Evangelia Chryssikou, PhD (*Temple University*). Associate Professor. Cognitive neuroscience, neuropsychology, neural basis of language, memory, and executive functions, neurocognitive processes associated with problem solving and flexible thought

Brian Daly, PhD (*Loyola University, Chicago*) *Interim Department Head*. Associate Professor. Pediatric neuropsychology, intervention with at-risk youth.

David DeMatteo, PhD, JD (*MCP Hahnemann University; Villanova University School of Law*) *Director of the JD-PhD Program in Law and Psychology*. Professor. Psychopathy, forensic mental health assessment, drug policy; offender diversion.

Evan M. Forman, PhD (*University of Rochester*) *Director WELL Center*. 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.

Pamela Geller, PhD (*Kent State University*) *Director, Clinical Training*. 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*). 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*. 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*). Professor. Forensic psychology, juvenile and adult criminality, violence risk assessment, forensic psychological assessment, treatment of mentally disordered offenders, academic-sports mentoring.

Adrienne Juarascio, PhD (*Drexel University*) *Director, Practicum Training*. Assistant 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*). Teaching Professor. Authentic teaching methods in Psychology as well as student persistence behavior.

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.

David Kutzik, PhD (*Temple University*). Professor. Social and cultural theory, political economy, gerontology, materialisms, activity theory, reflection theories, communities of practice and labor theories of culture.

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.

John Medaglia, PhD (*The Pennsylvania State University*). Assistant Professor. Applying models and methods developed in neuropsychology, cognitive neuroscience and graph theory to understand and treat brain dysfunction and enhance healthy functioning

Megan Meyer, PhD (*Temple University*). Assistant Teaching Professor. Influences on preferred body type; changes in body image, self-esteem, and self-efficacy in females as a function of strength training; Sensation and Perception

Danette Morrison, PhD (*University of Maryland - College Park*). Assistant Teaching Professor. Social and academic motivation within school context; Social relationships and identity development; Educational attainment of ethnic minorities

Arthur Nezu, PhD, DHLL, ABPP (*State University of New York at Stony Brook*). Distinguished University Professor of Psychology, Professor of Medicine, Professor of Community Health and Prevention. 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 of Psychology, Professor of Medicine. 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.

Nancy Raitano Lee, PhD (*University of Denver*) *Director of MS and BS/MS Programs*. Associate 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

Diana Robins, PhD (*University of Connecticut*) *Interim Director, AJ Drexel Autism Institute*. Professor. Autism screening, early detection of autism

Ludo Scheffer, PhD (*University of Pennsylvania*) *Director of Undergraduate Studies*. Teaching Professor. Meta-cognitive development, writing, and computers; Language and literacy development in the early years in the context of family and schooling; Youth-at-risk; School violence and bullying; Program/intervention effectiveness

Maria Schultheis, PhD (*Drexel University*) *Vice Provost of Research, Office of Research and Innovation*. 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*. Teaching Professor. Adult psychopathology; evidence-based clinical practice; competency-based training; competency-based clinical supervision.

Julia Sluzenski, PhD (*Temple University*). Assistant Teaching Professor. Spatial and episodic memory, memory loss across the lifespan, developmental psychology.

Fengqing (Zoe) Zhang, PhD (*Northwestern University*). Associate Professor. Neuroimaging data analysis; Data mining; Bayesian inference; High dimensional data analysis

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.

## Emeritus Faculty

Donald Bersoff, JD, PhD (*Yale University, New York University*). Professor Emeritus. Law and psychology; mental health law.

James Calkins, PhD. Professor Emeritus.

Douglas L. Chute, PhD (*University of Missouri*) *Louis and Bessie Stein Fellow*. Professor Emeritus. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Myrna Shure, PhD (*Cornell University*). Professor Emeritus. Child development, problem-solving interventions with children, prevention programs.

Mary Spiers, PhD (*University of Alabama at Birmingham*). Professor Emeritus. Clinical neuropsychology and medical psychology; memory and

practical applications for memory disorders in the elderly; cognitive health of women.

## Psychology: Applied Cognitive and Brain Sciences PhD

*Major: Psychology*

*Degree Awarded: Doctor of Philosophy (PhD)*

*Calendar Type: Quarter*

*Total Credit Hours: 90.0 (PhD)*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 42.2799*

*Standard Occupational Classification (SOC) code: 19-3031; 19-3032; 19-3039*

### About the Program

The Department of Psychology's program in Applied Cognitive and Brain Sciences (ACBS) program is a research-oriented, non-clinical program in experimental psychology and cognitive neuroscience. The program places equal emphasis on basic research and the application of scientific principles. Please visit the ACBS program website (<http://drexel.edu/coas/academics/graduate-programs/psychology-applied-cognitive-brain-science/>) more information.

For more information on the PhD program requirements, consult Department of Psychology's (<http://drexel.edu/coas/academics/departments-centers/psychology/>) web site.

### Admission Requirements

Drexel University is seeking applicants with a strong academic record, as evidenced by their GRE scores (a quantitative plus verbal sum of 1250 or greater is desirable), strength of undergraduate institution, and GPA (3.5 or greater is preferred). In addition, applicants should have outstanding letters of recommendation (from doctoral-level academic, research-oriented psychologists, if possible), high-quality research experience, and include a statement of purpose that convinces Drexel that a potential student is an excellent match for one or more of our research groups.

For more details on how to apply to this program, please visit the Graduate Admissions Psychology (<http://www.drexel.edu/grad/programs/coas/psychology-phd-applied-cognitive-and-brain-sciences/>) page.

### Degree Requirements

The PhD program curriculum requires students to earn a minimum of 90.0 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.

### Program Requirements

#### Required Courses

PSY 512	Cognitive Psychology	3.0
PSY 530	Neuroanatomy and Behavior	3.0
PSY 560	Teaching, Consultation and Supervision in Psychology	1.0-2.0
PSY 600	Current Topics in Applied Cognitive and Brain Sciences	3.0
PSY 610	Data Analysis in Psychology	3.0

PSY 611	Computer-Based Research Methods for Psychological Research	3.0
PSY 710	Data Analysis II	3.0
PSY 711	Data Analysis III: Advanced Topics	3.0
PSY 810	Behavioral Data Mining *	3.0
or PSY 811	Multilevel Regression	
PSY 812	Cognitive Neuroscience	3.0
PSY 898	Master's Thesis in Psychology **	3.0
PSY 998	Ph.D. Dissertation in Psychology	41.0
PSY I999	Independent Study in PSY **	0.0-12.0
PSY I899	Independent Study in PSY **	0.0-12.0
PSY electives		18.0
<b>Total Credits</b>		<b>90.0-115.0</b>

\* Or any other statistics course approved by the program director.

\*\* The actual number of credits required will vary dependent upon student's thesis and research topic.

#### Sample Electives

PSY 510	Research Methods I	3.0
PSY 511	Research Methods II	3.0
PSY 516	Developmental Psychology	3.0
PSY 517	Social Cognition	3.0
PSY 532	Introduction to Cognitive Modeling	3.0
PSY 562	Consciousness	3.0
PSY 614	Problem Solving & Creativity	3.0
PSY 616	Motivation and Emotion	3.0
PSY 617	Empirical Unconscious Process	3.0
PSY 621	Theories of Personality	3.0
PSY 630	Biological Basis of Behavior and Treatment	3.0
PSY 632	Sensory and Motor Systems	3.0
PSY 648	Forensic Assessment I	3.0
PSY 649	Forensic Assessment II	3.0
PSY 712	History and Systems	3.0
PSY 720	Health Psychology	3.0
PSY 730	Criminal Law and Psychology	3.0
PSY 746	Neuropsychological Evaluation and Intervention of Children and Adolescents	3.0
PSY 840	Advanced Cognitive-Behavioral Therapy	3.0

### Sample Plan of Study

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

#### First Year

Fall	Credits	Winter	Credits	Spring	Credits	Summer	Credits
PSY 512	3.0	PSY 530	3.0	PSY 711	3.0	VACATION	
PSY 560	1.0-2.0	PSY 611	3.0	PSY Electives	6.0		
PSY 610	3.0	PSY 710	3.0				
PSY 812	3.0						
	<b>10-11</b>		<b>9</b>		<b>9</b>		<b>0</b>

#### Second Year

Fall	Credits	Winter	Credits	Spring	Credits
PSY 810 or 811*	3.0	PSY 898	3.0	PSY 600	3.0
PSY Electives	6.0	PSY Electives	6.0	PSY 998	8.0
	<b>9</b>		<b>9</b>		<b>11</b>

Third Year			
Fall	Credits Winter	Credits Spring	Credits
PSY 998	11.0 PSY 998	11.0 PSY 998	11.0
	11	11	11
<b>Total Credits 90-91</b>			

\* Or any other statistics course approved by the program director.

## Applied Cognitive and Brain Sciences Faculty

Evangelia Chryssikou, PhD (*Temple University*). Associate Professor. Cognitive neuroscience, neuropsychology, neural basis of language, memory, and executive functions, neurocognitive processes associated with problem solving and flexible thought

Eugenia Ellis, PhD, AIA (*Virginia Polytechnic Institute and State University*). Professor. Natural and electric light sources and effects on biological rhythms and health outcomes; ecological strategies for smart, sustainable buildings of the nexus of health, energy and technology.

Youngmoo Kim, PhD (*MIT*) Director, *Expressive and Creative Interactive Technologies (ExCITe) Center*. Professor. Audio and music signal processing, voice analysis and synthesis, music information retrieval, machine learning.

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.

Frank J. Lee, PhD (*Carnegie Mellon University*). Professor. Human-computer interaction; cognitive engineering and science; intelligent software agents for games and education.

Hualou Liang, PhD (*Chinese Academy of Sciences*). Professor. Neuroengineering, neuroinformatics, cognitive and computational neuroscience, neural data analysis and computational modeling, biomedical signal processing.

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.

John Medaglia, PhD (*The Pennsylvania State University*). Assistant Professor. Applying models and methods developed in neuropsychology, cognitive neuroscience and graph theory to understand and treat brain dysfunction and enhance healthy functioning

Nancy Raitano Lee, PhD (*University of Denver*) Director of *MS and BS/MS Programs*. Associate 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

Dario Salvucci, PhD (*Carnegie Mellon University*). Professor. Human computer interaction, cognitive science, machine learning, applications for driving.

Maria Schultheis, PhD (*Drexel University*) Vice Provost of Research, *Office of Research and Innovation*. 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.

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 (fNIRS) and electroencephalography (EEG) and methodology and research design.

Fengqing (Zoe) Zhang, PhD (*Northwestern University*). Associate Professor. Neuroimaging data analysis; Data mining; Bayesian inference; High dimensional data analysis

## Psychology: Clinical Psychology PhD

Major: Psychology

Degree Awarded: Doctor of Philosophy (PhD)

Calendar Type: Quarter

Total Credit Hours: 93.0 (PhD)

Co-op Option: None

Classification of Instructional Programs (CIP) code: 42.2799

Standard Occupational Classification (SOC) code: 19-3031; 19-3032; 19-3039

## About the Program

The PhD program in Clinical Psychology program is a scientist-practitioner-oriented program that is fully accredited by the American Psychological Association (APA). The program places equal emphasis on clinical research and the application of scientific principles. It encompasses five years of full-time study and provides graduate students with a strong foundation in relevant psychological theory, experience in the practice of psychological assessment and intervention, experience in conducting meaningful clinical research, and opportunities to develop teaching competencies.

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 clinical neuropsychology, clinical health psychology, cognitive and behavioral psychology, clinical child psychology, and/or forensic psychology.

## Additional Information

See the Clinical Psychology program's website (<https://drexel.edu/coas/academics/graduate-programs/psychology/doctorate-clinical-psychology/>) for more information.

## Admission Requirements

All students are admitted with the expectation that they intend to complete the PhD degree; however, before advancing to doctoral-level studies, students must earn the MS including completion of a master's thesis. Admitted students who hold a bachelor's degree are expected to complete both the master's degree and post-master's portions of the Drexel curriculum. Applicants who already hold a master's from another university may be admitted with post-master's status if their graduate-level

preparation is deemed equivalent to the master's portion of the Drexel curriculum.

## Requirements for Students Enrolling with a Bachelor's Degree

For those entering with a bachelor's degree, the PhD program requires approximately five years to complete. The first two years of training correspond to the master's-level studies: focusing on clinical areas such as entry-level assessment and intervention skills, psychopathology, and specialized study in clinical neuropsychology, clinical health psychology, cognitive and behavioral psychology, clinical child psychology, and/or forensic psychology. These two years also include a major focus on research skills involving statistics, research design, and supervised research experience with the mentor. Entry-level assessment, intervention, and teaching skills are also developed.

By the end of the first two years of study, students should have completed 45.0 credits of coursework, maintained a GPA of at least 3.5, developed and defended a thesis, passed comprehensive examinations, and completed practicum experience, both internally (Psychological Service Center) and external clinical practicum experiences. Students demonstrating satisfactory performance in these areas will be admitted to post-master's status.

## Requirements for Students Who Already Hold a Master's Degree

Students entering with a master's degree from another university complete the PhD requirements in four to five years. The master's degree should have included an experimental thesis. Students lacking this prerequisite will still be considered for admission, but such students will be required to complete a research project equivalent to the Drexel master's thesis. In addition, students must demonstrate a GPA of at least 3.5 in master's-level courses in order to be accepted for post-master's status.

For additional information on how to apply, visit Drexel's Admissions Requirements for Psychology (<http://www.drexel.edu/grad/programs/coas/psychology-phd/>) page.

## Degree Requirements

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 90.0 credits. Typically, students enroll in 27.0 credits during the first year, 22.0 credits during the second and third years, 12.0 credits in the fourth year, and 8.0 credits during the fifth/final internship year. Drexel University operates on a calendar of four 11-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 major area of study. Credit levels listed are set at the minimum required.

## Program Requirements

### Required Courses

Foundations of Psychology		
PSY 516	Developmental Psychology	3.0
PSY 712	History and Systems	3.0
Statistics/Research Methods		
PSY 510	Research Methods I	3.0
PSY 610	Data Analysis in Psychology	3.0
PSY 710	Data Analysis II	3.0
PSY 711	Data Analysis III: Advanced Topics	3.0
PSY 898	Master's Thesis in Psychology	3.0
PSY 998	Ph.D. Dissertation in Psychology	4.0
Biological Bases of Behavior		
PSY 630	Biological Basis of Behavior and Treatment	3.0
Select one of the following: 3.0		
PSY 530	Neuroanatomy and Behavior	
PSY T880	Special Topics in Psychology	
Cognitive/Affective Bases of Behavior		
PSY 812	Cognitive Neuroscience	3.0
Select one of the following: 3.0		
PSY 512	Cognitive Psychology	
PSY 614	Problem Solving & Creativity	
PSY 616	Motivation and Emotion	
Social Bases of Behavior		
PSY 518	Social Psychology	3.0
PSY 550	Multicultural Perspectives in Psychology	3.0
Clinical and Professional Training General Foundations of Practice		
PSY 520	Psychopathology	3.0
PSY 524	Professional Issues and Ethics	3.0
PSY 560	Teaching, Consultation and Supervision in Psychology	3.0
Foundations of Psychological Evaluation/Measurement		
PSY 515	Clinical Case Conceptualization	3.0
PSY 522	Psychological and Intellectual Assessment	3.0
PSY 620	Personality Assessment	3.0
Foundations of Intervention		
PSY 721	Principles of Psychotherapy	3.0
PSY 722	Theories of Intervention	3.0
PSY 820	Cognitive-Behavioral Therapy	3.0
PSY 897	Clinical Psychology Practicum Seminar	3.0
PSY 899	Practicum	1.0
PSY 999	Internship	4.0
Advanced Professional Training Electives		
Select five of the following: 15.0		
PSY 542	Neuropsychological Assessment	
PSY 642	Neuropsychological Case Analysis and Integration	
PSY 646	Neuropsychological Assessment of Children and Adolescents	
PSY 648	Forensic Assessment I	
PSY 649	Forensic Assessment II	
PSY 650	Child Psychopathology & Treatment	
PSY 720	Health Psychology	
PSY 730	Criminal Law and Psychology	
PSY 734	Social Science Applications to the Law	
PSY 811	Multilevel Regression	
PSY 815	Evidence-Based Psychotherapy	
PSY 822	Pediatric Psychology	
PSY 823	Substance Use	
PSY 827	Behavioral Stress Management	
PSY 828	Weight and Eating Disorders	
PSY 830	Advanced Topics in Health Psychology	
PSY 840	Advanced Cognitive-Behavioral Therapy	
PSY 854	Psychology of Rehabilitation	



\* Taken for 1 credit in Fall and 2 credits in Spring.

## Major Areas of Study

### Clinical Neuropsychology

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
- A neuropsychology-focused thesis and dissertation
- Required classes: Neuroanatomy and Behavior, Neuropsychological Assessment, Neuropsychological Case Analysis and Integration
- At least two neuropsychology electives: Learning and Memory, Rehabilitation, Psychology, Principles of Neuroscience, Advanced Neuropsychological Assessment and Intervention: Children and Adolescents, Neuropsychology and Brain Imaging

### Forensic Psychology

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
- 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, Mental Health Law
- At least two forensic psychology electives

### Clinical Health Psychology

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
- A health psychology-focused thesis and dissertation

- Required classes: Health Psychology, Evidence-Based Assessment and Psychotherapy, Behavioral Stress Management
- At least three Health Psychology electives

### Cognitive and Behavioral Psychology

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 aim of this major area of study is 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 requirements beyond the core curriculum include:

- One Cognitive and Behavioral Psychology-oriented practicum
- A Cognitive and Behavioral Psychology-focused thesis and/or dissertation
- Required classes: Advanced Cognitive Behavioral Therapy, Evidence Based Assessment and Treatment, Acceptance Based Behavioral Therapy
- At least two Cognitive and Behavioral Psychology electives

### Clinical Child Psychology

The clinical child psychology major area of study is designed for students who have strong clinical and/or research interests in working with children and adolescents. Students in this major area of study will complete the required courses taken by all clinical psychology students and will also enroll in child-related elective courses designed to help them develop a greater degree of expertise in working with child and adolescent populations. It is expected that students completing this specialization will develop an appreciation of the research literature in the clinical child area and will possess specialty skills that enable them to function as competent practitioners in the child/adolescent area upon graduation.

Additional requirements beyond the core curriculum include:

- One Clinical Child Psychology oriented practicum
- A Clinical Child Psychology-focused thesis and/or dissertation
- Required classes: Child Psychopathology, Pediatric Psychology, Neuropsychological Evaluation and Intervention of Children and Adolescents
- At least two Clinical Child Psychology electives

For more information on the PhD program requirements, contact the Clinical Psychology PhD program (<https://drexel.edu/coas/academics/graduate-programs/psychology/doctorate-clinical-psychology/contact/>).

## Facilities

### Computers

Computer resources for student use include more than 20 personal computers (IBM, Macintosh) available in the library and 10 IBM PCs available in the computer laboratory. Both facilities are near the department. In both locations, word processing and biostatistics software is available.

By using computers from their homes or in the library, students have free access to email and a wide array of online services (e.g., the Internet, World Wide Web, and literature databases such as PsychLit and Medline).

### Library

Psychology books and journals are located at the Moore Campus Library on Henry Avenue, Queen Lane Library on the Queen Lane Campus, and the W. W. Hagerty Library on the University City Campus. The combined holdings represent one of the best psychology libraries on the East Coast.

### Equipment

Testing equipment for classroom instruction is available to psychology graduate students. The program also has videotape and audiotape equipment available for classroom instruction and research activities.

## Psychology Faculty

Meaghan Butryn, PhD (*Drexel University*). Associate Professor. Treatment and prevention of obesity and eating disorders, behavioral treatment, acceptance and commitment therapy.

Dorothy Charbonnier, PhD (*State University of New York at Stony Brook*). Associate Teaching Professor. The nature of the creative process and writing.

Evangelia Chryssikou, PhD (*Temple University*). Associate Professor. Cognitive neuroscience, neuropsychology, neural basis of language, memory, and executive functions, neurocognitive processes associated with problem solving and flexible thought

Brian Daly, PhD (*Loyola University, Chicago*) *Interim Department Head*. Associate Professor. Pediatric neuropsychology, intervention with at-risk youth.

David DeMatteo, PhD, JD (*MCP Hahnemann University; Villanova University School of Law*) *Director of the JD-PhD Program in Law and Psychology*. Professor. Psychopathy, forensic mental health assessment, drug policy; offender diversion.

Evan M. Forman, PhD (*University of Rochester*) *Director WELL Center*. 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.

Pamela Geller, PhD (*Kent State University*) *Director, Clinical Training*. 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*). 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*. 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*). Professor. Forensic psychology, juvenile and adult criminality, violence risk assessment, forensic psychological assessment, treatment of mentally disordered offenders, academic-sports mentoring.

Adrienne Juarascio, PhD (*Drexel University*) *Director, Practicum Training*. Assistant 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*). Teaching Professor. Authentic teaching methods in Psychology as well as student persistence behavior.

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.

David Kutzik, PhD (*Temple University*). Professor. Social and cultural theory, political economy, gerontology, materialisms, activity theory, reflection theories, communities of practice and labor theories of culture.

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.

John Medaglia, PhD (*The Pennsylvania State University*). Assistant Professor. Applying models and methods developed in neuropsychology, cognitive neuroscience and graph theory to understand and treat brain dysfunction and enhance healthy functioning

Megan Meyer, PhD (*Temple University*). Assistant Teaching Professor. Influences on preferred body type; changes in body image, self-esteem, and self-efficacy in females as a function of strength training; Sensation and Perception

Danette Morrison, PhD (*University of Maryland - College Park*). Assistant Teaching Professor. Social and academic motivation within school context; Social relationships and identity development; Educational attainment of ethnic minorities

Arthur Nezu, PhD, DHLL, ABPP (*State University of New York at Stony Brook*). Distinguished University Professor of Psychology, Professor of Medicine, Professor of Community Health and Prevention. 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 of Psychology, Professor of Medicine. 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.

Nancy Raitano Lee, PhD (*University of Denver*) *Director of MS and BS/MS Programs*. Associate 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

Diana Robins, PhD (*University of Connecticut*) *Interim Director, AJ Drexel Autism Institute*. Professor. Autism screening, early detection of autism

Ludo Scheffer, PhD (*University of Pennsylvania*) *Director of Undergraduate Studies*. Teaching Professor. Meta-cognitive development, writing, and computers; Language and literacy development in the early years in the context of family and schooling; Youth-at-risk; School violence and bullying; Program/intervention effectiveness

Maria Schultheis, PhD (*Drexel University*) *Vice Provost of Research, Office of Research and Innovation*. 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*. Teaching Professor. Adult psychopathology; evidence-based clinical practice; competency-based training; competency-based clinical supervision.

Julia Sluzenski, PhD (*Temple University*). Assistant Teaching Professor. Spatial and episodic memory, memory loss across the lifespan, developmental psychology.

Fengqing (Zoe) Zhang, PhD (*Northwestern University*). Associate Professor. Neuroimaging data analysis; Data mining; Bayesian inference; High dimensional data analysis

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.

## Emeritus Faculty

Donald Bersoff, JD, PhD (*Yale University, New York University*). Professor Emeritus. Law and psychology; mental health law.

James Calkins, PhD. Professor Emeritus.

Douglas L. Chute, PhD (*University of Missouri*) *Louis and Bessie Stein Fellow*. Professor Emeritus. Neuropsychology and rehabilitation; technological applications for the cognitively compromised and those with acquired brain injuries.

Myrna Shure, PhD (*Cornell University*). Professor Emeritus. Child development, problem-solving interventions with children, prevention programs.

Mary Spiers, PhD (*University of Alabama at Birmingham*). Professor Emeritus. Clinical neuropsychology and medical psychology; memory and

practical applications for memory disorders in the elderly; cognitive health of women.

## Public Policy

*Major: Public Policy*

*Degree Awarded: Master of Science (MS)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 44.0501*

*Standard Occupational Classification (SOC) code: 11-1031*

## About the Program

Drexel's MS in Public Policy is similar in its core curriculum to a Master of Public Administration (MPA) and a Master of Public Policy (MPP) program as it is designed for people who work, or who would like to work, for government or a nonprofit organization. It is innovative and distinct in at least two key respects: Its focus on case study research and its distinct tracks of specialization.

The program 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
- Conceptualize, design, and conduct research for policy purposes, as well as comprehensively analyze existing research
- Understand the history of public policy institutions in America and the management and governance of nonprofit organizations

In addition to the core courses, the program has a focus on case study research as a unifying element of the curriculum. Students are required to choose a specific case study topic that they will work on typically for three terms during the program. 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.

Specialization Tracks: 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 the following:

- Economic Policy
- Education Policy
- Environmental Policy
- Health Policy
- Information Policy
- Nonprofit Management

## Additional Information

For more information, view the Center for Public Policy (<http://drexel.edu/coas/academics/departments-centers/public-policy/>) page on the College of Arts and Sciences website. Current Drexel Thomas Kline School of Law students, please see the page on joint JD-MS Public Policy degrees (<http://drexel.edu/law/academics/jointDegrees/JD-MSPP/>) for more information.

## Admission Requirements

Acceptance for graduate study at Drexel University requires a four-year bachelor's degree from an accredited institution in the United

States or an equivalent international institution. There is no pre-requisite undergraduate major or specific coursework. Although admission requirements vary by program, regular acceptance typically requires a minimum grade point average (GPA) of 3.0 for the last two years of undergraduate work. The GPA for any graduate work must be at least 3.0.

The admission committee evaluates all credentials submitted by applicants to determine a student's ability and potential to succeed in graduate study. Applicants to this program should also include their intended area of focus (see the admissions page for the essay prompt) and are often contacted for an information interview. The committee is interested in the applicant's ability to contribute to their program of study and to the University community as a whole.

Drexel is extending the same scholarship opportunities to Master of Science in Public Policy students who enroll in 8.0 credits that are usually only available for full-time programs (minimum enrollment of 9.0 credits for full-time status).

Visit the Graduate Admissions (<http://www.drexel.edu/grad/programs/coas/>) website for more information about requirements and deadlines, as well as instructions for applying online.

## Degree Requirements

Students take required courses for the MS in Public Policy from multiple schools within Drexel University, including the Center for Public Policy in the College of Arts and Sciences, the LeBow College of Business, and the College of Computing and Informatics.

Students are required to receive a grade of "B" or better in all core coursework in order to fulfill the requirements of the MS in Public Policy degree and be eligible for graduation. This policy is in addition to the Drexel University Graduate College policy that requires all graduate students to maintain a minimum cumulative 3.0 GPA per term as well as an overall 3.0 GPA for graduation purposes.

### Required Courses

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
One of the following economics courses (taken before ECON 616)		3.0
BUSN 502	Essentials of Economics	
ECON 601	Managerial Economics	
ECON 616	Public Finance and Cost Benefit Analysis	3.0
INFO 680	US Government Information	3.0
URBS 530	Quantitative Methods & Reasoning for Urban Strategists	3.0
<b>Statistics - Choose 1</b>		<b>3.0</b>
CCM 705	Data Analysis in Communication	
ECON 540	Intro to Econometrics and Data Analysis	
ECON 550	Econometrics	
STAT 601	Business Statistics	
STAT 610	Statistics for Business Analytics	
<b>Case Study Courses</b>		<b>9.0</b>

The curriculum reinforces coursework with a series of accompanying 1-credit, online, Case Study Research courses. 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 continue further research and writing on their chosen case study topic. 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 510	Introduction to Case Study Research
PLCY 516	Case Study Research II (1-credit course taken 3 times)

PLCY 517	Case Study Final Project	
<b>Approved Public Policy Elective Courses*</b>		<b>9.0</b>
<b>Total Credits</b>		<b>45.0</b>

\* Elective courses are taught under the PLCY T580 Special Topics in Public Policy, or one of the participating departments. Students are required to take three 3-credit graduate level courses to fulfill the electives requirement. Public Policy students are able to select any graduate level courses (pending department approval) to create an electives "track" based on their own interests. Students have taken this opportunity to explore areas such as Education Policy, Environmental Policy and Urban Systems.

## Sample Plan of Study

First Year								
Fall	Credits	Winter	Credits	Spring	Credits	Summer	Credits	Total
PLCY 506	3.0	BUSN 502	3.0	PLCY 503	3.0	VACATION	3.0	
PLCY 504	3.0	INFO 680	3.0	PLCY 510	3.0			
URBS 530	3.0	PLCY 507	3.0	ECON 616	3.0			
		<b>9</b>			<b>9</b>			<b>9</b>
								<b>0</b>
Second Year								
Fall	Credits	Winter	Credits	Spring	Credits	Summer	Credits	Total
PLCY 516	3.0	PLCY 517	3.0					
Statistics (Choose one from the list)	3.0	Approved Elective	3.0					
		Approved Elective	3.0					
Approved Elective	3.0							
		<b>9</b>			<b>9</b>			<b>9</b>
<b>Total Credits 45</b>								

## Public Policy Faculty

Rebecca Clothey, PhD (*University of Pittsburgh*) Associate Department Head. Associate Professor. Comparative and international education, education of ethnic and linguistic minorities, sociology of education.

Richardson Dilworth, PhD (*Johns Hopkins University*) Director, Center for Public Policy. Professor. American political development, urban politics, public policy.

Christian Hunold, PhD (*University of Pittsburgh*). Professor. Environmental policy; comparative politics; urban wildlife; political theory.

Franco Montalto, PhD (*Cornell University*). Professor. Effects of built infrastructure on societal water needs, ecohydrologic patterns and processes, ecological restoration, green design, and water interventions.

Gwen Ottinger, PhD (*University of California, Berkeley*). Associate Professor. Social studies of science and technology, environmental justice, environmental political theory, citizen science, science and engineering ethics.

Mark Stehr, PhD (*University of California at Berkeley*) Director School of Economics. Professor. Health economics; health behaviors; public finance; public policy.

## Publishing

Major: Publishing

*Degree Awarded: Master of Arts (MA)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 09.1001*

*Standard Occupational Classification (SOC) code: 27-3041*

## About the Program

**\*Please note that applications for this program are NOT being accepted at this time, pending programmatic review.**

Students are given a broad scope view of the Publishing Industry via courses taught by publishing professionals and experts in their fields. In addition to the ten required courses, students will take an additional five courses in the aspect of publishing that best suits their interests. Courses will be taught in traditional classrooms, as well as online in both synchronized and asynchronous sessions; special projects can occur in day and evening hours.

The required course list contains seven courses specific to the Publishing program, and three by other disciplines (Law, Business, and Digital Design). The elective list contains three courses specific to the program, and then a wide-range of courses from Communication, Visual Arts and Design, Business, and Law.

Independent Projects are encouraged and are limited only by the student's imagination or area of interest. Opportunities abound at Drexel itself, as well as many other area publishers with whom we've built relationships.

## Additional Information

For more information, contact Dr. J. Roger Kurtz, English and Philosophy Department Head, at [jrk353@drexel.edu](mailto:jrk353@drexel.edu)

## Degree Requirements

### Required courses

LAW 603S	Media Law	3.0
MKTG 601	Marketing Strategy & Planning	3.0
PUB 504	Drexel Publishing Group Special Projects	3.0
PUB 530	The Publishing Environment	3.0
PUB 631	Publication Design: Print and Digital	3.0
PUB 635	Periodicals Publishing	3.0
PUB 720	The Ebook and Online Magazines	3.0
PUB 730	Book Publishing	3.0
PUB 750	Small Press Development	3.0
WEST 500	Introduction to Digital Design Tools	3.0

**Select five of the following: 15.0**

AADM 620	Legal and Ethical Issues in the Arts
AADM 751	Management Techniques In the Arts
COM 500	Reading & Research in Communication
COM 510	Technical Writing
COM 520	Science Writing
COM 525	Document Design and Usability
COM 530	Techniques and Science of Photography
COM 540	Technical and Science Graphics
COM 570	Technical, Science and Health Editing
COM 610	Theories of Communication and Persuasion
COM 670	Medical Writing
COM T680	Special Topics in Communication
LAW 602S	First Amendment
LAW 760S	Copyright

MGMT 601	Managing the Total Enterprise
MKTG 630	Global Marketing
ORGB 625	Leadership and Professional Development
PUB 701	Independent Project in Publishing
PUB I599	Independent Study in PUB
PUB T680	Special Topics in Publishing
<b>Total Credits</b>	<b>45.0</b>

## Sample Plan of Study

Term 1 Credits	Term 2 Credits	Term 3 Credits	Term 4 Credits	Term 5 Credits	Term 6 Credits
PUB 530 3.0	MKTG 601 3.0	PUB 750 3.0	PUB 504 3.0	LAW 603S 3.0	PUB 720 3.0
PUB 631 3.0	PUB 635 3.0	PUB T680 3.0	Elective 3.0	WEST 500 3.0	PUB 701 3.0
	PUB 730 3.0			Elective 3.0	PUB I599 3.0
<b>6</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>9</b>	<b>9</b>
<b>Total Credits 45</b>					

## Science, Technology, and Society

*Major: Science, Technology, and Society*

*Degree Awarded: Master of Science (MS)*

*Calendar Type: Quarter*

*Total Credit Hours: 45.0*

*Co-op Option: None*

*Classification of Instructional Programs (CIP) code: 30.1501*

*Standard Occupational Classification (SOC) code: 11-9121*

## About the Program

The Science, Technology, and Society (STS) program systemically investigates the social dimensions of science, technology, and medicine. Faculty from a range of disciplines contribute to a curriculum that features a broad set of perspectives, all grounded in a foundation of social theory, research methods, and writing and presentation skills. The STS program emphasizes three interrelated areas: environment and sustainability; health and medicine; and information, identities and networks. The STS Lab course is a unique feature of the curriculum—it prepares students to work as a team to address meaningful science- and technology-related topics. Working with a faculty advisor, graduate students develop an individualized plan of study that allows them to pursue their interests in depth.

STS students are independent thinkers who are dedicated to understanding the intersections of society, science, medicine, and technology. While STS students vary widely in their professional and educational backgrounds and career ambitions, they share a common commitment to a critical approach to our world's most pressing technoscientific challenges.

Prospective students for the MS in STS see this educational opportunity as a crucial factor in their skill development and career advancement. They are college graduates in engineering, the humanities, social sciences, and natural sciences; professionals in businesses, city, and state government offices and area hospitals; and middle and high school teachers. Students can attend full- or part-time and complete all coursework in the evening.

## Additional Information

For more information, visit the MS in Science, Technology, and Society (<http://drexel.edu/coas/academics/graduate-programs/science-technology-society/>) webpage.

## Admission Requirements

Applicants to the program must meet the general requirements for admission to graduate studies at Drexel University.

Prospective students must also submit a 500-word essay explaining why they want to enter the program and some of the issues related to science, technology, and society that they would like to study. These statements are read carefully by the faculty screening committee to evaluate each applicant's sense of purpose. Entering students typically begin during the fall quarter; however, students are able to start the program during any quarter.

Visit the Graduate Admissions (<https://drexel.edu/grad/programs/coas/>) website for more information about requirements and deadlines, as well as instructions for applying online.

## Degree Requirements

The program requires 45.0 credits of coursework. Required courses total 24.0 credits. Remaining credits are chosen from a list of electives.

### Basic Requirements

SCTS 501	Introduction to Science, Technology and Society	3.0
SCTS 502	Research Methods	3.0
SCTS 503	Advanced Research Methods	3.0
SCTS 504	Science, Technology & Society Theories	3.0

### Advanced Requirements

Ethics, Values, Identities, and Culture 6.0

Select two of the following:

CHP 807	Public Health Ethics	
INFO 679	Information Ethics	
SCTS 575	Digital Power and Resistance	
SCTS 600	Contemporary Feminist Theory	
SCTS 610	Material Culture	
SCTS 612	Medical and Healthcare Ethics	
SCTS 614	Technology, Progress, and Determinism	
SCTS 615	The Biopolitics of Health	
SCTS 620	Medicine, Technology and Science	
SCTS 650	Global Subjects of Biocapital	
SCTS 651	Transnational Science, Technology & Capitalism	

Science and Technology Policy 3.0

Select one of the following:

COM 650	Telecommunications Regulation and Policy	
INFO 725	Information Policy and Ethics	
PLCY 509	Sustainability & Public Policy	
SCTS 570	Environmental Policy	
SCTS 571	Science and Technology Policy	
SCTS 641	Risk and Disaster Policy	
SCTS 643	Contemporary Stem Workforces: Organizations of Labor in Lab, Shop and Clinic	
SCTS 645	War and Technoscience	

Science, Technology & Society Lab 3.0

Select one of the following:

SCTS 550	Special Topics in STS Lab	
SCTS 561	Mobilities Lab	
SCTS 562	Identity and Intersectionality Lab	
SCTS 563	Philadelphia in a Changing Climate Lab	

**Thesis and Electives \*** 21.0

SCTS 798 Master's Research

Suggested Electives \*\*

CHP 516	History of Public Health	
CCM 701	Contemporary Social Theory	

CCM 704	Research Methods in Communication, Culture and Media	
CCM 801	Seminar in Contemporary Theory	
COM 650	Telecommunications Regulation and Policy	
MGMT 602	Innovation Management	
PLCY 504	Methods of Policy Analysis	
PSY 612	Psychology of Human-Computer Interaction Design	
PSY 712	History and Systems	
SCTS 584	Historiography of Science	
SCTS 639	Politics of Life	
SCTS 640	STS Perspectives on Risk and Disaster	
SCTS 660	Theoretical and Sociological Aspects of Measurement	
SCTS 665	Advanced Topics in Philosophy of Science	
SCTS 697	Internship in Science, Technology and Society	
SCTS T780	Special Topics in Science Technology and Society	
SCTS I799	Independent Study in SCTS	
<b>Total Credits</b>		<b>45.0</b>

\* Students who elect to pursue the Thesis option should complete 9.0 credits of SCTS 798 - Master's Thesis and select 12.0 credits from the list of suggested electives.

\*\* Additional electives may be taken from other schools and colleges in the University with approval from the Director of the MS in Science, Technology & Society program.

## Sample Plan of Study

Term 1	Credits	Term 2	Credits	Term 3	Credits	Term 4	Credits	Term 5	Credits
SCTS 501	3.0	Science & Technology Policy course	3.0	SCTS 503	3.0	Three STS Electives	3.0	Three STS Electives	9.0
SCTS 502	3.0	Two Ethics, Values, Identities, & Culture courses	6.0	Science, Technology, & Society Lab course	3.0				
SCTS 504	3.0			STS Elective	3.0				
	<b>9</b>		<b>9</b>		<b>9</b>		<b>9</b>		<b>9</b>

**Total Credits 45**

## Science, Technology and Society Faculty

Lloyd Ackert, PhD (*Johns Hopkins University*). Teaching Professor. History of science and technology; ecology; Russian science.

Jesse Ballenger, PhD (*Case Western Reserve University*). Associate Teaching Professor. Healthcare, medicine and ethics; aging and neurodegenerative diseases; Science and Technology Studies.

Susan E. Bell, PhD (*Brandeis University*) *Department Head, Sociology*. Professor. Sociology of health and illness; global and transnational health; reproductive health, rights, and justice; experience of illness; narrative; visual sociology

Debjeni Bhattacharyya, PhD (*Emory University*). Associate Professor. Urban history, South Asian history, environmental history, legal history, transnational history, post-colonial theory, subaltern studies, history of modern economic thought and feminist history.

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.

Christian Hunold, PhD (*University of Pittsburgh*). Professor. Environmental policy; comparative politics; urban wildlife; political theory.

Kelly Joyce, PhD (*Boston College*) Director, *Master's Program in Science Technology & Society*. Professor. Science, medicine and technology; aging and technology; qualitative social science methods; healthcare and medicine.

Alison Kenner, PhD (*Rensselaer Polytechnic Institute*). Associate Professor. Science, technology, and health; environmental health problems; cities and place; feminist theory; medical anthropology; digital humanities

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

Dali Ma, PhD (*University of Chicago*). Associate Professor. Social hierarchy; Social networks; Sociology of entrepreneurship; Sociology of transitional China

Amanda McMillan Lequieu, PhD (*University of Wisconsin-Madison*). Assistant Professor. Environmental sociology, political economy, place and space, rural-urban interface, qualitative and historical methodologies.

Jason Orne, PhD (*University of Wisconsin-Madison*). Assistant Professor. Urban Sociology, Sexualities Studies, Qualitative Methodologies, Sociology of Race and Ethnicity, Social Psychology, Social Theory

Gwen Ottinger, PhD (*University of California, Berkeley*). Associate Professor. Social studies of science and technology, environmental justice, environmental political theory, citizen science, science and engineering ethics.

Flavia Padovani, PhD (*University of Geneva*). Associate Professor. History and philosophy of science, epistemology, logic.

Sharrona Pearl, PhD (*Harvard University*). Associate Professor. Medical ethics; science studies; history of science and medicine; critical race, gender, and disability studies; media studies.

Nic John Ramos, PhD (*University of Southern California*). Assistant Professor. African American History, history of Medicine, History of Psychiatry, urban History, 20th Century US History, History of Racial Capitalism, History of Sexuality

Jonathan Seitz, PhD (*University of Wisconsin*) Assistant Department Head, *History*. Teaching Professor. History of religion, science, medicine, witchcraft, early modern Europe, Italy.

Chloe Silverman, PhD (*University of Pennsylvania*) Director, *Center for Science, Technology & Society*. Associate Professor. Parent advocacy for autism, neurodiversity, and pollinator health research.

Andrew Smith, PhD (*SUNY, Stony Brook*). Associate Professor. Philosophy, social and political philosophy, American philosophy.

Kelly Underman, PhD (*University of Illinois at Chicago*). Assistant Professor. Medical education, the social construction of bodies and emotions and the politics of scientific knowledge production.

Kristene Unsworth, PhD (*University of Washington*). Assistant Teaching Professor. Information science, policy and ethics, critical discourse analysis and qualitative methodology.

Asta Zelenkauskaite, PhD (*Indiana University*). Associate 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.

## Emeritus Faculty

Robert J. Brulle, PhD (*George Washington University*). Professor Emeritus. Environmental policy and politics, critical theory, marine risk, social movements, environmental sociology.

# Graduate Minor in Communication

## About the Graduate Minor

A graduate minor in Communication is open to all graduate students at Drexel University. Minor in Communication allows you to establish a foundation in professional communication and further develop your professional skills. Enhance your major by adding this cross-cutting credential.

The Communication graduate minor is 12.0 credits; 6.0 credits are required and you have flexibility in selecting the remaining 6.0. You can select any two 3.0-credit graduate courses from Communication, including courses from three concentrations: Public Communication, Technical Communication, and Science and Health Communication.

## Program Requirements

COM 500	Reading & Research in Communication	3.0
COM 610	Theories of Communication and Persuasion	3.0
Any two 3.0-credit graduate courses in Communication (COM)		6.0
<b>Total Credits</b>		<b>12.0</b>

## Additional Information

For more information, contact:

Julia May, Program Director  
jh378@drexel.edu  
Phone: 215.895.5804

Nicole Pearson, Program Coordinator  
nmp39@drexel.edu  
Phone: 215.895.2524

# Graduate Minor in Communication, Culture and Media

## About the Graduate Minor

The graduate minor in Communication, Culture & Media (CCM) is a great choice for academically oriented students who wish to learn the basics of research and theory in communication and media studies, possibly to test the waters for further study, or to explore a personal fascination with mass media, mediated communication, cultural studies, social change and media. The CCM program also encourages interdisciplinary approaches

to the study of communication and media through faculty strengths in anthropology, communication, linguistics and sociology.

## Admission Requirements

Must be enrolled in a Drexel University graduate program.

## Program Requirements

<b>Choose one of the following courses:</b>		<b>3.0</b>
CCM 701	Contemporary Social Theory	
CCM 702	Communication Theory I: Persuasion and Media Effects	
CCM 703	Communication Theory II: Discourse and Semiotics	
CCM 704	Research Methods in Communication, Culture and Media	
CCM 705	Data Analysis in Communication	
Electives *		9.0
<b>Total Credits</b>		<b>12.0</b>

\* Any three 3.0-credit graduate courses in Communication, Culture and Media (CCM)

## Additional Information

For more information or to schedule an appointment, students should contact the Communication, Culture, and Media academic advisor and program coordinator:

Nicole Pearson

Phone: 215.895.2524 | Office: 3201 Arch Street, 151

Email: nmp39@drexel.edu

# Graduate Minor in Interdisciplinary Team-Oriented Creativity

## About the Graduate Minor

The graduate minor in Interdisciplinary Team-Oriented Creativity aims to train graduate students to be creative, innovative problem solvers through evidence-based pedagogies with demonstrated effectiveness in interdisciplinary team-based research. The heart of the graduate minor lies in two core courses and two electives, at least one of which must be outside a student's home department. The two courses, AS-I 501 *Creative Interdisciplinary Team Research: Principles and Practice* (Course I) and AS-I 502 *Enhancing the Creativity of a Research Project* (Course II), ground students in evidence-based creativity while providing an opportunity to practice interdisciplinary teamwork. The graduate minor in Interdisciplinary Team-Oriented Creativity can be tailored to any discipline.

## Admission Requirements

Student must be a matriculated graduate student.

## Program Requirements

AS-I 501	Creative Interdisciplinary Team Research: Principles and Practice	3.0
AS-I 502	Enhancing the Creativity of a Research Project	3.0
Select two of the following electives:		6.0
AADM 520	Creative Enterprise and Innovation	
AADM 650	Revenue Development in the Arts	
AADM 751	Management Techniques In the Arts	
BLAW 646	Legal Issues in New Ventures	

BUSN 501	Measuring and Maximizing Financial Performance	
CAEE 501	Community-Based Design	
CIVE 542	Incorporating Sustainability Principles in Design	
CCM 703	Communication Theory II: Discourse and Semiotics	
CCM 777	Communication Network Analysis	
CMGT 515	Risk Management in Construction	
COM 520	Science Writing	
COM 575	Grant Writing	
COM 576	Nonprofit Communications	
CRTV 501	Foundations in Creativity	
CRTV 502	Tools and Techniques in Creativity	
CRTV 503	Creativity in the Workplace	
CRTV 610	Creativity and Change Leadership	
CRTV 620	Research Methods and Assessment of Creative and Innovative Thinking	
CRTV 630	Global Perspectives on Creativity	
CRTV 650	Current Trends in Creativity & Innovation	
CRTV 660	Diagnostic Creative Intervention	
DSRE 620	Design Problem Solving	
DSRE 625	Technologies of Making	
DSRE 635	Translational Design Research	
ENTP 501	Entrepreneurship Practice & Mindset	
ENTP 611	Learning from Failure	
ENTP 621	Innovation & Ideation	
ENTP 631	Building Internal & External Relationships	
ENTP 641	Innovation in Established Companies	
ENTP 660	Early Stage Venture Funding	
MATE 504	The Art of Being a Scientist	
MGMT 640	Strategic Human Resource Management	
MGMT 655	Knowledge Management	
MKTG 638	New Product Planning, Strategy, and Development	
PENG 545	Introduction to Peacebuilding for Engineers	
PENG 550	Conflict Management for Engineers	
SCED 501	Collaborative Laboratory I	
SCTS 501	Introduction to Science, Technology and Society	
SCTS 502	Research Methods	
SCTS 504	Science, Technology & Society Theories	
SCTS 550	Special Topics in STS Lab	
SCTS 561	Mobilities Lab	
SCTS 562	Identity and Intersectionality Lab	
SCTS 563	Philadelphia in a Changing Climate Lab	
SYSE 685	Systems Engineering Management	
<b>Total Credits</b>		<b>12.0</b>

## Certificate in Public Relations

*Certificate Level: Graduate*

*Admission Requirements: Bachelor's degree*

*Certificate Type: Post-Baccalaureate*

*Number of Credits to Completion: 12.0*

*Instructional Delivery: Online*

*Calendar Type: Quarter*

*Expected Time To Completion: 1 year*

*Financial Aid Eligibility: Aid eligible as of Fall 2020 term*

*Classification of Instructional Program (CIP) Code: 09.0900*

*Standard Occupational Classification (SOC) Code: 11-2011*

## About the Program

The professional certificate in Public Relations is a post-baccalaureate certificate. It introduces students to the fundamentals of public relations as a professional field. Students will learn about the importance of



public relations as a strategic tool to interact with different audiences using different types of media. Courses cover relevant strategies and tactics such as strategic social media communication, corporate social responsibility, reputation management, crisis communication and media relations while teaching students applied skills in public relations planning and public relations writing.

## Admission Requirements

- Official transcript showing a bachelor's degree (or higher) from a regionally accredited institution or its foreign equivalent
- Overall undergraduate GPA of 2.5. For applicants not meeting this minimum GPA, we recommend submitting a 400-word statement summarizing their professional experience as it relates to public relations. Ideally, this statement will illustrate at least five years of professional experience pertaining to public relations.
- A 500-word statement of purpose explaining why the applicant wants to enter the program. The statement will be reviewed to evaluate each applicant's writing skills.
- A current resume
- TOEFL scores are required for international applicants or applicants who earned a degree outside the U.S. at a non-English speaking academic institution.

## Program Requirements

### Program Requirements

COM 536	Strategic Social Media Communication	3.0
COM 541	Foundations of Public Relations	3.0
COM 542	Public Relations Writing	3.0
COM 543	Public Relations Planning	3.0
<b>Total Credits</b>		<b>12.0</b>

## Sample Plan of Study

### First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
COM 541	3.0 COM 542	3.0 COM 543	3.0 COM 536	3.0
	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Total Credits 12</b>				

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