

Drexel University
CATALOG 2011-2012

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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

The Drexel University College of Medicine

Drexel University College of Medicine (DUCOM) is the consolidation of two venerable medical schools with rich and intertwined histories: Hahnemann Medical College and Woman's Medical College of Pennsylvania. Established in 1848 and 1850, respectively, they were two of the earliest medical colleges in the United States, and Woman's was the very first medical school for women in the nation.

Today, with over 1,100 medical students, Drexel University College of Medicine has one of the largest medical student enrollment of any private medical school in the country. More than 175 students are pursuing doctoral or master's degrees in biomedical graduate studies, and almost 600 students are enrolled in professional studies in the health sciences. There are some 570 residents, 650 clinical and basic science faculty, and more than 2,000 affiliate and other non-compensated faculty.

The College of Medicine's main campus, Queen Lane, is in a suburban-like setting in the East Falls section of Philadelphia. Additional facilities are located at the Center City campus, next to Hahnemann University Hospital. Our Pediatrics Department is at St. Christopher's Hospital for Children, and the Psychiatry Department is based at Friends Hospital. Students can receive clinical education at more than 20 affiliated hospitals and ambulatory sites chosen for their commitment to teaching as well as medical excellence. The College of Medicine is renowned for its innovative educational programs, enhanced by the use of technology that permeates all components of the curriculum.

DUCOM's clinical practice, Drexel Medicine, is a patient-focused practice emphasizing quality, innovation and community service, and enhanced by physician involvement in the research and educational programs.

Collaborative projects leveraging Drexel University's technological expertise continue to push the frontiers of nanomedicine and neuroengineering. The College of Medicine is a major regional center for spinal cord research, and founded one of the leading centers for malaria study in the nation. The College is also the first medical center worldwide to perform Single Port Access (SPA™) Surgery, a laparoscopic procedure that allows for hidden scars. Additionally, the College is also home to a memory disorders center dedicated to ground-breaking research in Alzheimer's and related dementias.

Drexel University College of Medicine houses one of eight National Institute on Drug Abuse (NIDA) Centers of Excellence for Physician Information, one of 21 National Centers of Excellence in Women's Health designated by the Department of Health & Human Services, the Executive Leadership in Academic Medicine (ELAM) program and the Archives and Special Collections on Women in Medicine. It has developed the largest HIV/AIDS primary care practice in the Mid-Atlantic region. Faculty clinicians are highly respected in numerous other specialties, including pain management, sports medicine and toxicology.

For more information, visit the [Drexel University College of Medicine](#) website.



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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

Biochemistry

MS without thesis: 36.0 semester credits

MS with thesis: 48.0 semester credits

PhD: 96.0 semester credits

About the Programs

The Department of Biochemistry and Molecular Biology offers a challenging and broad-based graduate program of research and coursework leading to the MS or PhD degree. The aim of the graduate program is to train scientists to identify, address, and solve biomedical problems at the molecular level. The themes of molecular structure, molecular mechanisms, and molecular regulation are recurrent throughout the diverse research areas represented by the biochemistry faculty.

MS in Biochemistry

A minimum of two years of full-time study is required for an MS degree. Master's graduates typically look forward to careers in clinical biochemistry, in pharmaceuticals and medical research equipment sales, or as research technicians in university and industrial laboratories.

PhD in Biochemistry

The average duration of study for a PhD degree is five years. Graduates are well-rounded, independent scientists qualified to pursue careers in research in universities, the pharmaceutical and biotech industries, and government. In addition, PhD scientists may choose to focus on college teaching, research administration, science policy, or patent law.

About the Curriculum

Background courses in biochemistry, molecular and cell biology, and integrative biology are taken during the first academic year. In addition, every student carries out short research projects in three different laboratories chosen by the student. This exposure to research not only gives the student broad research training, but also helps the student to select a thesis advisor at the end of the first academic year. In the second year, the student begins thesis research and takes several advanced courses, tailored to the student's individual interests. All students participate in student seminars and are encouraged to attend seminars in the department and University.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information about this program, including scheduling a plan of study, visit the College of Medicine's [Biomedical Graduate Studies](#) website.

MS and PhD Degree Requirements

MS Degree Requirements: Non-Thesis Option

36.0 semester credits

Required Courses

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 505S	Biochemical Basis of Disease	1.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
BIOC 508S	Experimental Approaches to Biochemical Problems	4.0
BIOC 603S	Special Topics in Biochemistry	2.0
IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
MCBG 507S	Macromolecular Structure & Function	2.0

Suggested Electives*



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BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 504S	Biochemistry 3rd Lab Rotation	4.0
BIOC 510S	Cancer Biology	3.0
MCBG 506S	Advanced Cell Biology	2.0
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	3.0
MIIM 604S	Special Topics in Virology	3.0
MIIM 630S	Advanced Molecular Biology	2.0
NEUR 609S	Advanced Neuroscience	4.0
PATH 601S	Cell and Molecular Pathobiology of Cancer	4.0
PHGY 503S	Graduate Physiology	4.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 525S	Drug Discovery and Development	3.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.

MS Degree Requirements: Thesis Option **48.0 semester credits**

Required Courses

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 505S	Biochemical Basis of Disease	1.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
BIOC 508S	Experimental Approaches to Biochemical Problems	4.0
BIOC 600S	Biochemistry Thesis Research	9.0
BIOC 603S	Special Topics in Biochemistry	2.0
IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 507S	Macromolecular Structure & Function	2.0

Suggested Electives*

BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 504S	Biochemistry 3rd Lab Rotation	4.0
BIOC 510S	Cancer Biology	3.0
MCBG 506S	Advanced Cell Biology	2.0
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	3.0
MIIM 604S	Special Topics in Virology	3.0
MIIM 630S	Advanced Molecular Biology	2.0
NEUR 609S	Advanced Neuroscience	4.0
PATH 601S	Cell and Molecular Pathobiology of Cancer	4.0
PHGY 503S	Graduate Physiology	4.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 525S	Drug Discovery and Development	3.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) program.

PhD Degree Requirements **96.0 semester credits**

Required Courses

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 504S	Biochemistry 3rd Lab Rotation	4.0
BIOC 505S	Biochemical Basis of Disease	1.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
BIOC 508S	Experimental Approaches to Biochemical Problems	4.0
BIOC 511S	Writing for Researchers: Grants and Papers	1.0
BIOC 600S	Biochemistry Thesis Research	9.0
BIOC 603S	Special Topics in Biochemistry	2.0
IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 507S	Macromolecular Structure & Function	2.0

Suggested Electives*

Students are required to take a minimum of one of the courses from the following list:

BIOC 510S	Cancer Biology	3.0
MCBG 506S	Advanced Cell Biology	2.0
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	3.0
MIIM 604S	Special Topics in Virology	3.0
MIIM 630S	Advanced Molecular Biology	2.0
NEUR 609S	Advanced Neuroscience	4.0
PATH 601S	Cell and Molecular Pathobiology of Cancer	4.0
PHGY 503S	Graduate Physiology	4.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 525S	Drug Discovery and Development	3.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) program.



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MS in Biotechnology

40.0 semester credits.

About the Program

The MS in Biotechnology program is designed to train laboratory personnel in the theory and practice of state-of-the-art technologies for biochemical analysis. The program is targeted to individuals who will be seeking employment in biotechnology/pharmaceutical firms or academic laboratories and is appropriate for recent college graduates or experienced technicians. Graduates of this program will possess a set of technical skills that will make them very competitive for laboratory jobs in the academic or industrial sectors, or, if they are already employed, enhance their potential for advancement.

The Program will last three semesters plus 1 summer session and will include both classes and hands-on practica.

For more information about this program, visit the College of Medicine's [Biomedical Graduate Studies](#) page.

Requirements for Admission

For acceptance to the Program, the applicant must have completed a four-year, biology or chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA, and must have also fulfilled all of the requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee (BGECE). Students applying to the Program will be expected to have undergraduate experience in chemistry, cell biology, biochemistry, and mathematics, including at a minimum two (2) semesters each of introductory chemistry, organic chemistry, physics, calculus and biology.

For additional information on how to apply, visit Drexel's [Admissions](#) website.

About the Curriculum

The program consists of two parts:

(1) A set of required didactic courses designed to provide students with the theoretical underpinnings of modern Biochemistry and Biotechnology. This knowledge will form a foundation for the hands-on aspects of the second portion of the curriculum.

(2) A set of four hands-on practica providing detailed exposure and experience in four different aspects of biochemistry/biotechnology. Each practica will be conducted under the close supervision of a faculty member with expertise in the area, and will progress from an initial set of experiments in which the results are already known (allowing students to become familiar with techniques) then progressing to a project tightly associated with the ongoing research in the mentor's laboratory.

Practica during the fall and spring semesters will be 4.0 semester credit hours. The summer practicum will be 8.0 semester credit hours, and will include preparation of a scholarly paper that reviews a topic related to the techniques associated with that particular practicum. Possible practica themes include: protein expression and purification; crystallography; mass spectroscopy; protein-protein and protein-ligand interaction with SPR and/or calorimetry; and imaging/microscopy.

Curriculum

Required Courses		20.0 Credits
BIOC 507S	Biochemistry Seminar Series*	3.0
BIOC508S	Experimental Approaches to Biochemical Problems	4.0
BIOC 603S	Special Topics in Biochemistry	1.0
IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0

Required Practica

20.0 Credits



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BIOC 512S	Biotechnology Practicum I	4.0
BIOC 513S	Biotechnology Practicum II	4.0
BIOC 514S	Biotechnology Practicum III**	8.0
BIOC 515S	Biotechnology Practicum IV	4.0

*Taken for one credit each term in fall, spring and summer for a total of 3.0 credits.

**The 8.0 credit Practicum is taken in the summer.



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MS in Drug Discovery and Development

38.0 semester credits

About the Program

The MS in Drug Discovery and Development provides in-depth exposure to the multiple elements involved in drug discovery and development. This program has been designed to prepare students for a smooth transition into an enduring and productive research career within the pharmaceutical and biotechnology industry. It covers all aspects of drug discovery and development ranging from the discovery and characterization of drug targets through to regulatory approval and commercialization. Students will also be exposed to business aspects as well as to other areas of biotechnology as well as to the basic sciences of pharmacology and physiology.

The MS in Drug Discovery and Development is available to individuals who have already obtained a BS or BA degree in some field of the biomedical or health sciences who may wish to pursue an industry-focused master's-level degree. This may include individuals who wish to pursue a career in the pharmaceutical or biotechnical industries.

This program is also intended for individuals from other disciplines who wish to have a broader base of information about drug discovery and development, those who may wish to transition into the industry, or those who are already active in the industry and seek to increase their knowledge. The curriculum has been designed with the recognition that the complex pharmaceutical and biotechnical industries require a diversity of personnel experience.

For more information about this program, visit the College of Medicine's [Biomedical Graduate Studies](#) page.

Requirements for Admission

For acceptance into the MS in Drug Discovery and Development program, the applicant must have completed a four-year's bachelor's degree program with at least a 3.0 GPA, and must have also fulfilled all of the requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee (BGEC). Students applying should have undergraduate exposure in most of the following areas, including biology, microbiology, chemistry, biochemistry and mathematics.

For additional information on how to apply, visit Drexel's Admissions page for [Biomedical Graduate Studies](#).

About the Curriculum

The curriculum is designed to provide students with a detailed core focusing on the many facets of the drug discovery and development process, while simultaneously providing students with multiple options to pursue related areas of interest.

Required Courses

Required Semester courses		Semester Term Credits
IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 525S	Drug Discovery and Development I	3.0
PHRM 526S	Drug Discovery and Development II	3.0
PHRM 605S	Drug Discovery and Development Research	4.0
PHGY 503S	Graduate Physiology	4.0
Required Quarter courses		Quarter Term Credits
BMES 604	Pharmacogenomics	3.0



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MGMT 940	Seminar in Organizational Behavior	3.0
ORGB 625	Leadership and Professional Development	3.0

Semester Elective Course Options: Semester Term Credits

MIIM 521S	Biotechniques I	2.0
MIIM 524S	Vaccines and Vaccines Development	2.0
MIIM 530S	Fundamentals of Molecular Medicine I - Cellular Processes and Functions	3.0
MIIM 531S	Fundamentals of Molecular Medicine II - Cellular Communication	3.0
MLAS 536S	Animal Models in Biomedical Research	1.0

Quarter Elective Course Options: Quarter Term Credits

BIO 631	Bioinformatics I	3.0
MGMT 685	Readings in Strategic Management	3.0
MGMT 910	Readings in Strategic Management	3.0
PROJ 501	Introduction to Project Management	3.0
PROJ 535	International Project Management	3.0
PBHL 530	Epidemiology	4.0



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Microbiology and Immunology

MS without thesis: 36.0 semester credits

MS with thesis: 48.0 semester credits

PhD: 96.0 semester credits

About the Programs

The Department of Microbiology and Immunology offers students the MS and PhD degrees. The programs are designed to promote understanding of the molecular mechanisms of infectious diseases. The department has research programs in the areas of parasitic, viral, and opportunistic infections; bacterial pathogenesis and biodefense; immunology; and drug development driven by investigators with national and international reputations and with extended histories of extramural funding from the NIH, as well as other sources of funding.

In the first year, students complete both required courses in the core curriculum, and research laboratory rotation requirements. All students must pass an examination at the end of the first year, while also attending seminars and journal clubs.

MS in Microbiology and Immunology

MS students are required to successfully complete the core curriculum and the first year program-specific course work (Molecular Pathogenesis I and II and Immunology). The preliminary examination, taken at the end of the first year, involves a proposal describing the research to be undertaken towards completion of the MS degree. In all semesters, MS students must attend seminars and journal clubs.

PhD in Microbiology and Immunology

PhD students are required to successfully complete the core curriculum and the first year program-specific course work (Molecular Pathogenesis I and II and Immunology). The preliminary examination, taken at the end of the first year, involves a research proposal written in response to a question submitted by a committee of the Program's faculty. Advanced level courses in immunology, virology, advanced molecular biology, and microbial pathogenesis are offered to interested students in the second year and PhD students are required to enroll for credit for at least two advanced courses.

PhD candidates must pass a qualifying examination in the middle of their third year. In all semesters, PhD students must attend seminars and journal clubs. PhD students are also required to submit a minimum of two manuscripts (publications from their research) during the course of the program. The average amount of time required to complete the PhD requirements is five years.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information, including scheduling a plan of study, visit the College of Medicine's [Microbiology and Immunology Program](#) website.

MS and PhD Degree Requirements

MS Degree Requirements: 36.0 semester credits
Non-Thesis Option

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
MIIM 502S	Microbiology and Immunology Journal Club	1.0
MIIM 507S	Microbiology and Immunology Student Seminar Series	1.0
MIIM 508S	Immunology I	3.0



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MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	Molecular Pathogenesis II	3.0
MIIM 606S	Microbiology and Immunology Seminar	1.0

Suggested Electives*

Students are required to take a minimum of 9.0 credits from the following list:

MIIM 504S	Microbiology and Immunology 1st Lab Rotation	4.0
MIIM 524S	Vaccines and Vaccine Development	3.0
MIIM 555S	Molecular Mechanisms of Micro Pathogenesis	3.0
MIIM 604S	Special Topics in Virology	3.0
MIIM 607S	Immunology II	3.0
MIIM 613S	Emerging Infectious Diseases	2.0 - 3.0
MIIM 615S	Experimental Therapeutics	2.0 - 3.0
MIIM 630S	Advanced Molecular Biology	2.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.

MS Degree Requirements: 48.0 semester credits
Thesis Option

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MIIM 502S	Microbiology and Immunology Journal Club	1.0
MIIM 504S	Microbiology and Immunology 1st Lab Rotation	4.0
MIIM 507S	Microbiology and Immunology Student Seminar Series	1.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	Molecular Pathogenesis II	3.0
MIIM 600S	Microbiology and Immunology Thesis Research	9.0
MIIM 606S	Microbiology and Immunology Seminar	1.0

Suggested Electives*

MIIM 505S	Microbiology and Immunology 2nd Lab Rotation	4.0
MIIM 524S	Vaccines and Vaccine Development	3.0
MIIM 555S	Molecular Mechanisms of Micro Pathogenesis	3.0
MIIM 604S	Special Topics in Virology	3.0
MIIM 607S	Immunology II	3.0
MIIM 613S	Emerging Infectious Diseases	2.0 - 3.0
MIIM 615S	Experimental Therapeutics	2.0 - 3.0
MIIM 630S	Advanced Molecular Biology	2.0

*No electives are required for the MS with Thesis option. This list includes suggested electives, however additional courses from the Biomedical Graduate programs may also be taken. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MIIM 502S	Microbiology and Immunology Journal Club	1.0
MIIM 504S	Microbiology and Immunology 1st Lab Rotation	4.0
MIIM 505S	Microbiology and Immunology 2nd Lab Rotation	4.0
MIIM 506S	Microbiology and Immunology 3rd Lab Rotation	4.0
MIIM 507S	Microbiology and Immunology Student Seminar Series	1.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	Molecular Pathogenesis II	3.0
MIIM 600S	Microbiology & Immunology Thesis Research	9.0
MIIM 606S	Microbiology and Immunology Seminar	1.0

Suggested Electives*

Students are required to take a minimum of 2 courses from the following list:

MIIM 555S	Molecular Mechanisms of Micro Pathogenesis	3.0
MIIM 604S	Special Topics in Virology	3.0
MIIM 607S	Immunology II	3.0
MIIM 613S	Emerging Infectious Diseases	2.0 - 3.0
MIIM 615S	Experimental Therapeutics	2.0 - 3.0
MIIM 630S	Advanced Molecular Biology	2.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.



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Molecular and Cell Biology and Genetics

MS without thesis: 36.0 semester credits

MS with thesis: 48.0 semester credits

PhD: 96.0 semester credits

About the Programs

The interdisciplinary, research-oriented Molecular and Cell Biology and Genetics program offers both MS and PhD degrees. Its strength is derived from the combined research expertise of the faculty in various departments, including neurobiology and anatomy, biochemistry and molecular biology, microbiology and immunology, medicine, pathology, and pharmacology and physiology. Faculty members conduct research on a broad array of topics, including cell, molecular, and cancer biology as well as genetics, infectious diseases and immunology.

About the MS Program

In the MS program, the focus is on strengthening the student's grasp of molecular biology and biotechnology and on providing a knowledge of research methods available in this fast-expanding field.

About the PhD Program

In addition to the curriculum described below, PhD students must pass a qualifying exam at the end of their second year. This program is research focused, with the ultimate goal of training students to become leaders of scientific research in academics and industry.



Admission Requirements

Drexel University College of Medicine has a rolling admissions policy, which means that complete applications are reviewed as they are received. Applicants are therefore advised to apply early, as decisions to accept or deny admission may be made before the official deadlines.

To learn more about applying to Drexel College of Medicine programs visit the Drexel College of Medicine's [Biomedical Studies](#) website.

About the Curriculum

Background courses in biochemistry, molecular and cell biology, and integrative biology are taken during the first academic year. In addition, every student carries out short research projects in three different laboratories during the first year. This exposure to research not only gives the student broad research training, but also helps the student to select a thesis advisor at the end of the first academic year. In the second year, the student begins thesis research and takes several advanced courses, tailored to the student's individual interests.

The program offers a weekly seminar series with invited external and intramural speakers who address the program's broad research interests. Journal Club members meet weekly in their own informal setting to present results of interest from the current literature.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information, including scheduling a plan of study, visit the College of Medicine's [Molecular and Cell Biology and Genetics Program](#) website.

MS and PhD Degree Requirements

MS Degree Requirements: Non-Thesis Option

36.0 semester credits

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0

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MCBG 501S	Molecular and Cell Biology and Genetics: 1st Lab Rotation	4.0
MCBG 502S	Molecular and Cell Biology and Genetics: 2nd Lab Rotation	4.0
MCBG 506S	Advanced Cell Biology	2.0
MCBG 511S	Special Topics in Molecular and Cell Biology and Genetics	2.0
MCBG 512S	Molecular and Cell Biology and Genetics Journal Club	1.0
MCBG 513S	Molecular and Cell Biology and Genetics Seminar	1.0

Advanced Electives **Three courses**

In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 3 advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge.

MS Degree Requirements: Thesis Option **48.0 semester credits**

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 501S	Molecular and Cell Biology and Genetics: 1st Lab Rotation	4.0
MCBG 506S	Advanced Cell Biology	2.0
MCBG 511S	Special Topics in Molecular and Cell Biology and Genetics	2.0
MCBG 512S	Molecular and Cell Biology and Genetics Journal Club	1.0
MCBG 513S	Molecular and Cell Biology and Genetics Seminar	1.0
MCBG 600S	Molecular and Cell Biology and Genetics Thesis Research	9.0

Advanced Electives **Two courses**

In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 2 advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge.

PhD Degree Requirements **96.0 semester credits**

Required Courses

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 501S	Molecular and Cell Biology and Genetics: 1st Lab Rotation	4.0
MCBG 502S	Molecular and Cell Biology and Genetics: 2nd Lab Rotation	4.0

MCBG 503S	Molecular and Cell Biology and Genetics: 3rd Lab Rotation	4.0
MCBG 506S	Advanced Cell Biology	2.0
MCBG 511S	Special Topics in Molecular and Cell Biology and Genetics	2.0
MCBG 512S	Molecular and Cell Biology and Genetics Journal Club	1.0
MCBG 513S	Molecular and Cell Biology and Genetics Seminar	1.0
MCBG 600S	Molecular and Cell Biology and Genetics Thesis Research	9.0

Advanced Electives

Three courses

In consultation with the Advisory Committee and according to the area of selected research, the student must select a minimum of 3 advanced elective courses from a diverse range of topics that complement the core curriculum and provide relevant, in-depth knowledge.



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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

Molecular Medicine

About the Program

The Master of Science in Molecular Medicine program is designed to provide academic and practical biotechnological knowledge in translational research, particularly in the areas of molecular therapeutics and vaccine development. The program is ideally suited for enhancing the scientific credentials of the following target groups:

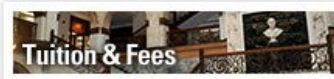
- industrial employees
- high school biology teachers
- new college graduates
- college undergraduates
- pre-medical students

The degree encompasses the fundamental requirements to establish a sound grounding in microbiology, biochemistry, genetics, and molecular biology. The program is designed with two years of required and elective graduate courses, and a research internship in the summer session of the first or second year. The flexibility of the curriculum enables students to complete the degree requirement within 18 months on a full-time basis, and up to 4 years on a part-time basis. The successful completion of the degree will be determined by grades obtained in the graduate courses, participation in seminars and journal clubs, and performance in the research component.

The research component of the curriculum can be fulfilled by two alternative approaches: (1) a research internship in which a 12 week research program will be undertaken in the summer session of either the first or second year of the program; or (2) as a combination of a 6 week research rotation in the laboratory of a participating faculty member in combination with the taking of one or more elective courses which focus on state-of-the-art biotechniques. A dissertation is not required.

Classes can be attended at any of three Drexel College of Medicine locations: Center City and Queen Lane campuses in Philadelphia, and the Pennsylvania Biotechnology Center in nearby Doylestown. State-of-the-art video conferencing provides real-time interactive learning at all three locations.

For additional information about the program, view the [MS in Molecular Medicine](#) page on the College of Medicine's website.



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3141 Chestnut Street, Philadelphia, PA 19104
catalog@drexel.edu

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MS in Molecular Medicine

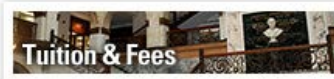
Admission Requirements

For acceptance to the MS in Molecular Medicine program, the applicant must have completed a four year, biology or chemistry-based bachelor's degree program, or equivalent, with at least a 3.0 GPA, and fulfillment of all requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee (BGEC), as stated below:

- Official transcripts from all colleges and universities attended.
- Official copies of entrance test scores and official test scores from the Graduate Record Examination (GRE).
- References from at least three instructors or professionals
- An application fee of \$50, made payable to Drexel University, is required for application processing. Online application is free.
- International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. Applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score on the Test of English as a Foreign Language (TOEFL).

For undergraduate students to participate in the program prior to graduation, they must have a GPA of 3.0 or better and a letter of support from their undergraduate institution, from a faculty member teaching in their undergraduate major area of interest.

All applications are to be submitted through the [Office of Biomedical Graduate Studies](#).



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MS in Molecular Medicine

36.0 semester credits

About the Curriculum

Through the combination of required and elective courses, a total of 36.0 credits is required to successfully obtain the degree of Masters of Science in Molecular Medicine. In order to maintain full-time student status, a minimum of 9.0 credits must be taken in any given academic semester. Students should work with their program advisors to plan their course of study.

Research Requirements

The research component can be fulfilled by two approaches: (1) a research internship in which a 12-week research program will be undertaken in the summer session of either the first or second year of the program. (The internship can be undertaken in a laboratory of a participating faculty member, or in a laboratory of one of the Industrial Partners when necessary research training plans of longer duration and depth can be developed with the approval of the Program Advisory Committee); or (2) as a combination of a 6-week research rotation in the laboratory of a participating faculty member in combination with the taking of one or more elective courses which focus on state-of-the-art biotechniques.

For a plan of study listing the sequence of how courses should be completed, see the [MS in Molecular Medicine Sequence](#) page.



Required courses: 18.5 Credits

IDPT500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics	2.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	Molecular Pathogenesis II	3.0
MIIM 527S	Fundamentals of Molecular Medicine IV Immunology & Immunopathology	2.5
MIIM 530S	Fundamentals of Molecular Medicine I - Cellular Processes and Functions	2.0
MIIM 531S	Fundamentals of Molecular Medicine II - Cellular Communication	2.0
MIIM 533S	Fundamentals in Molecular Medicine V	1.0
MIIM 606S	Microbiology and Immunology Seminar	1.0

Electives

To complete the 36.0 credits total, students select from a menu of additional electives, and complete their required research component.

MIIM 521S	Biotechniques I	2.0
MIIM 522S	Biotechniques II	3.0
MIIM 523S	Molecular Virology	3.0

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MIIM 524S	Vaccines and Vaccine Development	3.0
MIIM 525S	Principles and Practices of Biocontainment	1.0
MIIM 526S	The Use of Animal Models in Biological Research	1.0
MIIM 532S	Fundamentals of Molecular Medicine III - Cell Specialization and Multicellular Organisms	2.0
MIIM 534S	Fundamentals in Molecular Medicine VI	1.0
MIIM 555S	Advanced Bacterial Pathogenesis	2.0
MIIM 613S	Emerging Infectious Diseases	2.0
MIIM 615S	Experimental Therapeutics	2.0
MIIM 621S	Biotechniques and Laboratory Research I	3.0
MIIM 622S	Biotechniques and Laboratory Research II	3.0
MIIM 650S	Research Internship in Molecular Medicine	6.0



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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

Molecular Pathobiology

MS without thesis: 39.0 semester credits

MS with thesis: 48.0 semester credits

PhD: 96.0 semester credits

About the Programs

The Molecular Pathobiology program provides a thorough education in contemporary knowledge of pathophysiological mechanisms and prepares students for careers in research as well as teaching in academic and corporate institutions. Students entering without advanced standing should complete the MS program in two to three years and the PhD program in four to five years.

The program has a large faculty, drawn from many basic science and clinical departments within the University. Active research programs involve HIV neuropathology, cancer biology and therapeutics, inhibition of tumor angiogenesis, ulcerative colitis, pathophysiology of apoptosis, tissue engineering, transplant immunology, and diseases of the cardiovascular, respiratory, biliary, and gastrointestinal systems.

Funding for these programs provides an opportunity for research training in such diverse areas as the cellular and molecular biology of cancer; tumor immunology and virology; molecular genetics; neurobiology; pathophysiology of cardiovascular, biliary, and gastrointestinal diseases; and contemporary advances in epithelial ion transport, signal transduction, tissue engineering, and apoptosis.

To learn more about applying to Drexel College of Medicine programs visit the Drexel College of Medicine's [Biomedical Studies](#) website.



About the Curriculum

Background courses in biochemistry, molecular and cell biology, and integrative biology are taken during the first academic year. In addition, every student carries out short research projects in three different laboratories chosen by the student. This exposure to research not only gives the student broad research training, but also helps the student to select a thesis advisor at the end of the first academic year. In the second year, the student begins thesis research and takes several advanced courses, tailored to the student's individual interests.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information, including a scheduling a plan of study, visit the College of Medicine's [Molecular Pathobiology Program](#) website.

MS and PhD Degree Requirements

MS Degree Requirements: Non-Thesis Option **39.0 semester credits**

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
PATH 503S	Pathobiology Journal Club	1.0
PATH 509S	Pathologic Processes	3.0
PATH 601S	Cell and Molecular Pathobiology of Cancer: Angiogenesis	4.0

Suggested Electives* **3 courses**

Students are required to take a minimum of three courses from the following list:

ANAT 602S	Medical Neuroscience	6.0
BIOC 510S	Cancer Biology	3.0

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MIIM 500S	Medical Microbiology	5.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 607S	Integrative Neuroscience	4.0
PATH 502S	Path ob io logy 1st Laboratory Rotation	4.0
PATH 505S	Path ob io logy 2nd Laboratory Rotation	4.0
PATH 506S	Path ob io logy 3rd Laboratory Rotation	4.0
PHGY 503S	Graduate Physiology	4.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.

MS Degree Requirements: Thesis Option **48.0 semester credits**

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PATH 502S	Path ob io logy 1st Laboratory Rotation	4.0
PATH 503S	Path ob io logy Journal Club	1.0
PATH 509S	Pathologic Processes	3.0
PATH 600S	Pathology Thesis Research	9.0
PATH 601S	Cell and Molecular Path ob io logy of Cancer: Angiogenesis	4.0

Suggested Electives* **Min. 1 course**

Students are required to take a minimum of one course from the following list:

Suggested Electives*

ANAT 602S	Medical Neuroscience	6.0
BIOC 510S	Cancer Biology	3.0
MIIM 500S	Medical Microbiology	5.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 607S	Integrative Neuroscience	4.0
PATH 505S	Path ob io logy 2nd Laboratory Rotation	4.0
PATH 506S	Path ob io logy 3rd Laboratory Rotation	4.0
PHGY 503S	Graduate Physiology	4.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) program.

PhD Degree Requirements **96.0 semester credits**

Required Courses

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PATH 502S	Path ob io logy 1st Laboratory Rotation	4.0
PATH 503S	Path ob io logy Journal Club	1.0
PATH 505S	Path ob io logy 2nd Laboratory Rotation	4.0
PATH 506S	Path ob io logy 3rd Laboratory Rotation	4.0
PATH 509S	Pathologic Processes	3.0
PATH 600S	Pathology Thesis Research	9.0
	Cell and Molecular Path ob io logy of	

Suggested Electives***2 courses**

Students are required to take a minimum of two courses from the following list:

Suggested Electives*

ANAT 602S	Medical Neuroscience	6.0
BIOC 510S	Cancer Biology	3.0
MIIM 500S	Medical Microbiology	5.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 607S	Integrative Neuroscience	4.0
PHGY 503S	Graduate Physiology	4.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) program.



Drexel University

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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

Neuroscience

MS without thesis: 36.0 semester credits

MS with thesis: 48.0 semester credits

PhD: 96.0 semester credits

About the Programs

To meet the need for research scientists with broad backgrounds in neuroscience, the University offers an interdepartmental neuroscience program leading to MS and PhD degrees. The program provides a core curriculum of integrated courses related to the neurosciences. In addition, elective courses are aimed at helping students amplify and add specialization to their educational experience. Upon completing these programs, students pursue careers in academic, governmental, or industrial settings.

The MS in Neuroscience Program

The MS program gives students a broad background in neuroscience and the techniques used in neuroscience research. A master's thesis based on a laboratory research project is a requirement for the degree. Students who wish to continue their graduate training after completing the MS degree requirements may apply to the PhD program, and their credits may be applied to the doctoral program.

The PhD in Neuroscience Program

The PhD program trains individuals to conduct independent research and to teach in the neurosciences. The program includes two years of coursework followed by original research leading to a thesis. Laboratory rotations begin in the fall of the first year.

For more information, visit the College of Medicine's [Neuroscience Program](#) web site.

Admission requirements

Students will be selected on the basis of adequate educational background and medical experience. A Bachelor's Degree in the Health Sciences or related field, with a cumulative GPA of at least 3.0, is the minimum requirement for acceptance into the Master's Degree Program. Prerequisite course work should include microbiology, anatomy, physiology, mathematics, English composition, general chemistry, organic and/or biochemistry and biological science.

All candidates will be required to have a formal interview with the Selection Committee prior to final acceptance. Deadline for submission of the application is April 15 of the year in which the students plan to enroll. The applicants will be notified of the Committee's decision on a rolling basis.

Candidates for admission must provide the following credentials:

- Completed application form
- Transcript of college academic record
- Graduate Record Examination (GRE) scores
- Three letters of recommendation
- Self-assessment essays:
 - A. Discuss personal goals, conditions, or career aspirations that motivate you to pursue graduate study at Drexel University.
 - B. What are your most important accomplishments?
 - C. What do you expect to achieve through this program?

The application form is available at the [Biomedical Graduate Applications](#) site.

About the Curriculum

Students in both the PhD and MS programs begin their coursework with a core curriculum. The curriculum consists of a series of core courses that are shared by all of the biomedical graduate programs in the medical school, and a series of programmatic courses. All students in the Neuroscience Program must take the core curriculum, although the possibility exists for students to be excused from a particular course if they are able to prove that they already have the necessary knowledge required of the particular course.

During the second year, students select elective courses and begin their thesis research in consultation with the Advisory-Examination Committee. At the end of the second year, students take a comprehensive examination to qualify for PhD candidacy.

There are three rotations in the curriculum for which the student will be assigned a grade. The purpose of these rotations is enable the student to select the most appropriate Graduate Advisor to supervise the research project for the student. The Neuroscience Program Director and Steering Committee will advise each student on the selection of rotations, as well as on the progress and outcome of rotations. Flexibility will be afforded in certain situations in which the student may be able to select an advisor before completing all three rotations, or in situations wherein it is advisable to terminate a particular



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rotation early in favor of another choice.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

MS and PhD Degree Requirements

MS Degree Requirements: Non-Thesis Option **36.0 semester credits**

Required Courses

ANAT 501S	Neurobiology Topics I	2.0
or		
PHRM 502S	Current Topics in Pharmacology and Physiology	1.0
ANAT 602S	Medical Neuroscience	6.0
IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or		
IDPT 550S	Biochemistry and Biophysics	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 609S	Graduate Neuroscience II	4.0

Advanced Neuroscience Course **One course**

Students are required to select a minimum of one of the following courses::

NEUR 511S	Advanced Cellular and Developmental Neuroscience	1.0
NEUR 512S	Advanced Systems and Behavioral Neuroscience	1.5
NEUR 634S	Motor Systems	4.0

Suggested Electives*

MCBG 506S	Advanced Cell Biology	2.0
PHRM 512S	Graduate Pharmacology	3.0
PHGY 503S	Graduate Physiology	4.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.

MS Degree Requirements: Thesis Option **48.0 semester credits**

Required Courses

ANAT 501S	Neurobiology Topics I	2.0
or		
PHRM 502S	Current Topics in Pharmacology and Physiology	1.0
ANAT 602S	Medical Neuroscience	6.0
IDPT 500S	Scientific Integrity and Ethics	2.0

IDPT 521S	Molecular Structure and Metabolism	5.0
or		
IDPT 550S	Biochemistry and Biophysics	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 501S	Neuroscience 1st Lab Rotation	4.0
NEUR 502S	Neuroscience 2nd Lab Rotation	4.0
NEUR 503S	Neuroscience 3rd Lab Rotation	4.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 600S	Neuroscience Thesis Research	9.0
NEUR 609S	Graduate Neuroscience II	4.0

Advanced Neuroscience Course **One course**

Students are required to select a minimum of one of the following courses::

NEUR 511S	Advanced Cellular and Developmental Neuroscience	1.0
NEUR 512S	Advanced Systems and Behavioral Neuroscience	1.5
NEUR 634S	Motor Systems	4.0

Suggested Electives*

MCBG 506S	Advanced Cell Biology	2.0
PHRM 512S	Graduate Pharmacology	3.0
PHGY 503S	Graduate Physiology	4.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.

PhD Degree Requirements **96.0 semester credits**

Required Courses

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

PhD students may enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the degree completion requirement of 96.0 credits.

ANAT 501S	Neurobiology Topics I	2.0
or		
PHRM 502S	Current Topics in Pharmacology and Physiology	1.0
ANAT 602S	Medical Neuroscience	6.0
IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or		
IDPT 550S	Biochemistry and Biophysics	5.0

IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 600S	Neuroscience Thesis Research	27.0
NEUR 609S	Graduate Neuroscience II	4.0

Advanced Neuroscience Course **One course**

Students are required to select a minimum of one of the following courses::

NEUR 511S	Advanced Cellular and Developmental Neuroscience	1.0
NEUR 512S	Advanced Systems and Behavioral Neuroscience	1.5
NEUR 634S	Motor Systems	4.0

Required Electives*

MCBG 506S	Advanced Cell Biology	2.0
PHRM 512S	Graduate Pharmacology	3.0
PHGY 503S	Graduate Physiology	4.0

*Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.



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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

Pharmacology and Physiology

MS without thesis: 36.0 semester credits

MS with thesis: 48.0 semester credits

PhD: 96.0 semester credits

About the Programs

The Department of Pharmacology and Physiology offers graduate programs leading to the MS and the PhD degrees. The programs require independent research under the direction of departmental faculty members who are engaged in highly active research programs involving molecular, cellular, and behavioral approaches to experimental pharmacology and physiology in a strongly collaborative environment.

Students in both the PhD and MS programs begin their coursework with a core curriculum in biomedical sciences, and immediately start laboratory rotations. Intensive graduate level pharmacology, physiology and neuropharmacology courses round out the core programmatic courses. Specialization in ion channel physiology, smooth muscle physiology, behavioral pharmacology and signal transduction processes may involve the taking of several elective courses. Each program requires the defense of a thesis based on original research.

About the MS Program

The MS program, requiring two years of full-time study, provides a broad knowledge and technical expertise in pharmacology and physiology, allowing graduates to become partners in research in either an academic or an industrial environment. Students who wish to continue their graduate studies after the MS degree may apply to the PhD program, and their course credits may be applied to the doctoral program.

About the PhD Program

PhD candidates must pass a qualifying examination by November of their third year and they must have one first-author manuscript accepted for publication in a peer-reviewed journal during the course of the program.

Admission Requirements

Drexel University College of Medicine has a rolling admissions policy, which means that complete applications are reviewed as they are received. Applicants are therefore advised to apply early, as decisions to accept or deny admission may be made before the official deadlines.

To learn more about applying to Drexel College of Medicine programs visit the Drexel College of Medicine's [Biomedical Studies](#) website.

About the Curriculum

The core curriculum is a comprehensive interdisciplinary program of study for all first-year research master's and PhD students in the Biomedical Graduate Studies programs. The goal of the core curriculum is to provide a broad foundation in biomedical sciences and serve as a framework for advanced study in more specialized areas.

Courses Repeatable for Credit

As well as taking all required courses, MS and PhD students may re-enroll in courses having the status "repeatable for credit" (such as journal club, seminar and research courses) for the duration of their program in order to meet the total number of credits required for graduation.

For more information about scheduling and developing a plan of study, visit the College of Medicine's [Pharmacology and Physiology](#) page.

MS and PhD Degree Requirements

MS Degree Requirements: Non-Thesis Option

36.0 semester credits

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
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IDPT 501S	Biostatistics I	2.0
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or



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NEUR 500S	Statistics for Neuro/Pharm Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
PHRM 502S	Current Topics in Pharmacology and Physiology	1.0
PHRM 507S	Principles of Neuropharmacology	4.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Special Topics in Pharmacology and Physiology	1.0
PHGY 503S	Graduate Physiology	4.0

Advanced Pharmacology and Physiology electives **Minimum of 3 courses**

Students are required to select a minimum of three advanced electives. Students normally consult with their committee to select advanced electives.

MS Degree Requirements: Thesis Option **48.0 semester credits**

Required Courses

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
or		
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PHRM 502S	Current Topics in Pharmacology and Physiology	1.0
PHRM 503S	Pharmacology and Physiology 1st Lab Rotation	4.0
PHRM 504S	Pharmacology and Physiology 2nd Lab Rotation	4.0
PHRM 507S	Principles of Neuropharmacology	4.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Special Topics in Pharmacology and Physiology	1.0
PHRM 600S	Pharmacology Thesis Research	9.0
PHGY 503S	Graduate Physiology	4.0

Advanced Pharmacology and Physiology electives **Minimum of 2 courses**

Students are required to select a minimum of two advanced electives. For more information about advanced elective options, visit the College of Medicine's [Pharmacology and Physiology](#) website.

Required Courses

During the third year, students develop a plan for their doctoral research in conjunction with their thesis advisor. A formal, written thesis proposal is then presented to the student's Thesis Advisory Committee. Acceptance of this proposal after oral examination by the Committee leads to the final stage of doctoral training. PhD candidates then spend the majority of their time on thesis research. After concluding their research, they must submit and publicly defend their thesis before the Thesis-Examination Committee.

IDPT 500S	Scientific Integrity and Ethics	2.0
IDPT 501S	Biostatistics I	2.0
or		
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PHRM 502S	Current Topics in Pharmacology and Physiology	1.0
PHRM 503S	Pharmacology and Physiology 1st Lab Rotation	4.0
PHRM 504S	Pharmacology and Physiology 2nd Lab Rotation	4.0
PHRM 505S	Pharmacology and Physiology 3rd Lab Rotation	4.0
PHRM 507S	Principles of Neuropharmacology	4.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Special Topics in Pharmacology and Physiology	1.0
PHRM 600S	Pharmacology Thesis Research	9.0
PHGY 503S	Graduate Physiology	4.0

Advanced Pharmacology and Physiology electives**Minimum of 2 courses**

Students are required to select a minimum of two advanced electives. For more information about advanced elective options, visit the College of Medicine's [Pharmacology and Physiology](#) website.

Additional electives

Students are required to select additional electives to complete the minimum of 96.0 credits for graduation. Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's [Biomedical Graduate Studies](#) programs.



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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

Academic Medicine

About the Program

The MS in Academic Medicine is designed to address topics of value to the academic physician, including training in leadership, education, ethics, professionalism, public health, health accreditation, statistics, bioepidemiology, research techniques, medical writing and editing, grant writing, research regulations, public speaking and academic health center management. These are topics typically important to educators, but not commonly covered in depth during residency training.

Students pursuing an MS in Academic Medicine must designate a concentration. At this time the first available concentration is the field of otolaryngology.

Goals and objectives

The MS in academic medicine provides a structured pathway for physicians planning careers as clinical educators to acquire specialized knowledge and to demonstrate a special expertise in teaching. The objectives of the MS in Academic Medicine include:

- training young physicians to be skilled clinical educators;
- providing students with core knowledge about academic medicine that is not included systematically in residency training programs;
- encouraging research;
- exposing students to the process of supervising and mentoring research;
- encouraging life-long continued study of materials and methods for clinical education.

Program requirements

MS students in Academic Medicine will follow the residency curriculum that is standard for residents throughout the US. In addition they will:

- Engage in a formal year-long course that will provide training relevant to careers in academic medicine;
- Attend journal clubs overseen by the faculty;
- Pass in-service training examinations at the 70th percentile or better, or receive board certification;
- Complete a research requirement.

Course work

A minimum of thirty six credits are required with a B average or better. Thus, the course of study for the MS in Academic Medicine will be in addition to the standard curriculum for residents (see the [curriculum](#)) plus the requirement of a research based, first authored publication.

Examinations

All residents are required to take in-service training examinations annually. This is a national, standardized test provided for each clinical specialty. Performance at the 70th percentile or better in this examination is considered a passing grade for the MS. Alternatively, board certification would be sufficient to acknowledge that the student has mastered a body of knowledge suitable for the MS degree. Each clinical specialty has its own (very rigorous) requirements for board certification, supervised by the American Board of Medical Specialties.



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MS in Academic Medicine

Requirements for Admission

All applications are to be submitted through the [Office of Biomedical Graduate Studies](#). The applications are then reviewed by the department in which the degree is offered (for example: otolaryngology - head and neck surgery).

Recommendations for acceptance are presented to the Biomedical Graduate Education Committee of the College of Medicine for final approval. The requirements for admission include but are not limited to:

- enrollment in an ACGME approved residency program;
- satisfactory completion of at least one year of residency;
- a letter of recommendation from the applicant's Department Chair or Program Director;
- an interview in person;
- medical school transcript.



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MS in Academic Medicine: Otolaryngology Concentration

36.0 semester credits (minimum)

About the Curriculum

A minimum of thirty six credits are required with a B average or better. Thus, the course of study for the MS in Academic Medicine will be in addition to the standard curriculum for residents plus the requirement of a research based, first authored publication.

Research Requirements

Each candidate for the MS will conduct a research project under the guidance of his/her advisory committee. In most cases this project will encompass clinical or bench research that will result in a first author publication in a peer-reviewed journal. (Case reports are not sufficient for fulfilling this requirement) However if the student is involved in scholarly activity of another nature that is deemed sufficiently rigorous by the advisory committee, flexibility to recognize and accept other activities is intended. For example, such activities might include writing a book or developing the curriculum for a new academic program.

Curriculum

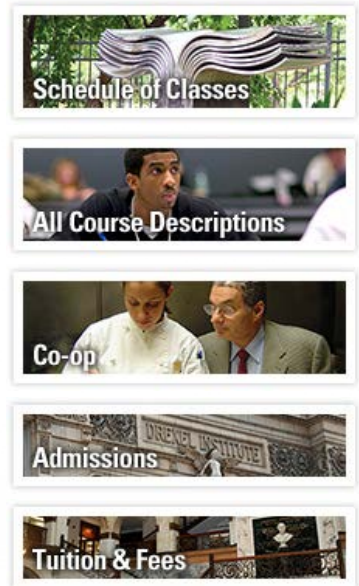
Required courses for MS in Academic Medicine: 36.0 Credits

ACMD 600S	Academic Medicine: Core Knowledge I	3.0
ACMD 601S	Academic Medicine: Core Knowledge II	3.0
ACMD 602S	Academic Medicine Thesis Research	4.0
IDPT500S	Scientific Integrity and Ethics	2.0
IDPT 600S	Thesis Defense	9.0
IDPT 600S	Thesis Defense	9.0
	Additional didactic courses included in the Associated Residency Program	9.0

Required courses for concentration in Otolaryngology 13.0 Credits

OTO 600S	General Otolaryngology	3.0
OTO 601S	Otology	3.0
OTO 602S	Head and Neck Oncology	3.0
OTO 603S	Pediatric Otolaryngology, Introduction	3.0
OTO 604S	Journal Club in Otolaryngology	1.0

Students select two Otolaryngology electives from the following: 6.0 Credits



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OTO 605S	Laryngology - Voice, Introduction	3.0
OTO 606S	Laryngology - Voice, Advanced	3.0
OTO 607S	Laryngology - Swallowing	3.0
OTO 608S	Temporal Bone Dissection	3.0
OTO 609S	Neurotology	3.0
OTO 610S	Audiology	3.0
OTO 611S	Endocrine Surgery	3.0
OTO 612S	Allergy and Immunology	3.0
OTO 613S	Radiology of the Head and Neck	3.0
OTO 614S	Pathology and Histology	3.0
OTO 615S	Pediatric Otolaryngology, Advanced	3.0
OTO 616S	Otolaryngology Practice	3.0
OTO 617S	Research Methodology and Publication	3.0
OTO 618S	Facial Plastic and Reconstructive Surgery	3.0
OTO 619S	Sleep Disorders	3.0
OTO 620S	Taste and Smell	3.0
OTO 621S	Rhinosinusology	3.0
OTO 622S	Bronchoesophagology	3.0

Students select one Otolaryngology surgery elective from the following:

6.0 Credits

OTO 700S	General Otolaryngologic Surgery	6.0
OTO 701S	Otologic Surgery	6.0
OTO 702S	Head and Neck Oncologic Surgery	6.0
OTO 700S	General Otolaryngologic Surgery	6.0
OTO 703S	Pediatric Otolaryngologic Surgery	6.0
OTO 704S	Neurotologic Surgery	6.0
OTO 705S	Laryngologic Surgery	6.0
OTO 706S	Rhinologic Surgery	6.0
OTO 707S	Surgery of the Sinuses	6.0
OTO 708S	Bronchoesophagology	6.0
OTO 709S	Cosmetic Plastic and Reconstructive Surgery	6.0

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Master of Science in Biological Science

55 graduate semester credits (+ 28 undergraduate credits)

About the Program

Students who complete the one-year [Medical Science Preparatory Certificate](#) (MSP) program with a B average or higher and have taken the MCAT exam are guaranteed admission to the program for the following year and can take additional courses, leading to the Master of Science in Biological Science degree.

Summer Research Project

MSPP 550S	Research Project	2.0
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Fall Semester

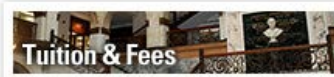
IMSP 502S	Medicine and Society I	3.0
IMSP 510S	Medical Biochemistry I	7.5
IMSP 520S	Medical Physiology I	3.5
IMSP 540S	Cell Biology and Microanatomy I	5.0
IMSP 550S	Medical Nutrition*	1.0
IMSP 570S	Medical Immunology*	3.0

*This course is optional.

Spring Semester

IMSP 503S	Medicine and Society II	2.0
IMSP 511S	Medical Biochemistry II	0.5
IMSP 521S	Medical Physiology II	3.5
IMSP 541S	Cell Biology and Microanatomy II	3.0
IMSP 560S	Medical Neuroscience	6.0

For more information about the program, visit Drexel's College of Medicine [Professional Studies in the Health Sciences](#) website.



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Master of Science in Clinical Research Organization and Management

About the Program

The Master of Science in Clinical Research Organization and Management offers students a rigorous graduate education taught by leaders from the pharmaceutical, biotechnology and medical device industries, as well as from academic research centers.

The program provides online courses that include scientific rationale related to the design and analysis of clinical trials, biostatistics, ethics-based reasoning for the conduct of research, clinical trial management processes, and federal regulatory rules and policies essential to the development of a broadly-educated and well-prepared professional in clinical research and new therapeutic product investigation.

The program is designed so that graduates will be able to:

- Successfully apply the framework and philosophies of research to the management of clinical trials, employing quality principles of current good clinical practice to produce valid and useful data;
- Ensure that sound ethical principles and values are always recognized and upheld in research involving a human population;
- Use current statistical knowledge and methods in the design, implementation, conduct, and assessment of clinical trial management; and
- Understand the scientific and clinical research literature to effectively interpret the results of clinical research, thereby enhancing the decision-making process.

Students have the ability to custom-tailor their learning by enrolling in programs and courses in a variety of medical topics.

For more information about the program, visit the [Master of Science in Clinical Research Organization and Management](#) page on the Drexel e-Learning site.

For information about applying to the program, visit the Drexel University Online [Admissions Criteria](#) web page.



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Master of Science in Clinical Research Organization and Management

36.0 semester credits

The Master of Science in Clinical Research Organization and Management consists of 12 courses. Any courses offered by the Clinical Research Organization Management program may be applied to fulfill the requirements of this major.

The program is organized into five areas of study devoted to clinical research and related administrative and regulatory issues. Students can take courses within their preferred area of study, a cross-section of courses within other areas of study, or any other CR courses being offered.

Areas of study:

New Product Research and Development

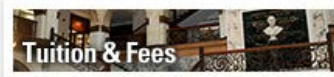
CR 513S	Pharmaceutical R & D Business Process and Information Flow	3.0
CR 514S	World Wide Regulatory Submissions	3.0
CR 515S	Introduction to Clinical Trials	3.0
CR 609S	Innovative Product Development	3.0
CR 620S	Biotechnology: Principles, Practices and Regulations	3.0

Regulatory Compliance, Ethics and Law

CR 505S	Ethical Issues for Clinical Research	3.0
CR 511S	History of Misconduct in Biomedical Research	3.0
CR 535S	Current Federal Regulatory Issues in Biomedical Research	3.0
CR 555S	Issues in Compliance and Monitoring	3.0
CR 565S	Contemporary Issues in Human Research Protection	3.0
CR 633S	Quality Assurance Audits	3.0
CR 612S	Fundamentals of Compliance	3.0
CR 545S	Pharmaceutical Law	3.0

Biostatistics and Data Management

CR 500S	Epidemiological Methods for Clinical Research	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 560S	Special Topics	3.0



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CR 600S	Designing the Clinical Trial	3.0
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Clinical Research Management and Safety Surveillance

CR 512S	Fundamentals of Academic Research Administration	3.0
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CR 525S	Scientific Writing and the Interpretation of Medical Literature	3.0
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CR 625S	Health Policy and Pharmacoeconomics	3.0
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New Therapeutic Product Business and Strategic Planning

CR 530S	Technology Transfer and Intellectual Property	3.0
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CR 635S	Strategic Planning	3.0
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CR 550S	Leadership Skills	3.0
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Master of Science in Clinical Research for Health Professionals

About the Program

The MS in Clinical Research for Health Professions is a unique program, addressing the desires of residents, fellows and young clinicians to attain knowledge in how to conduct translational/pharmaceutical research while developing their clinical careers. The program is also available to other clinical health professionals such as nurses (with a minimum of a bachelor's degree required), audiologists, etc. to help these individuals advance their professional opportunities.

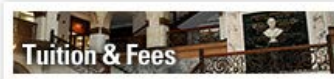
Online course work coupled with supervised research activities will allow health care professionals in any academic hospital setting throughout the US to receive an MS degree from Drexel University College of Medicine (DUCoM).

Research Project

The MS in Clinical Research for Health Professionals is a non-thesis program. However, it is consistent with a master's level education that students be challenged to clearly express well-organized thoughts in written form. The collection, analysis and refinement of scientific information to produce a professional-level written document are crucial skills for those in the health professions. This requirement will expose students to the entire process of developing a research project and reporting on that research project up to and including experiencing a facsimile of the peer review and re-submission process.

It is anticipated that each student will conduct a minimum of 9 hours research/week for 3 credits per semester. Research may include a broad spectrum of clinical studies such as: retrospective studies; bench-top studies in conjunction or not with pharmaceutical companies; development of new clinical methodologies/techniques; or, development/evaluation of new clinical devices. Research mentors must be established researchers with a doctoral degree. A curriculum vitae of the proposed research advisor must be submitted with the student's application for evaluation by the PSC admissions committee and the program's director. The appropriateness of the mentor will be evaluated by an ad hoc committee whose members come from both the Office of Professional Studies and the Drexel University College of Medicine clinical faculty. The student must submit a 7-10 page journal-format paper at the end of each semester documenting their research and demonstrating that each successive semester's work builds upon their prior work.

For more information about the program, visit the [Professional Studies at the Drexel University College of Medicine](#) site.



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Master of Science in Clinical Research for Health Professionals

36.0 semester credits

The MS in Clinical Research for Health Professionals requires completing a minimum of 15.0 semester credits, comprised of three required courses and two clinical research electives.

In addition, students will register for a total of 21.0 research credits.

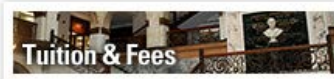
Curriculum

Students select three of the following courses: 9.0 Credits

CR 500S	Epidemiology	3.0
CR 515S	Introduction to Clinical Trials	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 525S	Scientific Writing and the Interpretation of Medical Literature	3.0
CR 612S	Fundamentals of Compliance	3.0
CR 545S	Pharmaceutical Law	3.0

Students select two of the following courses: 6.0 Credits

CR 500S	Epidemiology	3.0
CR 501S	Emerging Trends in the Medical Device Industry	3.0
CR 505S	Ethical Issues for Clinical Research	3.0
CR 511S	History of Misconduct in Biomedical Research	3.0
CR 512S	Fundamentals of Academic Research Administration	3.0
CR 515S	Introduction to Clinical Trials	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 525S	Scientific Writing and the Interpretation of Medical Literature	3.0
CR 535S	Current Federal Regulatory Issues in Biomedical Research	3.0
CR 545S	Pharmaceutical Law	3.0
CR 565S	Contemporary Issues in Human Research Protection	3.0



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CR 570S	Principles and Practice of Pharmacovigilance	3.0
CR 600S	Designing the Clinical Trial	3.0
CR 609S	Innovative Product Development	3.0
CR 612S	Fundamentals of Compliance	3.0
CR 614S	Pharmacotherapy in New Drug R & D	3.0
CR 616S	The Introduction of Therapeutic Products	3.0
CR 617S	Informatics in Pharm Research and Development	3.0
CR 620S	Biotechnology: Principles, Practices and Regulations	3.0
CR 625S	Health Policy and Economics	3.0
CR 999S	Special Topics: Clinical Data Management	3.0
CR 699S	Special Topics: health Data Stewardship in Clinical Research	3.0

Research/Journal-type paper requirement

Min 21.0 Credits

Each student conducts a minimum of 9 hours research/week for 3 credits per semester. *

CRHP 501S	Research Health Professions I	3.0
CRHP 502S	Research Health Professions II	3.0
CRHP 503S	Research Health Professions III	3.0
CRHP 504S	Research Health Professions IV	3.0
CRHP 505S	Research Health Professions V	3.0
CRHP 506S	Research Health Professions VI	3.0
CRHP 507S	Research Health Professions VII	3.0

* Research may include a broad spectrum of clinical studies such as: retrospective studies; bench-top studies in conjunction or not with pharmaceutical companies; development of new clinical methodologies/ techniques; or, development/evaluation of new clinical devices.

Research mentors must be established researchers with a doctoral degree. A curriculum vitae of the proposed research advisor must be submitted with the student's application for evaluation by the PSC admissions committee and the CRHP program director. The appropriateness of the mentor will be evaluated by an Ad Hoc committee whose members come from both the Office of Professional Studies and the Drexel College of Medicine clinical faculty.

The student must submit a 7-10 page journal-format paper at the end of each semester documenting their research and demonstrating that each successive semester's work builds upon their prior work. Contact the CRHP program director for additional requirements.



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Master of Science in Criminalistic Science

About the Program

Criminalistics is defined as the scientific study and analysis of crime scenes and the evidence within those scenes to solve a crime and apprehend the perpetrator of the crime. The disciplines within criminalistics are science based, with most using multiple combinations of the natural sciences to conduct examinations and analysis of evidence and crime scenes.

In addition to required courses in criminal law, trial process and the use of evidence, the Master of Science in Criminalistic Science program offers courses in fingerprint science, forensic engineering, motor vehicle crash reconstruction, firearms and tool mark analysis, fire and explosion analysis, footwear and tire track analysis, bloodstain pattern analysis, trace materials and forensic geology and botany, and nuclear, biological, chemical terrorism/mass disaster management.



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Master of Science in Criminalistic Science

Admission requirements

Applicants must have a bachelor's degree from an accredited college or university and must have completed one year of coursework in undergraduate biology, general (inorganic) chemistry, organic chemistry, and physics. Official general GRE and/or MCAT scores are required for admission.

Typical applicants would have a minimum 3.0 GPA, a general GRE score of 1100, and/or a composite MCAT score of 24.

Selection is based upon academic qualifications, standardized test scores, references, an evaluation of the candidate's goals and commitment, and a telephone interview.

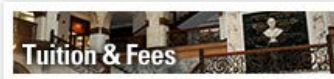
Each applicant's academic record will be evaluated based upon its individual merits. Since consideration for employment within the field of Criminalistic Science necessitates the absence of a criminal background, it is expected that all individuals applying to this program will have no history of criminal behavior, including prior illicit drug and/or prescription drug abuse.

For additional information on how to apply for this program, contact:

Ms. Thelicia Hill

thelicia.hill@drexel.edu

Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
Forensic Science Program
Mail Stop 344, 245 North 15th Street
Philadelphia, PA 19102-1192



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Master of Science in Criminalistic Science

48.0 credits.

Sample Sequence

Required Courses

First Year

Fall Quarter

FCA 503	Physical Aspects of Forensic Science	3.0
MFSP 502	Biological Aspects of the Forensic Sciences	3.0
MFSP 534	Human Osteology and Calcified Tissue Biology	3.0
MFSP 516	Techniques in Crime Scene Investigation	3.0

Winter Quarter

FCA 501	Medico-Legal Death Investigation	3.0
MFSP 511	Criminal Law and the Court: Use of Evidence I	3.0
MFSP 599	Special Topics: Anatomy	3.0

Spring Quarter

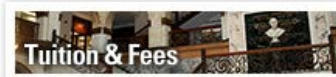
MFSP 507	Forensic Anthropology and Topics in Human Identification I	3.0
MFSP 512	Criminal Law and the Court: Use of Evidence II	3.0
MFSP 529	Ethics for the Forensic Sciences	3.0

Second Year

Fall Quarter

Students select 9.0 credits of electives from the following options:

MFSP 515	Cyber Crime	3.0
MFSP 517	Arson and Explosion Analysis	3.0
MFSP 518	Latent Fingerprint Analysis	3.0
MFSP 521	Techniques of Interview and Interrogation	3.0
MFSP 531	Forensic Photography	3.0



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Spring Quarter

Students select 9.0 credits of electives from the following options:

MFSP 520	Firearms & Tool Mark Analysis		3.0
MFSP 523	Vehicle Accident Recognition	3.0	
MFSP 524	Footwear/Tire Track Analysis	3.0	
MFSP 525	Nuclear, Biological, and Chemical Terrorism	3.0	
MFSP 526	Bloodstain Pattern Analysis	3.0	
MFSP 548	Criminal Investigative Analysis	3.0	



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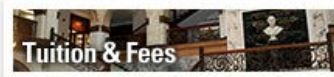
Master of Science in Histotechnology

About the Program

Drexel's MS in Histotechnology, a one-year (12-month) program, is designed to offer the necessary didactic coursework as well as the practical experience needed to function as a histotechnologist. Coursework includes laboratory management and leadership skills as well as advanced histotechnology courses.

In addition to the course work, students complete a three-month practicum designed to allow students to apply the knowledge and techniques learned during their didactic courses in a clinical hospital setting. The practicum allows the student the opportunity to perform routine as well as specialized, histotechnology techniques under the supervision of a qualified histotechnologist.

For more information about this program, visit the College of Medicine's [Professional Studies](#) programs page.



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Master of Science in Histotechnology

Admission requirements

A bachelor's degree in a biological or allied health science with a cumulative GPA of approximately 2.75, is the minimum requirement for acceptance into the Master's Degree Program. Prerequisite course work will include mathematics, English composition, general chemistry, organic and/or biochemistry and biological science. Microbiology, anatomy and histology are recommended but not required.

All candidates will be required to have a formal interview with the Selection Committee prior to final acceptance. Deadline for submission of the application is the second Friday in June of the year in which the students plan to enroll. The applicants will be notified of the Committee's decision on a rolling basis.

Candidates for admission must provide the following credentials:

- Completed application form
- Resume
- Transcript of college academic record
- Graduate Record Examination (GRE) scores
- Two letters of evaluation
- Self-assessment essays:
 - A. Discuss personal goals, conditions, or career aspirations that motivate you to pursue graduate study at Drexel University.
 - B. What are your most important accomplishments?
 - C. What do you expect to achieve through this program?

The application and supporting material must be received no later than the program deadline date. Applicants will be accepted on a rolling admissions basis.

For further information, contact:

Chris Mignogna
Master of Histotechnology Program Director
Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 N. 15th Street, Mail Stop 344
Philadelphia, PA 19102-1192



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COLLEGES & SCHOOLS MAJORS MINORS GRADUATE PROGRAMS CERTIFICATE PROGRAMS ARCHIVE

Master of Science in Histotechnology

42.0 credits.

Curriculum

Fall

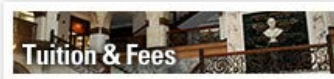
MSPP 511S	Concepts in Biochemistry and Cell Biology	4.0
MLAS 545S	Fundamentals of Histology	2.0
MSPA 540S	Histotechnology I	3.0
MSPA 520S	Medical Terminology	3.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
Total credits		15.0

Spring

MHPP 500S	Advanced Histotechnology	4.0
MHPP 501S	Anatomy for Histotechnologists	4.0
MHPP 502S	Histotechnology Capstone Project	3.0
MSPA 581S	Medical Microbiology I	3.0
Total credits		14.0

Summer

MSPA 510S	Laboratory Management	2.0
MSPA 560S	Medical Ethics	2.0
MHPP 503S	Histotechnology Practicum	9.0
Total credits		13.0



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MS in Interdisciplinary Health Sciences Program

About the Program

Students already participating in the Interdisciplinary Health Science (IHS) Certificate program who qualify (see [admissions guidelines](#)) and wish to obtain additional, more focused education within the medically related health sciences can earn a Master of Science degree. Having obtained a broad exposure to a variety of health care and medically related sciences during the first year, the MIHS year will permit students to refine their knowledge and further explore closely related subjects in their chosen area of focus in greater depth.

During their participation in the MIHS year of the program, students will complete 24 additional credit hours of graduate course work (for a total minimum of 48 hours in entire 2 year program) including a final research paper. The Master of Science (MS) will be awarded contingent upon satisfactory completion of all program requirements, including an earned GPA of no less than 3.0.

For more information about this program, visit the College of Medicine's [Professional Studies](#) programs page.



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Master of Science in Interdisciplinary Health Sciences Program

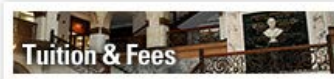
Admission requirements

Students cannot apply directly to the Master of Science (MS) in Interdisciplinary Health Sciences program. The MS in Interdisciplinary Health Sciences program is a second-year continuation of the [Interdisciplinary Health Sciences \(IHS\) Certificate Program](#)

Applicants to the Interdisciplinary Health Sciences (IHS) Certificate program are required to have a bachelor's degree from a US accredited institution, or its equivalent. The student should have successfully completed the minimum science courses required for application to medical school and have a minimum GPA of approximately 2.75 or better. In addition, students should have approximately a 20 or better on the MCAT exam with no science section below 7, or have scores in the 50th percentile on the general GRE.

After successful completion of the IHS Certificate with a minimum GPA of 3.0, students will be guaranteed admission into the MIHS program. Students with a graduate level GPA below a 3.0 from the IHS Certificate Program will be considered on an individual basis. Upon admission to the MIHS year, students will be required to declare a concentration track. See the [curriculum](#) page for more details about the concentrations.

For more information about applying to the program, visit the College of Medicine's [Professional Studies](#) programs page.



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Master of Science in Interdisciplinary Health Sciences (MIHS) Program

24.0 additional semester credits for a total minimum of 48.0 semester credits in the two-year program

After completing the [Interdisciplinary Health Science Certificate](#) requirements, students complete 24 additional credit hours of graduate course work. Students select a concentration track, and complete a final research paper. For additional guidance on the research paper requirements, students should contact the MIHS Program Director.

Curriculum

Fall		Credits
IHS 504S	Research Project and paper	3.0
	Concentration track courses*	9.0
Spring		
MLAS 530S	Biostatistics	3.0
	Concentration track courses*	9.0

*Concentration Tracks:

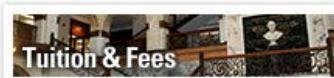
Clinical Research, Management and Laboratory Skills

Students select concentration courses from the following list:

CR 620S	Principles, Practice, and Regulation of Biotechnology	3.0
CR 625S	Health Policy and Economics	3.0
CR 614S	Applications of Pharmacotherapy in Research and Development	3.0
MLAS 520S	Financial Management of Laboratory Animal Facilities	3.0
MLAS 523S	Organizational Management I	3.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
MSPA 590S	Leadership Skills in the Health Sciences	3.0
MSPA 560S	Medical Ethics	2.0
MLAS 535S	Biology and Care of Laboratory Animals	4.0
MLAS 536S	Animal Models in Biomedical Research	1.0
PHRM 525S	Drug Discovery and Development	3.0

Biochemical and Pharmacologic Principles

Students select concentration courses from the following list:



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MFSP 502	Biological Aspects of Forensic Science	3.0	
MFSP 509	Forensic Toxicology I	3.0	
MFSP 510	Forensic Toxicology II	3.0	
MFSP 532	Forensic Microbiology		3.0
MLAS 513S	Biochemical Basis of Disease	2.0	
MLAS 529S	Molecular Genetics	2.0	
MMSP 530S	Selected Topics in Pharmacology	7.0	
MSPP 511S	Concepts in Biochemistry and Cell Biology	4.0	
MSPP 515S	Biological Function and Regulation	4.0	
PHRM 512S	Graduate Pharmacology	3.0	
PHRM 525S	Drug Discovery and Development	3.0	
PHGY 503S	Graduate Physiology	4.0	

Concepts in Anatomy and Pathology

Students select concentration courses from the following list:

MFSP 505	Forensic Pathology I	3.0	
MFSP 506	Forensic Pathology II	3.0	
MFSP 507	Forensic Anthropology	3.0	
MFSP 534	Human Osteology and Calcified Tissue Biology	3.0	
MLAS 513S	Biochemical Basis of Disease	2.0	
MLAS 531S	Embryology	4.0	
MLAS 536S	Animal Models in Biomedical Research	1.0	
MLAS 545S	Fundamentals of Histology	2.0	
MSPA 550S	Applied Anatomic Pathology	4.0	
MSPA 570S	Medical Pathology I	6.0	
MSPA 571S	Medical Pathology II	4.0	
MSPP 513S	Summer Seminar: Special Topics in Anatomy	4.0	

Laboratory Techniques

Students select concentration courses from the following list:

MFSP 507	Forensic Anthropology	3.0	
MFSP 531	Forensic Photography		3.0
MFSP 532	Forensic Microbiology	3.0	
MFSP 546	Forensic DNA Analysis		4.0
MLAS 535S	Biology and Care of Laboratory Animals	4.0	
MLAS 536S	Animal Models in Biomedical Research	1.0	
MLAS 545S	Fundamentals of Histology	2.0	
MSPA 520S	Medical Terminology	3.0	
MSPA 540S	Histotechnology I	3.0	
MSPA 580S	Medical Microbiology I	4.0	
MSPA 581S	Medical Microbiology II	3.0	
MSPA 560S	Medical Ethics	2.0	

Medical Science

Students in this concentration must take all of the following required courses:

IMSP 502S	Medicine and Society I	3	
IMSP 503S	Medicine and Society II	2.0	
IMSP 510S	Medical Biochemistry I	7.5	
IMSP 511S	Medical Biochemistry II	.5	
IMSP 520S	Medical Physiology I	3.5	

IMSP 521S	Medical Physiology II	3.5
IMSP 540S	Cell Biology and Microanatomy I	5
IMSP 541S	Cell Biology and Microanatomy II	3
IMSP 560S	Medical Neuroscience	6

Medical Technology

(Concentration is under development)

For more information, visit the College of Medicine's [Professional Studies](#) programs page.



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Master of Science in Forensic Science

About the Program

In the past few years film and television has introduced our entire society to the once closed world of forensic science. One of the elements that the entertainment industry has correctly identified as shedding light into the field is that a multidisciplinary approach is necessary to allow our criminal justice system to run properly.

The Master of Science in Forensic Sciences is designed to provide a thorough introduction to both the scientific and legal aspects of the field, which will then be followed by more in-depth study of specific forensic science fields. The fifth and sixth quarters are designed to allow students the study of one of three current areas of concentration: molecular biology, criminalistics, or clinical forensic medicine. Opportunities for overlapping study within these disciplines are also available. Students will be exposed to both the intricacies of problem solving as well as to the real-world application of the related disciplines within the field of forensic science. A collaborative network of municipal agencies, private enterprise and allied professional programs within the University has been built to prepare professionals who can confront the forensic challenges of the new millennium.

The program is not limited to only those students with undergraduate degrees in criminal justice and topic related fields. The program is designed to attract students at a multidisciplinary level. Students with coursework in the natural sciences, pre-medicine, engineering, computer science, psychology and the social sciences are only a few of the disciplines which will find this program beneficial.

For more information about this program, visit the College of Medicine's [Master of Science in Forensic Science](#) web page.



Schedule of Classes



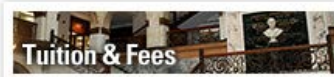
All Course Descriptions



Co-op



Admissions



Tuition & Fees

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Master of Science in Forensic Science

Admission Requirements

Admission into the program requires that the student have a strong background in the sciences. Students are required to have an academic year in each of the following sciences: biology; chemistry; organic chemistry and physics. A minimum 3.0 undergraduate GPA is desired, however, all supplemental materials and overall experience will be factored into the acceptance process. Additional course work to strengthen areas of weakness will be reviewed. The following submissions will be necessary for admission to the program:

- An application along with \$45.00 fee
- Official transcripts for each College or University
- Three letters of evaluation
- MCAT and/or GRE test scores

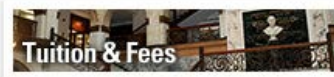
Contact information

For additional information on how to apply for this program, contact:

Ms. Thelicia Hill

thelicia.hill@drexel.edu

Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
Forensic Science Program
Mail Stop 344, 245 North 15th Street
Philadelphia, PA 19102-1192



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Master of Science in Forensic Science

61.5 credits

Curriculum

Required Courses

Fall (1st Quarter)

MFSP 502	Biological Aspects of the Forensic Sciences	3.0
MFSP 516	Techniques of Crime Scene Investigation	3.0
MFSP 528	Introduction to Criminal Law and Trial Process	3.0
MFSP 534	Human Osteology and Calcified Tissue Biology	3.0

Winter (2nd Quarter)

MFSP 505	Principles of Forensic Pathology I	3.0
MFSP 509	Forensic Toxicology and Instrumental Analysis I	3.0
MFSP 511	Criminal Law and the Court: Use of Evidence I	3.0
MFSP 599	Special Topics: Anatomy	3.0
MFSP 599	Special Topics: Physiology	3.0

Spring (3rd Quarter)

MFSP 506	Principles of Forensic Pathology II	3.0
MFSP 507	Forensic Anthropology and Topics in Human Identification I	3.0
MFSP 510	Forensic Toxicology and Instrumental Analysis II	3.0
MFSP 512	Criminal Law and the Court: Use of Evidence II	3.0

Summer (4th Quarter)

MFSP 527	Research Project	3.0
MFSP 529	Ethics for the Forensic Scientist	3.0



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Summer Electives:

MFSP 513	Summer Practicum	4.0
MFSP 514	Statistics for the Forensic Scientist	3.0
MFSP 515	Cyber Crime	3.0
MFSP 531	Forensic Photography	3.0

Fall (5th Quarter)

MFSP 549	Forensic Graduate Seminar	1.5
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Fall Elective:

MFSP 531	Forensic Photography	3.0
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Second Year Concentrations/Electives

Concentration Courses

After completing the required first year courses, students may choose to concentrate in one of 3 tracks: *Criminalistics*, *Molecular Biology* or *Clinical Forensic Science*.

Students may complete the courses within one track, or elect to take courses from different tracks. The total number of credits for graduation is 61.5.

■ **Criminalistics Concentration**

The criminalistics concentration offers courses in fingerprint science; forensic engineering; motor vehicle crash reconstruction; firearms and tool mark analysis; fire and explosion analysis; footwear and tire track analysis; bloodstain pattern analysis; trace materials and forensic geology and botany; and nuclear, biological, chemical terrorism/mass disaster management.

■ **Molecular Biology Concentration**

The molecular biology concentration offers courses in biochemistry; cell biology, human genetics; medical microbiology; immunology; forensic DNA analysis; bioterrorism; histology; virology; population genetics and eukaryotic genetics.

■ **Clinical Forensic Science Concentration**

Criminalistics Concentration:

Students select from the following set of courses to complete a minimum of 9.0 credits.

MFSP 517	Arson and Explosive Analysis	3.0
MFSP 518	Latent Fingerprint Analysis	3.0
MFSP 520	Firearms & Tool Mark Analysis	3.0
MFSP 522	Trace Material and Forensic Geology and Botany	3.0
MFSP 523	Vehicle Accident Recognition	3.0
MFSP 524	Footwear/Tire Track Analysis	3.0
MFSP 526	Bloodstain Pattern Analysis	3.0
MFSP 531	Forensic Photography	3.0
MFSP 548	Criminal Investigative Analysis	3.0

Molecular Biology Concentration:

Students select from the following set of courses to complete a minimum of 9.0 credits.

MFSP 532	Forensic Microbiology	3.0
MFSP 533	Principles of Immunology	3.0
MFSP 545	Special Topics in Cell Biology	3.0
BIO 500	Biochemistry I	3.0
BIO 635	Advanced Genetics and Molecular Biology	3.0

Clinical Forensic Science Concentration:

Students select from the following set of courses to complete

a minimum of 9.0 credits.

MFSP 539	The Autopsy: History, Principles and Applications	3.0
MFSP 544	Introduction to Forensic Psychiatry	3.0
MFSP 599	Special Topics in Forensic Science: Emergency Medicine and Traumatology	3.0
PBHL 663	Injury Prevention and Control	3.0

Winter (6th Quarter)

Criminalistics Concentration:

Students select from the following set of courses to complete a minimum of 9.0 credits.

MFSP 517	Arson and Explosion Analysis	3.0
MFSP 520	Firearms & Tool Mark Analysis	3.0
MFSP 521	Techniques of Interview and Interrogation	3.0
MFSP 524	Footwear and Tire Track Analysis	3.0
MFSP 525	NBC Terrorism	3.0
MFSP 547	Homicide Investigation	3.0

Molecular Biology Concentration:

Students select from the following set of courses to complete a minimum of 9.0 credits.

BIO 500	Biochemistry I	3.0
BIO 501	Biochemistry Laboratory I	2.0
ENVS 501	Chemistry of the Environment	3.0
ENVS 516	Sanitary Microbiology	3.0
MFSP 546	Forensic DNA Analysis	3.0

Clinical Forensic Science Concentration

Students select from the following set of courses to complete a minimum of 9.0 credits.

MFSP 540	Introduction to Forensic Engineering and Science	3.0
MFSP 541	Introduction to Forensic Radiology	3.0
MFSP 543	Introduction to Forensic Pediatrics	3.0



Master of Laboratory Animal Science Program

The MLAS program is designed for individuals who have a bachelor's degree in animal science or a related field and who are seeking advanced career positions in laboratory animal science and laboratory animal facility management. Graduates of the MLAS degree program can hold supervisory positions in biotechnology, pharmaceutical companies, and institutions of higher learning. The MLAS degree is also a powerful means to boost students' credentials for admission to veterinary medical school.

For more information about the program, visit Drexel College of Medicine's [Master of Laboratory Animal Science](#) website.



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Master of Laboratory Animal Science Program

Admission requirements

Candidates for admission must possess a bachelor's degree from an accredited college or university. In addition to the completed application, applicants must submit three letters of recommendation (two from past science professors, one from a veterinarian or past employer), a statement of goals, and official transcripts from all post-secondary institutions attended.

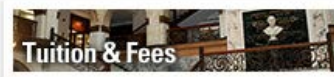
Applicants must also submit official scores from the Graduate Record Examination (GRE).

The deadline for submission of applications is the second Friday in July of the year the student seeks admission.

Contact Information:

Julian E. Mesina, DVM, PhD, MPH
Director, Animal Science Programs
245 N. 15th Street
Mail Stop 344
Philadelphia, PA 19102
Phone:
Fax: 215-762-8803
jmesina@drexelmed.edu

Richard B. Huneke, DVM, MPH, diplomat ACLAM
Associate Director, MLAS
Phone:
Fax: 215-762-7449
richard.huneke@drexelmed.edu



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Master of Laboratory Animal Science Program

48.0 semester credits

The MLAS degree can be completed full-time in two years and one summer practicum, or part-time in four or less years. Students must successfully complete a minimum of 48 credit hours for graduation. A minimum grade point average of 3.0 is required for graduation as well as grades of "C" or better.

First Year: Fall Semester

Required Courses		Credits
MSPA 580S	Medical Microbiology I	4.0
MLAS 510S	Clinical Orientation to Laboratory Animal Facilities	1.0
MLAS 523S	Organizational Management I	3.0
MLAS 536S	Animal Models in Biomedical Research	1.0

Electives

PHGY 503S	Graduate Physiology	4.0
PHRM 512S	Graduate Pharmacology	3.0

First Year: Spring Semester

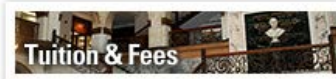
Required Courses

MLAS 520S	Financial Management in Laboratory Animal Science	3.0
MLAS 535S	Biology and Care of Laboratory Animals	4.0
MLAS 529S	Molecular Genetics	2.0

Second Year: Fall Semester

Required Courses

MLAS 525S	Animal Anatomy	2.0
MLAS 531S	Embryology	3.0
MLAS 606S	Clinical Laboratory Techniques and Concepts	1.0
MLAS 610S	Diseases of Laboratory Animals	3.0



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Electives

PHGY 503S	Graduate Physiology	4.0
PHRM 512S	Graduate Pharmacology	3.0
MLAS 513S	Biochemical Basis of Disease (UPENN)	2.0
MLAS 514S	Hematopoiesis (UPENN)	1.5
MLAS 545S	Fundamentals of Histology	2.0

Second Year: Spring Semester**Required Courses**

MLAS 501S	Laboratory Animal Science Seminar	2.0
MLAS 521S	Architecture, Engineering, and Planning of Laboratory Animal Facilities	4.0
MLAS 530S	Biostatistics in Veterinary Science	3.0

Second Year: Summer Session**Required Course**

MLAS 801S	Laboratory Animal Practicum	12.0
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Master of Science in Medical Science

About the Program

Students completing the first year of the [Interdepartmental Medical Science Certificate](#) program who have at least a B average and wish to receive a graduate degree may continue for another year of training to complete the requirements for the Master of Science in Medical Science. The degree can be completed in one additional year and requires research (non-thesis).

Students not meeting the minimum 3.0 GPA will be evaluated by the program director on an individual basis for admission into the MS in Medical Science program.

To fulfill requirements for the MS in Medical Science, students who have a 3.00 or higher GPA take one second-year medical school course and conduct either bench-top or clinical research with a Primary Investigator. Students whose GPA falls below a 3.00 are required to take 6 credits of graduate level biological science coursework. After successful completion of the program, the student is awarded a non-thesis Master of Science in Medical Science.

Required Courses

Fall Semester

[MMSP 501S](#) Research in Medical Science I 6.0

[MMSP 503S](#) Research Seminar I 1.0

[MMSP 520S](#) Medical Pathology I 6.0

or

[MMSP 530S](#) Selected Topics in Pharmacology 7.0

Spring Semester

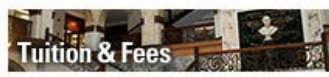
[MMSP 510S](#) Laboratory Techniques in Biochemistry and Molecular Biology 2.0

[MMSP 502S](#) Research in Medical Science II 6.0

[MMSP 504S](#) Research Seminar II 1.0

After successful completion of the program, the student is awarded Master of Science degree.

Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 North 15th Street, Mail Stop 344, Room 4104 NCB
Philadelphia, PA 19102
Telephone:
Email: medicalsciences@drexelmed.edu



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Master of Science in Pathologists' Assistant

About the Program

A pathologists' assistant is an intensely trained allied health professional who provides anatomic pathology services under the direction and supervision of a pathologist. Pathologists' assistants interact with pathologists in the same manner that physicians' assistants carry out their duties under the direction of physicians in surgical and medical practice.

The Master of Science in Pathologists' Assistant program at Drexel offers traditional and non-traditional post-baccalaureate students the opportunity to train in the highly specialized field of anatomic pathology. This two-year, full-time program begins in May of each year. The first year is comprised of the instructional portion of the program, supplemented by pathology laboratory exposure. The second year of the program is composed of several hospital-based rotations offering progressively responsible experience in autopsy and surgical pathology. These rotations are supplemented with informal classroom education.

Program Accreditation

The Commission on Higher Education of the Middle States Association of Colleges and Schools (MSACHE): The Commission on Higher Education is the unit of the Middle States Association of Colleges and Schools that accredits degree-granting colleges and universities in the Middle States region. It examines the institution as a whole, rather than specific programs within the institution. Drexel University is accredited by MSACHE, last reaffirmed in 2002 and is currently in the review process for future reaccreditation. Visit the MSACHE website at www.msache.org to read more about the professional activities of this organization.

The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS): NAACLS, in conjunction with the AAPA, has established national standards for Pathologists' Assistant training programs. The standards include both didactic course work and clinical experiences necessary to properly educate a pathologists' assistant. The Master of Pathologists' Assistant program at the Drexel University College of Medicine is accredited by NAACLS. Visit the NAACLS website at www.naacls.org to read more about the professional activities of this organization.

National Accrediting Agency for Clinical Laboratory Sciences
8410 W. Bryn Mawr Ave. , Suite 670, Chicago, IL, 60631,.

Professional Certification

The American Society for Clinical Pathology Board of Registry (ASCP BOC): The ASCP BOC, in conjunction with the AAPA, has established a national certification program for Pathologists' Assistants. In 2005, the ASCP BOC first offered a national certification examination for Pathologists' Assistants. In order to be eligible for the BOC examination, applicants must be graduates of a pathologists' assistant educational program accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS). Visit the ASCP BOC website at www.ascp.org/bor to read more about the certification program and the professional activities of this organization.

Professional Affiliation

The American Association of Pathologists' Assistants (AAPA): The AAPA is the only national professional organization for pathologists' assistants.

The AAPA:

- is a not-for-profit, volunteer organization dedicated to advancing the pathologists' assistant profession by providing its members with education, networking, and professional support;
- supports professional competency through program accreditation and individual certification;
- Promotes public and professional awareness of the pathologist's assistant as an integral member of the healthcare team.

Visit the AAPA website at www.pathologistsassistants.org to read more about the professional activities of this association.

Career Opportunities

Pathologists' assistants are employed in community hospitals, academic centers such as medical schools and university hospitals, private pathology laboratories, medical research centers, government hospitals and medical examiner offices.

For more information about this program, visit the College of Medicine's [Master of Science in Pathologists' Assistant program](#) web page.



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Master of Science in Pathologists' Assistant

A pathologist's assistant is someone who has the ability to relate to people, the capacity for calm and reasoned judgment and who demonstrates a commitment to quality patient care.

The program's courses and content are ideal for:

- Recent graduates with a degree in a biological or allied health science, with exposure to anatomy, physiology, chemistry and microbiology. Previous exposure to Pathology is recommended.
- Allied health professionals, in particular cytotechnologists, histotechnologists and medical technologists.

Admission requirements

Students will be selected on the basis of adequate educational background and medical experience. A bachelor's degree in a biological or allied health science with a cumulative GPA of at least 3.0, is the minimum requirement for acceptance into the Master's Degree Program. Prerequisite course work will include microbiology, human anatomy, physiology, mathematics, English composition, general chemistry, organic and/or biochemistry and biological science.

All candidates will be required to have a formal interview with the Selection Committee prior to final acceptance. Deadline for submission of the application is the second Friday in February of the year in which the students plan to enroll. The applicants will be notified of the Committee's decision on a rolling basis.

Candidates for admission must provide the following credentials:

- Completed application form
- Resume
- Transcript of college academic record
- Graduate Record Examination (GRE) scores
- Three letters of evaluation
- Self-assessment essays:
 - A. Discuss personal goals, conditions, or career aspirations that motivate you to pursue graduate study at Drexel University.
 - B. What are your most important accomplishments?
 - C. What do you expect to achieve through this program?

For further information, contact:

James W. Moore, MHS, PA (ASCP)

Pathologists' Assistant (FAAPA)
Program Co-Director
Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 N. 15th Street, Mail Stop 344
Philadelphia, PA 19102-1192

james.moore@drexelmed.edu

Tina Rader, MHS, PA (ASCP)

Pathologists' Assistant (FAAPA)
Program Co-Director
Drexel University College of Medicine
Office of Professional Studies in the Health Sciences
245 N. 15th Street, Mail Stop 344
Philadelphia, PA 19102-1192

tina.rader@drexelmed.edu



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Master of Science in Pathologists' Assistant

91.0 credits.

Curriculum

First Year

Summer

MSPA 500S	Gross Anatomy	5.0
MLAS 545S	Histology	2.0
MLAS 531S	Embryology	3.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
	Total credits	15.0

Fall

MSPA 530S	Biomedical Photography	4.0
MSPA 540S	Histotechnology I	3.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 570S	Medical Pathology I	6.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
	Total credits	20.0

Spring

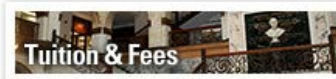
MSPA 550S	Applied Anatomic Pathology	4.0
MSPA 541S	Histotechnology II	3.0
MSPA 581S	Medical Microbiology II	3.0
MSPA 571S	Medical Pathology II	4.0
MSPP 515S	Biological Function and Regulation	4.0
	Total credits	18.0

Second Year

The second year consists of several hospital-based clinical rotations.

Summer

MSPA 560S	Medical Ethics	2.0
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MSPA 600S	Surgical Pathology I	6.0
MSPA 610S	Autopsy Pathology I	6.0
Total credits		14.0

Fall

MSPA 601S	Surgical Pathology II	6.0
MSPA 611S	Autopsy Pathology II	6.0
Total credits		12.0

Spring

MSPA 602S	Surgical Pathology III	6.0
MSPA 612S	Autopsy Pathology III	6.0
Total credits		12.0



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The Doctor of Medicine (MD) Program

General Information

With its dedication to academic and clinical excellence, Drexel University College of Medicine has earned national recognition as an institution that provides innovation in medical education. Medical students are trained to consider each patient's case and needs in a comprehensive integrated manner, taking into account many more factors than the presenting physiological condition. The medical college is dedicated to preparing "Physician Healers" – doctors who practice the art, science and skill of medicine.

Recognizing that students have different learning styles, students choose between two innovative academic curricula for their first two years of study. Both options focus on professional medical education, preparing students to pursue a career as either a generalist or specialist. Both stress problem solving, lifelong learning skills and the coordinated teaching of basic science with clinical medicine.

Both curricular tracks give early exposure to clinical skills training by using standardized patients to help students learn the art and skill of taking histories, counseling and educating patients, and performing physical exams.

The IFM Curriculum The [Interdisciplinary Foundations of Medicine \(IFM\)](#) curriculum integrates basic science courses and presents them through clinical symptom-based modules. Each first-year module focuses on clinical symptoms and features relevant material from the perspective of several basic and behavioral science disciplines. By the end of the first year, the basic and behavioral science courses have presented their entire core content, integrating it with related material in other disciplines. In the second year, students study basic and clinical sciences using an organ system approach. Students learn in lectures, labs, and small group settings.

The PIL Curriculum

Students who choose the [Program for Integrated Learning \(PIL\)](#), a problem-based curriculum, learn primarily in small groups which are supervised and facilitated by faculty. There are seven 10-week blocks over the first two years. Each block contains 10 case studies, detailing real patient issues relating to the topics of the block. The cases serve as the stimulus and context for students to search out the information they need to understand, diagnose, and treat clinical problems. Developing the information they need to learn is crucial to the PIL approach. Sharing information, concept mapping, evaluating and giving and receiving feedback are essential facets of the curriculum. Laboratories and lectures complement the case studies

Years 3 and 4

The [third year curriculum](#) is devoted to required clinical clerkship rotations in medicine, family medicine, obstetrics and gynecology, pediatrics, psychiatry, and surgery. The clerkships all embody the following principles:

- Common curricular objectives at all sites
- Students spend 30% of their clinical time in expanded ambulatory care experiences
- Each clerkship incorporates the concept of interdisciplinary teaching, with representatives of other departments or service areas
- Each clerkship integrates the teaching of basic sciences into clinical material

All third year clerkships take place in Drexel's affiliated hospitals. Students' assignments for the third year are based on the results of a lottery system.

The [fourth-year curriculum](#) is structured in the form of "pathways" – courses that give students a well-rounded educational experience with some focus on potential careers. Students can choose a discipline-specific or generalist pathway. All students have a pathway advisor. The pathway system is structured so that students take both required courses and electives. The required courses include a sub internship in internal medicine, a clerkship in neurology and an additional course specific to the pathway chosen. Students also choose six elective courses, in close consultation with their pathway advisor.

Fourth-year students complete their required courses at Drexel's affiliated hospitals. However, pathway advisors usually advise their students to select electives outside the Drexel system. Additionally, opportunities exist for fourth-year electives at international sites.

For more information, visit the College of Medicine's [MD Program](#) web site.



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MD Dual Degree Programs

Drexel College of Medicine offers several programs that let students earn dual degrees at the graduate level. Applicants to dual degree programs proceed with their application to either the MPH, MBA or PhD programs separately from their medical school application. Applicants must be accepted to the medical school in order to be considered for a dual degree program.

MD/PhD Program

The MD/PhD program is designed for a limited number of individuals who are strongly motivated toward a career in academic medicine and medically oriented research. The program trains individuals in the fundamental clinical aspects of medicine and offers advanced training in a specific field of research. Physicians with extensive research training are uniquely positioned to advance medical care and to teach at the cutting edge of medical discovery. Tuition scholarships and stipends for medical school and graduate school are provided for a limited number of students.

MD/MPH

With Drexel's School of Public Health, the College of Medicine offers a joint five-year program for highly qualified students to pursue both the MD and the Master of Public Health degrees. Students are taught to be physicians with a public-health orientation to the development, planning, delivery, and evaluation of health care programs and policies.

MD/MBA

The MD/MBA degree meets a growing demand by physicians who wish to manage corporate medical practices, hospitals, and related organizations and contribute to the development of health policy. The joint program prepares physicians to apply management principles to individual or group practices or to move into management positions at many types of organizations. Students receive training at both the College of Medicine and at Drexel's A.A.C.S.B. -accredited LeBow College of Business. The program lets students earn both degrees in five years.

For additional information, visit the College's [Dual Degrees](#) page.



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Certificate in the Study of Clinical Research

15.0 semester credits

This Certificate Program is a valuable professional resource for today's busy physicians, physician assistants, nurses, clinical fellows, research coordinators, and other individuals working in the medical field who want in-depth exposure to the skills and knowledge needed in the evolving clinical research field without having to commit to an entire master's program.

This program requires the successful completion of five graduate courses. With the assistance of a curriculum advisor, students will choose from a variety of specialized courses depending on their educational objectives and employment-related experiences. Graduate credit will not be given for work-related experience.

Visit the Drexel University e-Learning site for additional information about the [Certificate in the Study of Clinical Research](#).

Requirements

CR 515S	Introduction to Clinical Trials	3.0
CR 545S	Pharmaceutical Law	3.0
CR 612S	Fundamentals of Compliance	3.0

Electives

CR 565S	Contemporary Issues in Human Research Protection	3.0
CR 570S	Principles and Practice of Pharmacovigilance	3.0
CR 525S	Scientific Writing and the Interpretation of Medical Literature	3.0
CR 609S	Innovative Product Development	3.0
CR 620S	Principles, Practices, and Regulations of Biotechnology	3.0
CR 625S	Health Policy and Economics	3.0



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Drexel Pathway to Medical School (DPMS) Certificate Program

Track I = 37.0 semester credits
Track II = 28.0 semester credits

About the Program

The Drexel Pathway to Medical School (DPMS) Program is an early assurance program that provides students from lower socioeconomic/disadvantaged backgrounds a unique opportunity to prove their ability to succeed in a medical school program. Students take a combination of graduate and medical school courses. Track 1 program students are also provided with an MCAT preparation course. They are required to sit for the MCAT following completion of the spring semester as well as additional courses that prepare them for taking the MCAT in the spring semester. Track 2 program students have been accepted into the program with a qualifying MCAT and therefore do not need to retake the exam. Instead, they are required to take an additional medical school course on a satisfactory/unsatisfactory basis. If successful in the DPMS program, the student will be granted automatic admission into the College of Medicine following completion of the program.

See the [Drexel Pathway to Medical School \(DPMS\)](#) page on the College of Medicine's web site for application information.

About the Certificate Curriculum

Students who complete and pass all courses with a minimum grade of C included in the Drexel Pathway to Medical School program curriculum, achieve a minimum 2.75 graduate GPA, and for Track 1 students, release new official MCAT scores to the program, will be granted a certificate of program completion.

Track 1 program students achieving a 3.00 graduate GPA, a minimum score of 7 Verbal Reasoning, 8 Physical Science, M Writing Sample, and 8 Biological Science on a new MCAT will retain their acceptance to the College of Medicine and begin studies in the fall.

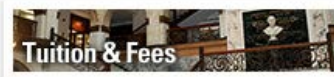
Track 2 program students achieving a minimum 3.00 graduate GPA and passing the Medical Immunology course also retain their acceptance and matriculate into the College of Medicine in the fall.

Students who do not retain their acceptance to Drexel University College of Medicine may be considered for acceptance into the Drexel Pathway to Medical School II program, where they can earn a Master of Science degree with an additional year of coursework

Continuing for a Master of Science Degree

After completion of the certificate portion of the program, some students may desire to pursue a Master of Science degree. See the list below for the additional courses required to be awarded a Drexel Pathway to Medical School Master of Science degree.

Required courses		Credits
Summer Enrichment Program		
DPMS 500S	Medical Science Preparation	1.0
Fall Semester		
IMSP 510S	Medical Biochemistry I	7.5
IMSP 520S	Medical Physiology I	3.5
IMSP 570S	Medical Immunology (Track 2 students for pass/fail)	3.0
or	MCAT Review (Track 1 students)	6.0
PHRM 512S	Graduate Pharmacology	3.0



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Spring Semester

IMSP 511S	Medical Biochemistry II	0.5
MSPP 513S	Special Topics in Anatomy	2.0
IMSP 521S	Medical Physiology II	3.5
IMSP 530S	Medicine and Society II	4.0
	MCAT Review	6.0

After completion of the certificate portion of the program, students desiring to continue on to pursue the Master of Science take the following additional courses:

Summer Research Project

MSPP 550S	Research Project	2.0
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Fall Semester

IMSP 502S	Medicine and Society I	2.0
IMSP 540S	Cell Biology and Microanatomy I	5.0
IMSP 550S	Medical Nutrition	1.0
IMSP 570S	Medical Immunology (All students for letter grade)	3.0
MSPP 505S	Laboratory Techniques in Biochemistry and Molecular Biology*	2.0

*Alternately, students can choose to take MSPP 505S in the Spring semester.

Spring Semester

IDPT 501S	Biostatistics I	2.0
IMSP 541S	Cell Biology and Microanatomy II	3.0
IMSP 560S	Medical Neuroscience	6.0



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Evening Post-Baccalaureate Pre-Medical Certificate Program

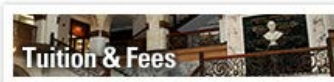
32.0 semester credits

The Office of Professional Studies in the Health Sciences at Drexel University's College of Medicine offer the Evening Post-Baccalaureate Pre-Medical (PMED) program for individuals who wish to pursue a career in medicine or other health program. This unique program gives individuals who hold a non-science baccalaureate degree the opportunity to continue working while they take courses in the evening to prepare themselves for medical, veterinary, dental, podiatric, chiropractic, or other allied health professional schools.

The program is the equivalent of five semesters and takes two years to complete. The curriculum includes science prerequisite courses for application to most medical and other health profession schools.

The curriculum offers the prerequisite science courses required by most health professional schools. During the first year, general chemistry and general physics with laboratories are offered. During the second year, students take organic chemistry and general biology, in sequence, in the summer and fall semesters. Outside of the program, the opportunity for students to take additional courses through Drexel University is available.

Required Courses		Credits
PMED 111S	General Chemistry I	3.0
PMED 112S	General Chemistry I Lab	1.0
PMED 121S	General Physics I	3.0
PMED 122S	General Physics I Lab	1.0
PMED 131S	General Chemistry II	3.0
PMED 132S	General Chemistry II Lab	1.0
PMED 141S	General Physics II	3.0
PMED 142S	General Physics II Lab	1.0
PMED 211S	General Biology I	3.0
PMED 212S	General Biology I Lab	1.0
PMED 221S	Organic Chemistry I	3.0
PMED 222S	Organic Chemistry I Lab	1.0
PMED 231S	General Biology II	3.0
PMED 232S	General Biology II Lab	1.0
PMED 241S	Organic Chemistry II	3.0
PMED 242S	Organic Chemistry II Lab	1.0



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For more information, visit Drexel's College of Medicine [Evening Post-Baccalaureate Pre-Medical Certificate Program](#) web page.

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Interdepartmental Medical Science (IMS) Certificate Program

34.5 semester credits

The IMS program is an interdisciplinary curriculum that integrates basic science courses and presents them through clinical system based modules. Applicants to the IMS program include students who are late in their decision to apply to medical school, students interested in improving their academic record before applying or re-applying to medical schools, or students who would like a year in a medical school setting before deciding whether medicine is the career for them. The program has been designed for college graduates who wish to enhance their academic credentials required for entry into U.S. medical school programs. However, the IMS program can also assist students interested in applying to dental, optometry, podiatry, or chiropractic schools.

Interdepartmental Medical Science Curriculum

Considered as a special master's program, students in the IMS program are afforded the opportunity to take actual first-year medical school courses. Applicants to the IMS program must have already fulfilled undergraduate premedical requirements and demonstrated mastery of the material at a minimum grade of "C." These prerequisites include a year of biology, chemistry, physics and organic chemistry including respective laboratory sections. Students who feel that they have overcome their previous academic performance and can prove to medical schools that they can perform at a higher level are appropriate applicants to this program.

For more information, visit Drexel's College of Medicine [Interdepartmental Medical Science Program](#) web page.

Interdepartmental Medical Science Required Courses	Credits
---	---------

Fall Semester

IMSP 502S	Medicine and Society I	3.0
IMSP 510S	Medical Biochemistry I	7.5
IMSP 520S	Medical Physiology I	3.5
IMSP 540S	Cell Biology and Microanatomy I	5.0
IMSP 570S	Medical Immunology*	3.0
IMSP 550S	Medical Nutrition*	1.0

* Although optional for students pursuing the certificate, these courses are required for students who desire the M.MS degree. Students receive their grade for this course in the spring.

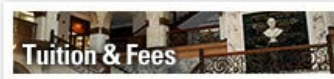
Spring Semester

IMSP 503S	Medicine and Society II	2.0
IMSP 511S	Medical Biochemistry II	.5
IMSP 521S	Medical Physiology II	3.5
IMSP 541S	Cell Biology and Microanatomy II	3.5
IMSP 560S	Medical Neuroscience	6.0

Master of Science in Medical Science Option

Those who have at least a B average and wish to receive a graduate degree may continue for another year of training to complete the requirements for the Master of Science in Medical Science. The degree can be completed in one additional year and requires research (non-thesis).

The [Master of Science in Medical Science Program](#) is the second year of the IMS program. Students cannot directly apply



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to the MS in Medical Science program. After successful completion of the IMS year (minimum 3.0 GPA in IMS) students are guaranteed admission into the MS in Medical Science program.

Students also have the option of transferring to other graduate programs after completing the Interdepartmental Medical Science Certificate program.



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Certificate of Interdisciplinary Health Science

24.0 semester credits

The Certificate of Interdisciplinary Health Science is designed to give students an opportunity to learn about the many professional venues through which medicine is practiced and health care delivered in this country, while taking graduate electives in a variety of medical and health related-sciences. Through rigorous coursework, students will be able to prepare for a broad spectrum of professional opportunities within the health sciences.

Applicants to the program are required to have a bachelor's degree from a US accredited institution, or its equivalent. The student should have successfully completed the minimum science courses required for application to medical school and have a minimum GPA of approximately 2.75 or better. In addition, students should have approximately a 20 or better on the MCAT exam with no science section below 7, or have scores in the 50th percentile on the general GRE.

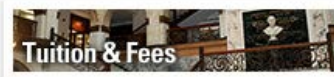
Students take 12-18 credits per semester for a minimum of 24 total credits, working with an advisor to select the courses that best suit their career goals.

Fall

Required Course		Credits
IHS 500S	Career Counseling in the Health Sciences Seminar I	1.0

Working with an advisor, students select courses from the following:

CR 505S	Ethical Issues in Research	3.0
CR 515S	Introduction to Clinical Trials	3.0
CR 525S	Scientific Writing and Medical Literature	3.0
CR 535S	Current Federal Regulatory Issues in Biomed Research	3.0
CR 545S	Pharmaceutical Law	3.0
CR 550S	Leadership Skills in the Health Sciences	3.0
CR 612S	Fundamentals of Compliance	3.0
CR 617S	Informatics in Pharmaceutical Research and Development	3.0
MFSP 516	Techniques: Crime Scene Investigation	3.0
MFSP 518	Latent Fingerprint Analysis	3.0
MFSP 521	Techniques of Fingerprint Analysis	3.0
MLAS 505S	Microbiology with Laboratory	4.0
MLAS 523S	Organizational Management I	3.0
MLAS 525S	Animal Anatomy	2.0
MLAS 531S	Embryology	3.0
MLAS 536S	Animal Models for Biomedical Research	1.0
MSPA 545S	Fundamentals of Histotechnology	2.0
MFSP 502	Biological Aspects of Forensic Science	3.0



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MFSP 528	Introduction to Criminal Law/Trial Process	3.0
MSPA 540S	Histotechnology I	2.0
MSPA 580S	Medical Microbiology I	4.0
MLAS 531S	Embryology	3.0
MLAS 500S	Bionucleonics	3.0
PHRM 512S	Graduate Pharmacology	3.0
MSPP 511S	Concepts in Biochemistry and Cell Biology	4.0

Spring

Required Courses

IHS 501S	Career Counseling in the Health Sciences Seminar II	1.0
IHS 502S	Neuropharmacology	3.0
MSPP 525S	Community Dimensions in Medicine	2.0

Working with an advisor, students select additional courses from the following:

PBHL 530	Epidemiology	3.0
MFSP 526	Bloodstream Pattern Analysis	3.0
MLAS 535S	Biology and Care of Laboratory Animals	3.0
MSPA 581S	Medical Microbiology II	3.0
MSPP 513S	Special Topics in Anatomy	4.0
MSPP 515S	Biological Functions and Regulation	4.0
CR 545S	Pharmaceutical Law	3.0

For more information, visit the [Drexel University College of Medicine](#) web page.



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Certificate in Quantitative Principles for Clinical Research

9.0 semester credits

This certificate of study addresses the needs of residents and fellows to attain knowledge in the conduct of clinical research while developing their clinical careers. All coursework is online, providing flexibility for the trainees and training programs.

Students completing this certificate can then apply to either the [Clinical Research Organization and Management](#) or the [Clinical Research for Health Professionals](#) program to obtain an MS degree.

Visit the Drexel University e-Learning site for additional information about the [Quantitative Principles for Clinical Research](#).

Required Courses

CR 500S	Epidemiology	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 525S	Scientific Writing and the Interpretation of Medical Literature	3.0



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Medical Science Preparatory (MSP) Certificate

35.0 semester credits

The Medical Science Preparatory (MSP) program is a one-year certificate program designed to help students enhance their credentials for application to medical school by improving their science background and MCAT scores. Students in the MSP program have completed the premedical science requirements but need to enhance their science preparation in order to take or retake the MCAT. Those students who successfully complete the program will receive a Certificate of Program Completion.

Medical Science Preparatory Curriculum

Students in the Medical Science Preparatory program take four graduate level courses in anatomy/histology, biochemistry/cell biology, pharmacology, and physiology. Also included are undergraduate level review courses in physics and chemistry, a laboratory component, and participation in community service activities. In addition, there are weekly reviews in the verbal reasoning, biological science, and physical science sections of the MCAT. Mock MCATs are given during the year. Students are required to take the April MCAT.

For more information, visit Drexel's College of Medicine [Medical Science Preparatory Program](#) web page.

Master of Science in Biological Science Option

Those who complete the program with a B average or higher and receive a 27 on the MCAT are guaranteed admission to the IMS program for the following year. Those who complete the degree requirements during this second year receive an MS in Biological Science. Although students in good academic standing have the option of returning for the second year, they are not required to do so.

Medical Science Preparatory Required Courses

Fall Semester

[MSPP 400S](#) Advanced Topics in Chemistry I 4.0

[MSPP 402S](#) Advanced Topics in Physics I 4.0

[MSPP 505S](#) Lab Techniques in Biochemistry and Molecular Biology 2.0

[MSPP 511S](#) Concepts in Biochemistry and Cell Biology 4.0

[PHRM 512S](#) Graduate Pharmacology 3.0

[MSPP 525S](#) Community Dimension of Medicine 2.0

MCAT Preparatory Course

Total credits 19.0

Spring Semester

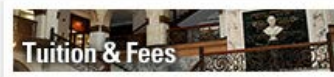
[MSPP 401S](#) Advanced Topics in Chemistry II 4.0

[MSPP 403S](#) Advanced Topics in Physics II 4.0

[MSPP 513S](#) Special Topics in Anatomy 4.0

[MSPP 515S](#) Biological Function and Regulation 4.0

MCAT Preparatory Course



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For more information about continuing on to the Master's of Biological Science, visit Drexel's College of Medicine [Master of Biological Science](#) web page.



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Veterinary Medical Science (VMS) Post-Baccalaureate Certificate

30.0 semester credits

Requirements

This one-year, full-time program was developed in consultation with the Office of Admissions of several veterinary schools in the nation. After earning the VMS certificate, qualified students have the option to continue their studies in our [Master of Laboratory Animal Science Program \(MLAS\)](#).

The curriculum has been designed to augment the student's understanding of the basic sciences which would ensure success in their professional careers as clinical veterinarians.

VMS Certificate Required Courses

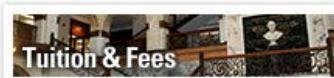
Fall

IMSP 510S	Medical Biochemistry I	7.5
IMSP 520S	Medical Physiology I	3.5
MLAS 505S	Microbiology with Laboratory	4.0
MLAS 525S	Animal Anatomy	2.0
MLAS 606S	Clinical Laboratory Techniques and Concepts	1.0
MSPA 580S	Medical Microbiology I	4.0

Spring

IMSP 511S	Medical Biochemistry II	0.5
IMSP 521S	Medical Physiology II	3.5
MLAS 529S	Molecular Genetics	2.0
MLAS 530S	Biostatistics in Veterinary Science	3.0
MSPP 513S	Special Topics in Anatomy	4.0

Upon completion of the VMS certificate, students have the option to continue their studies in the Master of Laboratory Animal Science program, pending a 3.0 GPA during their VMS year. To be awarded the MLAS degree, an additional 30 credits of coursework and 12 credits of practicum must be completed in two consecutive semesters and one summer session.



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