



DREXEL UNIVERSITY

College of
Medicine

School of Biomedical Sciences and Professional Studies

CATALOG

2014-2015



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College of Medicine: School of Biomedical Sciences and Professional Studies

Overview

Renowned for its innovative, student-centered educational programs, Drexel University College of Medicine School of Biomedical Sciences and Professional Studies (<http://www.drexelmed.edu>) 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, there are more than 165 students pursuing doctoral or master's degrees in biomedical graduate studies, and more than 700 students enrolled in professional studies in the health sciences. There are some 625 residents, 700 clinical and basic science faculty, and more than 2,000 affiliate and other non-compensated faculty.

Majors

- Academic Medicine (MS)
- Biochemistry (MS, PhD)
- Biological Science (MS)
- Biotechnology (MS)
- Cancer Biology (MS)
- Clinical Research for Health Professionals (MS)
- Clinical Research Organization & Management (MS)
- Criminalistic Science (MS)
- Drexel Pathway to Medical School (MS)
- Drug Discovery and Development (MS)
- Forensic Science (MS)
- Histotechnology (MS)
- Immunology (MS)
- Infectious Disease (MS)
- Interdisciplinary Health Sciences (MS)
- Laboratory Animal Science (MLAS)
- Medical and Healthcare Simulation (MS)
- Medical Science (MS)
- Microbiology and Immunology (MS, PhD)
- Molecular Cell Biology and Genetics (MS, PhD)
- Molecular Medicine (MS)
- Molecular Pathobiology (MS, PhD)
- Neuroscience (MS, PhD)
- Pathologists' Assistant (MS)
- Pharmacology & Physiology (MS, PhD)

Certificates

- Clinical Research
- Interdepartmental Medical Science

- Interdisciplinary Health Sciences
- Medical Science Preparatory Program
- Pre-Medical, Evening Program
- Quantitative Principles for Clinical Research
- Veterinary Medical Science

Mission Statement

Drexel University College of Medicine excels and innovates in education, research, and delivery of compassionate care in our culture of diversity, spirited inquiry, collaboration, and opportunity.

About the College

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.

The College's medical 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 has developed one of the leading centers for malaria study in the nation. Additionally, the College is 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, with extensive NIH-funded research in prevention and therapeutic intervention. Faculty clinicians are highly respected in numerous other specialties, including cardiology and pain management.

Facilities

Drexel University College of Medicine is a living laboratory, giving students a broad variety of hands-on experience, enhanced by clinical rotations in hospitals, practicums, and external research opportunities, depending on their program of study. Students in all programs benefit from the College's physical plant, which offers some of the most advanced facilities in biomedical, health sciences, and healthcare education. The Queen Lane campus is designed for the purpose of teaching basic sciences and clinical skills in lecture halls, classrooms, small group rooms and a variety of laboratories. The College of Medicine provides wireless Internet access to curricular resources from anywhere on campus. Computers, multimedia technology, and the Internet augment the information and skills students learn from classes, print materials, and on

clinical rotations. College of Medicine faculty members have been leaders in developing interactive computer-based learning tools, ranging from biochemical exercises to simulated patients presenting ethical dilemmas. Comprehensive curriculum websites, streaming videos of lectures, and online slide atlases for histology and pathology are all available.

Some of the College's key facilities and their features include:

Queen Lane Student Activities Center

A 17,700-square-foot student activity center was completed in 2006 at the Queen Lane Campus. The Student Activities Center occupies 2 floors and houses a full line of exercise equipment, a bookstore, student government offices and flexible space for events and lectures. The facility is available to students, staff and groups.

Queen Lane Medical Simulation Center

The College opened a state-of-the-art simulation center for medical education in 2010. Part of a new 25,000-square-foot addition, the center allows students to learn in simulated operating room and patient room settings.

Clinical Education Assessment Center

Ten examination rooms with digital capture that simulate physicians' offices are linked to control and observation rooms for faculty. Students work with standardized patients to enhance their abilities in medical interviewing, physical examination skills, and patient counseling.

Multidisciplinary Laboratories

- Forty-two tables with microscopes for teaching neuroanatomy, microbiology, and pathology are available.
- Microscopes are equipped with a networked video system so that all students in a class can look at a single slide under the microscope through monitors on their lab tables or on a projection screen and can retrieve microscopic images via computer.

New College Building

The New College Building at the Center City Hahnemann campus is designed for the purpose of teaching basic and clinical sciences, with auditoriums, classrooms, laboratories and offices. The lecture halls are designed to accommodate a variety of educational methodologies, spanning from the basic lecture format to the enriched laboratory setting where courses such as Anatomy, Pathology, Microbiology, Histology and Applied Anatomic Pathology can be taught.

Libraries

Drexel University has four libraries to serve the needs of students, faculty and staff. The collections of two libraries – one at Queen Lane and one at Center City – emphasize subjects relevant to the health sciences, with print resources distributed to meet the needs of the programs and departments at each campus, and free document delivery service between the locations.

Computers in the reference areas of each library, and the Microcomputer Centers, provide access to the Libraries' online catalog; to databases (indexes) including MEDLINE, CINAHL, and PsycINFO; to more than 2000 full-text electronic journals, and to online reference resources such as MD Consult and Harrison's Online. Full Internet access is provided for reference and research purposes.

All online resources (databases, electronic journals, etc.) are available to students, staff and faculty who are registered Library users, and can be accessed from off-campus locations. In addition to Internet access, computers in the Microcomputer Centers also provide a broad range

of software including word processing, spreadsheet, communications, graphics, and statistics. Computer-assisted instruction and tutorials are available for many curricula-related topics. A plotter and scanner are also available at some locations.

The Library staff is dedicated to providing assistance to students and other library users through on-the-spot reference help, mediated literature searches, and instructional sessions. Guides are available online to help with the use of Library services and resources.

Videoconferencing

Drexel University College of Medicine makes extensive use of videoconferencing between Philadelphia campuses and clinical teaching sites, and the Sacramento campus. There are videoconferencing classrooms with split screen to allow for speakers in different locations.

Web-Based Instruction

Uses of web-based instruction range from providing a supplement to classroom instruction to teaching a whole course remotely. Many instructors post their syllabi on the web, distribute supplementary readings via the web, and set up electronic discussion lists for their students. Having students submit assignments electronically is common practice.

Unique faculty-developed tools, including doc.com, a web-based set of video encounters between physician and patient, help medical students improve their communication skills. DxR, a web-based patient simulation program, trains students in clinical reasoning; and MedEthEx provides an online series of exercises in medical ethics and communication. The recently implemented Web-OSCE, closely linked to doc.com, allows medical trainees to interview standardized patients remotely and receive performance feedback.

Biochemistry

Master of Science: 36.0 - 48.0 semester credits

Doctor of Philosophy: 96.0 semester credits

About the Program

The graduate program in biochemistry 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 5-6 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 (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) website.

MS Degree Requirements Non-Thesis Option

MS without Thesis: 36.0 semester credits

Required Courses

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 500S	Responsible Conduct of Research	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 STRUCT & FUNCTI	2.0
BIOC 511S	Writing for Researchers: Grants and Papers	1.0

Suggested Electives *

Select one of the following: 2.0-4.0

BIOC 503S	Biochemistry 2nd Lab Rotation
BIOC 504S	Biochemistry 3rd Lab Rotation
BIOC 510S	Cancer Biology
MIIM 555S	Molec. Mech. Of Micro. Path
MIIM 604S	Special Topics in Virology
NEUR 609S	Graduate Neuroscience II
MIIM 630S	Advanced Molecular Biology
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG
PHGY 503S	GRADUATE PHYSIOLOGY
PHRM 512S	Graduate Pharmacology

PHRM 525S Drug Discovery and Development I

Total Credits

40.0-42.0

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

MS Degree Requirements Thesis Option

MS with thesis: 48.0 semester credits

Required Courses

BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 600S	Biochemistry Thesis Research	9.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
BIOC 511S	Writing for Researchers: Grants and Papers	1.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 507S	MACROMOLECULAR STRUCT & FUNCTI	2.0

Suggested Electives *

Select one of the following: 2.0-4.0

BIOC 503S	Biochemistry 2nd Lab Rotation
BIOC 504S	Biochemistry 3rd Lab Rotation
BIOC 510S	Cancer Biology
MIIM 555S	Molec. Mech. Of Micro. Path
MIIM 604S	Special Topics in Virology
MIIM 630S	Advanced Molecular Biology
NEUR 609S	Graduate Neuroscience II
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG
PHGY 503S	GRADUATE PHYSIOLOGY
PHRM 512S	Graduate Pharmacology
PHRM 525S	Drug Discovery and Development I

Total Credits

50.0-52.0

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

PhD Requirements

The program requires the completion *96.0 semester credits*. 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.

Required Courses

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 506S	Biochemistry Journal Club	1.0
BIOC 507S	Biochemistry Seminar Series	1.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 511S	Writing for Researchers: Grants and Papers	1.0
BIOC 600S	Biochemistry Thesis Research	9.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 500S	Responsible Conduct of Research	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 STRUCT & FUNCTI	2.0

Suggested Electives*

Students are required to take a minimum of one of the courses from the following list: 2.0-4.0

BIOC 510S	Cancer Biology	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 630S	Advanced Molecular Biology	
NEUR 609S	Graduate Neuroscience II	
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) program.

Courses

BIOC 502S Biochemistry 1st Lab Rotation 4.0 Credits

First rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 503S Biochemistry 2nd Lab Rotation 4.0 Credits

Second rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 504S Biochemistry 3rd Lab Rotation 4.0 Credits

Third rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

BIOC 505S Biochemical Basis of Disease 2.0 Credits

This is an advanced graduate course designed to explore the biochemical basis of a variety of diverse diseases, ranging from the diabetes to Alzheimer's. The course format consists of student presentations that will be augmented by specialized lecture.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: C] and IDPT 526S [Min Grade: C]

BIOC 506S Biochemistry Journal Club 1.0 Credit

A weekly journal club in which students take turns presenting recent papers from the biomedical literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 15 times for 100 credits

BIOC 507S Biochemistry Seminar Series 1.0 Credit

Weekly research seminars on topics in Biochemistry and Molecular Biology. Seminar speakers include both scientists from the Drexel faculty and scientists from outside institutions.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 15 times for 100 credits

BIOC 508S Experimental Approaches to Biochemical Problems 3.0 Credits

This course provides the student with a thorough understanding of the principles underlying the experimental techniques currently used to tackle biochemical problems. A combination of lecture, discussion, investigation of the primary literature, and demonstrations will be used.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: C] and IDPT 526S [Min Grade: C]

BIOC 509S Biochemical Basis of Disease 3.0 Credits

This is an advanced graduate course designed to explore the biochemical basis of a variety of diverse diseases, ranging from the Acquired Immunodeficiency Syndrome (AIDS) to Alzheimer's. The course format consists of specialized lectures that are augmented by student presentation. This course is open to all grad students. May be repeated once for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 3 credits

BIOC 510S Cancer Biology 3.0 Credits

This is a comprehensive team-taught course on various aspects of cancer including: transformation, oncogenes and suppresser genes, cell cycle, DNA damage/repair, cell signaling, oncogenesis, metastasis and cancer therapies. Faculty from Fox Chase Cancer Center participates in the teaching.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 511S Writing for Researchers: Grants and Papers 1.0 Credit

This is a course designed to introduce graduate students to the basics of scientific writing. The course will involve both the discussion of reading assignments and writing assignments for the students, which will be discussed and critiqued in class.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 512S Advanced Cancer Biology 2.0 Credits

The main goal of this advanced course is to provide further understanding of the principles of cancer biology. This course will emphasize reading and analyzing primary literature on the most recent advances in cancer research topics including methods to aid students who may carry out thesis work related to cancer research. This course will build upon basic information taught in the cancer biology course and intended for advanced graduate students (2nd year) looking for further understanding in the fields of cancer research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 513S Biotechnology Practicum I 4.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chosen taking into consideration the interests and career goals of the students. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Corequisite: IDPT 521S

BIOC 514S Biotechnology Practicum II 4.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chosen taking into consideration the interests and career goals of the student. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: B]

Corequisite: IDPT 526S

BIOC 515S Biotechnology Practicum III 8.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chosen taking into consideration the interests and career goals of the student. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: B] and IDPT 526S [Min Grade: B]

BIOC 516S Biotechnology Practicum IV 4.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chosen taking into consideration the interests and career goals of the student. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: B] and IDPT 526S [Min Grade: B]

BIOC 600S Biochemistry Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department. Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 15 times for 100 credits

BIOC 603S Advanced Topics in Biochemistry and Molecular Biology 1.5 Credit

This course will supplement basic information taught in the biomedical sciences first year graduate core curriculum and provide a comprehensive, in-depth analysis of various topics in biochemistry. The course will include a mixture of lectures and literature-based assignments. Lectures are intended to cover topics deemed important for Biochemistry and MCBG students, but which are not covered in depth in the core curriculum. This will include practical aspects of experimental design and execution.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 701S MEDICAL BIOCHEMISTRY 0.0 Credits**College/Department:** College of Medicine**Repeat Status:** Can be repeated multiple times for credit**BIOC 702S MEDICAL NUTRITION 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 850S MEDICAL BIOCHEMISTRY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 860S MED BIOCHEMISTRY REEXAM 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 970S BIOCHEMISTRY RESEARCH 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 9750S RESEARCH-BIOCHEMISTRY-16 WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 9752S RESEARCH-BIOCHEMISTRY - 2WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 9754S RESEARCH-BIOCHEMISTRY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Can be repeated 0 times for 0 credits**BIOC 9756S RESEARCH - BIOCHEMISTRY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 9758S RESEARCH-BIOCHEMISTRY- 8WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Can be repeated 0 times for 0 credits**BIOC 975S STRUCTURAL & MOLECULAR BIOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 976S BIOCHEMISTRY OF METABOLISM 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 977S PHYSIOLOGICAL CHEMISTRY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**BIOC 999S Special Topics in Biochemistry 1.0-4.0 Credit**

This course will focus on graduate level topics in the area of Biochemistry. The exact content, readings, and grading will be determined by the professor on a course by course basis.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Can be repeated 3 times for 16 credits

Certificate in Interdepartmental Medical Science

*Certificate Level: Graduate**Admissions Requirements: Bachelor's degree**Certificate Type: Certificate**Number of Credits to Completion: 34.0**Instructional Delivery: Campus**Calendar Type: Semester**Expected Time to Completion: 2 years**Financial Aid Eligibility: Not aid eligible*

About the Program

Students pursuing the Interdepartmental Medical Science (IMS) certificate are afforded the opportunity to take actual first-year medical school courses. This special master's program has been in existence since 1981 and has helped well over 1000 students to become practicing clinicians. This program is offered at both the Philadelphia and Sacramento campus locations. Benefits of this special master's program include:

- more medical school courses than other similar programs in existence;
- runs for two years which benefits those students not applying during the certificate year, but applying during the master's year;
- significant tuition advantages for students attending this program as compared to other similar programs;
- free tutoring and counseling services are available through the University;
- affiliations with several medical schools including Drexel University College of Medicine (DUCom), Edward Via College of Osteopathic Medicine, Philadelphia College of Osteopathic Medicine, St. George's, University of London, St. George's of Grenada School of Medicine, Touro College of Osteopathic Medicine, Universidad Autonoma de Guadelajara School of Medicine, and the University of Queensland School of Medicine;
- a guaranteed interview for students earning grades of B or better in all fall courses and an incoming MCAT score of 27 (9's in each section) or a 30 with no score less than a 7 (US citizens or permanent residents only);
- DUCom guarantees a minimum 25 seats for appropriate students from the office's post-baccalaureate programs (US citizens or permanent residents only).

Master of Science in Medical Science Option

The Master of Science in Medical Science Program is the second year of the Interdepartmental Medical Science (IMS) Certificate program. Upon successful completion of the IMS year, students may enter the second year of the special master's program in medical sciences. The degree requires non-thesis clinical or bench-top research. Advantages of continuing on for the master's degree include applying to health professional schools from an academic environment which should enhance a student's competitiveness for residency programs in an academic institution.

Additional Information

For more information, visit Drexel College of Medicine's Interdepartmental Medical Science Program (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/InterdepartmentalMedicalScienceIMSPProgram.aspx>) website.

Interdepartmental Medical Science

Required Courses

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 & Microanatomy I	5.0

Optional courses

IMSP 550S	Medical Nutrition *	
IMSP 570S	Medical Immunology *	

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

Total Credits **34.0**

* These courses are optional.

Admissions Requirements

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.

Certificate in Interdisciplinary Health Sciences

Certificate Level: Graduate

Admissions Requirements: Bachelor's degree

Certificate Type: Graduate

Number of Credits to Completion: 24.0

Instructional Delivery: Campus, Hybrid, Online

Calendar Type: Semester

Expected Time to Completion: 2 years

Financial Aid Eligibility: Not aid eligible

About the Program

The School of Biomedical Sciences and Professional Studies offers the Interdisciplinary Health Sciences (IHS) certificate program. IHS is designed to provide 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.

Students take 12.0-18.0 credits per semester for a minimum of 24.0 total credits, working with the program director to select the courses that best suit their career goals. For those students wishing to pursue medical school, an optional MCAT preparatory course is offered during the spring semester through the program.

For more information about the program, visit the College of Medicine's Interdisciplinary Health Sciences Certificate (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/InterdisciplinaryHealthSciences.aspx>) program page.

Fall

Required Courses

IHS 500S	Career Counseling in the Health Sciences Seminar I	1.0
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Working with an advisor, students select four courses from the following:

CR 505S	Ethical Issues in Research	
CR 515S	Intro to Clinical Trials	
CR 525S	Scientific Writing and Medical Literature	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 545S	Pharmaceutical Law	
CR 550S	Leadership Skills	
CR 612S	Fundamentals of Compliance	
CR 617S	Informatics in Pharm Res & Development	
MLAS 523S	Organizational Management	
MLAS 525S	Animal Anatomy	
MLAS 531S	Embryology	
MLAS 536S	Animal Models for Biomedical Research	
MLAS 545S	Fundamentals of Histology	
MSPA 540S	Histotechnology I	
MSPA 580S	Medical Microbiology I	
MLAS 531S	Embryology	
PHRM 512S	Graduate Pharmacology	
MSP 511S	Concepts in Bioch & Cell Biolo	

Spring

Required Courses

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

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

PBHL 530	Principles of Epidemiology	
MLAS 535S	Biology & Care Of Lab Animals	
MSPA 581S	Medical Microbiology II	
MSP 513S	Special Topics in Anatomy	
MSP 515S	Biological Function & Regulation	

CR 545S Pharmaceutical Law

Total Credits 24.0

For more information, visit the Drexel University College of Medicine's Interdisciplinary Health Sciences (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/InterdisciplinaryHealthSciences.aspx>) web page

Admissions Requirements

Applicants to the program are required to have a bachelor's degree from a US accredited institution or its equivalent. The applicant should have successfully completed a year of biology, general chemistry, organic chemistry and physics with respective laboratory sections and have a GPA of approximately 2.50 or better. In addition, students should have approximately a 15 or better on the MCAT exam with no science section below 5, comparable scores from other health professional aptitude exams (i.e., DAT), or have scores near the 50th percentile on the general GRE. The admissions committee reviews each application in its entirety for consideration.

The program's application can be found on the College of Medicine's Interdisciplinary Health Sciences Certificate Admissions (<http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/InterdisciplinaryHealthSciences.aspx>) web page.

Certificate in Medical Science Preparatory Program

Certificate Level: Graduate

Admissions Requirements: Bachelor's degree

Certificate Type: Graduate Certificate

Number of Credits to Completion: 47.0

Instructional Delivery: Campus

Calendar Type: Semester

Expected Time to Completion: 3 years

Financial Aid Eligibility: Not aid eligible

About the Program

The School of Biomedical Sciences and Professional Studies at Drexel University's College of Medicine offers the Medical Science Preparatory (MSP) program. The MSP certificate is a one-year program designed to help students enhance their credentials for application to medical or other health professional schools by improving their science background and admissions test scores, in particular the MCAT. This structured program offers both undergraduate and graduate level coursework as well as a formal two-semester MCAT course. Those students who successfully complete the program will receive a Certificate of Program Completion. Students may be considered for linkage with the following medical school programs:

Edward Via College of Osteopathic Medicine
Philadelphia College of Osteopathic Medicine
St. George's, University of London
St. George's of Grenada School of Medicine
Touro College of Osteopathic Medicine, New York
Universidad Autonoma de Guadajajara School of Medicine
University of Queensland School of Medicine

Medical Science Preparatory Curriculum

Students in the Medical Science Preparatory program are required to complete graduate level courses in anatomy, biochemistry, pharmacology, physiology, laboratory techniques and community outreach. Also included are undergraduate level courses in physics and chemistry and a formal MCAT preparation course.

For more information, visit Drexel's College of Medicine Medical Science Preparatory Program (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/Programs/PreMedicalPrograms/MedicalSciencePreparatoryMSPProgram.aspx>) web page.

Master of Science Option

Those MSP students who successfully complete the program may elect to continue on to earn a Master of Science degree through the Master of Biological Science or Master of Interdisciplinary Health Sciences programs. Working towards a master's degree will continue to enhance one's credentials for application to medical or other health professionals schools.

Fall		Credits
MSPP 400S	Advanced Topics in Chemistry I	4.0
MSPP 402S	Advanced Topics in Physics I	4.0
MSPP 404S	Concepts in Science and Verbal Reasoning I	6.0
MSPP 505S	Lab Tech in Bioch & Molec Biol	2.0
MSPP 511S	Concepts in Bioch & Cell Biolo	4.0
PHRM 512S	Graduate Pharmacology	3.0
MSPP 525S	Community Dimensions of Medici	2.0
Term Credits		25.0
Spring		
MSPP 401S	Advanced Topics in Chemistry II	4.0
MSPP 403S	Advanced Topics in Physics II	4.0
MSPP 405S	Concepts in Science and Verbal Reasoning II	6.0
MSPP 513S	Special Topics in Anatomy	4.0
MSPP 515S	Biological Function & Regulation	4.0
Term Credits		22.0

Total Credit: 47.0

For more information about continuing on to the Master's of Biological Science, visit Drexel's College of Medicine Master of Biological Science (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/Programs/MasterofBiologicalScienceMBSProgram.aspx>) web page.

Admission Requirements

Applicants to the Medical Science Preparatory (MSP) program must have earned a bachelor's degree from a US or other accredited institution. Prerequisite coursework must include a year of biology, chemistry, organic chemistry and physics with laboratory components.

The typical applicant should have a math/science GPA of 2.90 or better and an MCAT score of 18 or higher. The General Graduate Record Exam (GRE) will be accepted for those who have never taken the MCAT. Applicants applying to other professional school programs may supply their discipline specific national aptitude exam scores (Ex., DAT, OAT, etc.). Our admissions process is holistic in nature and includes

evaluations of letters of evaluation, community service and exposure in the health care field of interest.

The program's application can be found on the College of Medicine's Medical Science Preparatory Certificate Admissions (<http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/MedicalSciencePreparatory.aspx>) web page.

Certificate in Quantitative Principles for Clinical Research

Certificate Level: Graduate

Admissions Requirements: Bachelor's degree or higher

Certificate Type: Graduate

Number of Credits to Completion: 9.0

Instructional Delivery: Online

Calendar Type: Semester

Expected Time to Completion: 2 years

Financial Aid Eligibility: Not aid eligible

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 (<http://drexel.com/crom>) or the Clinical Research for Health Professionals (<http://drexel.com/crhp>) program to obtain an MS degree.

ADDITIONAL INFORMATION

Sara Perkel, MBA

Director, Graduate Programs in Clinical Research

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215-762-3812

Visit the Drexel University Online web site for additional information and to apply to the Quantitative Principals for Clinical Research (<http://www.drexel.com/online-degrees/biomedical-degrees/qpcr>) program.

Required Courses

CR 500S	Epidemiology	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 525S	Scientific Writing and Medical Literature	3.0
Total Credits		9.0

Certificate in Veterinary Medical Science

Certificate Level: Graduate

Admissions Requirements: Bachelor's degree

Certificate Type: Graduate Certificate

Number of Credits to Completion: 32.0

Instructional Delivery: Campus

Calendar Type: Semester

Estimated Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Gainful Employment Statistics (http://www.drexel.edu/provost/academicoverview/gainfulemployment/Veterinary_Medical_Science/gedt.html)

About the Program

The School of Biomedical Sciences and Professional Studies in the College of Medicine offers the Veterinary Medical Science (VMS) program. The VMS program is a one-year graduate level certificate program designed to help students enhance their credentials for veterinary medical school. It is intended for students who believe that their undergraduate performance did not fully reflect their academic abilities and who are now prepared to demonstrate they can excel.

Upon completion of the VMS certificate program, students have the option to continue their studies in the Master of Laboratory Animal Science (MLAS) program. In addition to further enhancing their academic credentials for veterinary medical school, earning the MLAS degree will allow students to pursue advanced careers in laboratory animal science or laboratory animal management.

Curriculum

The VMS curriculum consists of a unique combination of graduate level basic sciences courses, animal science courses, and medical school courses. VMS students are enrolled in several of the same first year medical school courses, as students from Drexel University College of Medicine (DUCOM). Success in this rigorous academic program can be viewed as an indicator of future potential in professional school.

Veterinary Medical School

Successful completion of the VMS program can significantly improve a student's academic credentials for application to veterinary medical school. Please review our website (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AnimalSciencePrograms/VeterinaryMedicalScience.aspx>) for a comprehensive list of veterinary medical schools that have been attended by VMS and MLAS alumni.

Career Opportunities

In addition to attending veterinary medical school, VMS graduates have the option to continue their studies within the MLAS program. MLAS graduates hold positions in laboratory animal facilities of universities, biotechnology companies, government agencies, and pharmaceutical companies. There they serve as veterinarians, supervisors, managers, IACUC administrators, trainers, educators, consultants, and sales representatives.

Additional Information

Erin Vogelsong, MS

Academic Administrator, Assistant Professor

Drexel University College of Medicine

Office of Professional Studies in the Health Sciences

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Philadelphia, PA 19102

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Fall		Credits
IMSP 510S	Medical Biochemistry I	7.5
IMSP 520S	Medical Physiology I	3.5

MLAS 525S	Animal Anatomy	2.0
MLAS 606S	Clinical Laboratory Techniques and Concepts	1.0
MSPA 580S	Medical Microbiology I	4.0

Term Credits **18.0**

Spring

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

Term Credits **13.0**

Total Credit: 31.0

Admissions Requirements

Students will be selected on the basis of adequate educational background and veterinary/ research/ animal care experience.

Prerequisite coursework includes: chemistry, biology, organic chemistry, and physics.

Candidates for admission must provide the following credentials:

- Bachelor's degree from an accredited U.S. college or university
- Cumulative GPA of 3.0 or higher
- General Graduate Record Exam (GRE) scores at or above the 60th percentile in all areas obtained within the last 5 years
- Official transcript from all post-secondary institutions attended
- Three letters of reference, two must be from science professors
- Personal statement stating the applicant's academic and professional goals

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

Certificate of Study in Clinical Research

Certificate Level: Graduate

Admissions Requirements: Bachelor's degree or higher

Certificate Type: Graduate

Number of Credits to Completion: 15.0

Instructional Delivery: Online

Calendar Type: Semester

Expected Time to Completion: 3 years

Financial Aid Eligibility: Not aid eligible

This part-time 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 clinical arena 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. All courses are conducted online to accommodate the needs of working professionals.

This program requires the successful completion of five graduate courses. Credits earned in the certificate program are recognized towards the Master of Science in Clinical Research Organization and Management (<http://drexel.com/crom>).

ADDITIONAL INFORMATION

Sara Perkel, MBA

Director, Graduate Programs in Clinical Research

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215-762-3812

Visit the Drexel University Online site for additional program information and to apply to the certificate (<http://drexel.com/cscr>) program.

15.0 semester credits

Requirements

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

Electives

Select two of the following: 6.0

CR 565S Contemporary Issues in Human Research Protection

CR 570S Principles and Practice of Pharmacovigilance

CR 525S Scientific Writing and Medical Literature

CR 609S INNOVATIVE PRODUCT DEVELOPMENT

CR 620S Biotech/Research

CR 625S Health Policy and Economics

Total Credits **15.0**

Courses

CR 500S Epidemiology 3.0 Credits

Epidemiology is at the core of research professions as it is the study of the distribution, determinants, and the course of health related events in populations, and the efficacy and effectiveness of prevention and intervention strategies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 501S Emerging Trends in Medical Device History 3.0 Credits

The goal of this course is to focus on the various trends that impact the research and development process inherent in the medical device industry. Case studies representing several therapeutic categories will be discussed from a business, medical scientific, ethical, regulatory and bio-medical engineering perspective.

College/Department: COM School of Biomedical Sciences Professional Studies

CR 505S Ethical Issues in Research 3.0 Credits

Students explore ethical issues to sound clinical research, review the foundations of regulations for clinical investigations, and to better understand the operational imperatives of Good Clinical Practices.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 510S Sponsored Projects Finance 3.0 Credits

The study of managing and monitoring external funding sources for research projects. Topics include: rules and regulations, proposal preparation and submission, cost accounting standards, salaries and benefits of staff, direct and indirect costs, the costing of equipment and facility use.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 511S The History of Misconduct in Biomedical Research 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 512S Fundamentals of Academic Research Administration 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 513S Pharmaceutical R&D: Business Process and Information Flow 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 514S World Wide Regulatory Submissions 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 515S Intro to Clinical Trials 3.0 Credits

This course introduces regulatory responsibilities of clinical investigators, sponsors, monitors, IRBs, FDA -all those parties intimately involved in clinical research. Information and exercises are designed to reinforce the elements of Good Clinical Practices.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 520S Applications of Clinical Research Biostatistics 3.0 Credits

Examines role of the statistician in clinical research. Course includes a discussion of the language of statistics to facilitate communication with the clinical research project team, basic methods of describing data, fundamentals of probability, simple models and methods of parameter estimation and statistical software packages for reporting data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 525S Scientific Writing and Medical Literature 3.0 Credits

This course teaches the medical professional the ability to read for understanding, and evaluate validity of information a medical or scientific paper. In addition, the student learns how to recognize various types of medical literature and the basics of how to perform a review of the medical literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 530S Tech Transfer 3.0 Credits

The study of leveraging research capabilities with the marketplace and communicating research results for public benefit. Topics to include: the identification, management, development and commercialization of marketable research and technologies. Additional topics include patents and licensing.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 535S Current Federal Regulatory Issues in Biomedical Research 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 545S Pharmaceutical Law 3.0 Credits

Presents principles and practices of the Federal Food, Drug and Cosmetic Act governing the research and development of pharmaceuticals and biologics for both humans and animals including an analysis of legal and social constructs affecting industry and the academic clinical investigator with emphasis on FDA enforcement actions.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 550S Leadership Skills 3.0 Credits

This course is an in-depth analysis of specific human capital, organizational behavior and project management issues facing research facilities as they pertain to larger, integrated organizations. Selected topics include: high impact communications, negotiating, motivation and recognition.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 555S COMPLIANCE & MONITORING ISSUES 3.0 Credits

This course focuses on measuring and improving clinical trial performance as a means of saving time and money, while ensuring quality health care, as well as offering to patients both safe and effective therapeutic products. Students are required to develop milestone efficiencies through the use of process-performance data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 560S Special Topics 3.0 Credits

Individualizes enhancement to core curriculum in research. Students will determine which extracurricular lectures and events they will attend based on their interest and career intent.

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

CR 565S Contemporary Issues in Human Research Protection 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 570S Principles and Practice of Pharmacovigilance 3.0 Credits

This course is an introduction to the ethical, clinical, and regulatory complexities of medication safety and matters thinking skills for improving the quality and effectiveness of drug safety monitoring for both the pharmaceutical industry and its impact on the public.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 600S Designing the Clinical Trial 3.0 Credits

Designers and ethical, clinical, strategic issues surrounding clinical drug research are the focus of this course. Topics include design of trials for Phases one through four, an overview of the statistical component of a clinical trial, monitoring of the trial, and managing clinical data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: CR 515S [Min Grade: C]

CR 609S INNOVATIVE PRODUCT DEVELOPMENT 3.0 Credits

This comprehensive course provides a solid foundation in new therapeutic product research and development for the subsequent courses in the CROM program. This course focuses on the process of drug and medical device development from early research, discovery, and product formulation, through the federal requirements for proving safety and efficacy.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 612S Fundamentals of Compliance 3.0 Credits

The study of the federal bodies and regulations that govern research. Topics include: the rules and regulations surrounding HIPAA and how it affects research on human subjects, the history and current role of the FDA, IACUC, and the IRB within the research arena.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 614S Pharmacotherapy in New Drug R&D 3.0 Credits

Through the use of selected readings, case studies available from the FDA, and Blackboard discussions, this course will integrate preclinical/clinical research pharmaceutical operations along with federal regulatory approval principles, emphasizing the essentials of pharmacokinetic / pharmacodynamic activity of medications as the sound basis for understanding the clinical application of drug therapy with specific populations.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 616S Intro to Therapeutic Products 3.0 Credits

This course is designed to provide an overview of the diverse marketing and advertising practices and strategies of the pharmaceutical industry and their impact on the professional healthcare infrastructure, as well as on the healthcare recipient population. Students will be encouraged to develop skills to crucially evaluate the marketing techniques of the pharmaceutical industry.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 617S Informatics in Pharm Res & Development 3.0 Credits

Using a combination of printed materials, case studies, literature reviews, and on-line discussions, this course will cover past and present contributions of computer applications in pharmaceutical research and development. In addition, the student will be challenged to portend where technological advances may prove to be strategically beneficial in the future.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 620S Biotech/Research 3.0 Credits

The study of the history, use and progression of biological techniques developed through basic research and now how it is applied to research and product development.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 625S Health Policy and Economics 3.0 Credits

The study of the development, analysis and communication of economic data in the context of clinical research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 630S Trans Research 3.0 Credits

The study of the conversion of research into information, resources or tools that can be used by the public to improve overall health and well-being. Students will learn the management and applicability issues in converting basic research discoveries and innovative ideas into clinical trials that lead to better treatment.

College/Department: COM School of Biomedical Sciences Professional Studies

CR 633S Quality Assurance Audits 3.0 Credits

This course provides the student with an in-depth knowledge of compliance and quality assurance issues as well as the related regulations inherent in the drug development process. Students develop auditing plans and strategies for conducting compliance inspections.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 635S Strategic Planning 3.0 Credits

This course introduces the student to the project management and planning process. Topics include: project communications, leadership, objectives, scope, success criteria, procurement, cost estimating, control mechanisms, developing mission statements and devising strategies that turn vision into reality. May be repeated twice for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 999S Special Topics 1.0-3.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

Evening Post-Baccalaureate Pre-Medical Certificate Program

Certificate Level: Undergraduate

Admissions Requirements: Bachelor's degree

Certificate Type: Certificate

Number of Credits to Completion: 32.0

Instructional Delivery: Campus

Calendar Type: Semester

Expected Time to Completion: 2 years

Financial Aid Eligibility: Not aid eligible

Effective Fall 2015, this certificate program is transitioning to a non-degree preparatory program with no certificate.

About the Program

The School of Biomedical Sciences and Professional Studies at Drexel University's College of Medicine offers the part-time Evening Post-Baccalaureate Pre-Medical certificate. This 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. This program also affords the individual who took science courses many years ago the opportunity to revisit the sciences. The structured program is the equivalent of five semesters completed in succession.

Linkage agreements have been established to allow students direct entry into medical school programs immediately after successful completion of the PMED program. These schools include Drexel University College of Medicine, Edward Via College of Osteopathic Medicine, Philadelphia College of Osteopathic Medicine, and the Robert Wood Johnson School of Medicine.

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 the summer and fall semesters. Outside of the program, the opportunity for students to take additional courses through Drexel University is available. Due to modifications being made to the MCAT in 2015, a biochemistry course will be made available through the PMED program.

For more information, visit Drexel's College of Medicine Evening Post-Baccalaureate Pre-Medical Certificate Program (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/EveningPostBaccalaureatePreMedical.aspx>) web page.

Required Courses

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

Total Credits **32.0**

Admission Requirements

Students applying to the program must have a bachelor's degree from an accredited institution in the United States. Admission into the program is competitive because of the limited number of seats. Applicants are accepted on a rolling admissions basis.

An applicant should have a minimum combined SAT score of 1000 or ACT score of 21 and a minimum undergraduate grade point average of 3.00. For those individuals far removed from the college years, additional factors, or other more recent coursework, will be considered.

Applicants to the program should have at least 6.0 semester credits of coursework in English literature and the behavioral sciences (psychology, sociology, or philosophy), as that is a requirement for admission into most health professional schools. The opportunity exists within the program to acquire these courses if a student without these courses is accepted. A strong understanding of algebra and trigonometry is a prerequisite for the program. Calculus will also be beneficial.

The program's application can be found on the College of Medicine's Evening Post-Baccalaureate Pre-Med Certificate Admissions (<http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/EveningPostBaccalaureatePreMedical.aspx>) web page.

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 length is three semesters plus one summer session and includes both classes and hands-on practica.

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; gene expression and manipulation; protein-protein and protein-ligand interaction with SPR; and imaging/microscopy.

Required Courses

BIOC 507S	Biochemistry Seminar Series *	3.0
BIOC 508S	Experimental Approaches to Biochemical Problems	4.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	1.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0

Required Practica

BIOC 513S	Biotechnology Practicum I	4.0
BIOC 514S	Biotechnology Practicum II **	8.0
BIOC 515S	Biotechnology Practicum III	4.0
BIOC 516S	Biotechnology Practicum IV	4.0

Total Credits **40.0**

* 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.

Admission Requirements

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. Students must fulfill all requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee:

- 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, 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), or IELTS.

Students applying to the program will be expected to have undergraduate experience in chemistry, cell biology, biochemistry, and mathematics--including, at a minimum--two semesters each of inorganic chemistry, organic chemistry, physics, calculus and biology.

Visit Drexel University's Graduate Admissions (<http://www.drexel.edu/grad/programs/ducom>) site for additional information regarding specific requirements for applying to the College of Medicine as well as important application dates.

Courses

BIOC 502S Biochemistry 1st Lab Rotation 4.0 Credits

First rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 503S Biochemistry 2nd Lab Rotation 4.0 Credits

Second rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 504S Biochemistry 3rd Lab Rotation 4.0 Credits

Third rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

BIOC 505S Biochemical Basis of Disease 2.0 Credits

This is an advanced graduate course designed to explore the biochemical basis of a variety of diverse diseases, ranging from the diabetes to Alzheimer's. The course format consists of student presentations that will be augmented by specialized lecture.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: C] and IDPT 526S [Min Grade: C]

BIOC 506S Biochemistry Journal Club 1.0 Credit

A weekly journal club in which students take turns presenting recent papers from the biomedical literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 15 times for 100 credits

BIOC 507S Biochemistry Seminar Series 1.0 Credit

Weekly research seminars on topics in Biochemistry and Molecular Biology. Seminar speakers include both scientists from the Drexel faculty and scientists from outside institutions.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 15 times for 100 credits

BIOC 508S Experimental Approaches to Biochemical Problems 3.0 Credits

This course provides the student with a thorough understanding of the principles underlying the experimental techniques currently used to tackle biochemical problems. A combination of lecture, discussion, investigation of the primary literature, and demonstrations will be used.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: C] and IDPT 526S [Min Grade: C]

BIOC 509S Biochemical Basis of Disease 3.0 Credits

This is an advanced graduate course designed to explore the biochemical basis of a variety of diverse diseases, ranging from the Acquired Immunodeficiency Syndrome (AIDS) to Alzheimer's. The course format consists of specialized lectures that are augmented by student presentation. This course is open to all grad students. May be repeated once for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 3 credits

BIOC 510S Cancer Biology 3.0 Credits

This is a comprehensive team-taught course on various aspects of cancer including: transformation, oncogenes and suppresser genes, cell cycle, DNA damage/repair, cell signaling, oncogenesis, metastasis and cancer therapies. Faculty from Fox Chase Cancer Center participates in the teaching.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 511S Writing for Researchers: Grants and Papers 1.0 Credit

This is a course designed to introduce graduate students to the basics of scientific writing. The course will involve both the discussion of reading assignments and writing assignments for the students, which will be discussed and critiqued in class.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 512S Advanced Cancer Biology 2.0 Credits

The main goal of this advanced course is to provide further understanding of the principles of cancer biology. This course will emphasize reading and analyzing primary literature on the most recent advances in cancer research topics including methods to aid students who may carry out thesis work related to cancer research. This course will build upon basic information taught in the cancer biology course and intended for advanced graduate students (2nd year) looking for further understanding in the fields of cancer research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 513S Biotechnology Practicum I 4.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chosen taking into consideration the interests and career goals of the students. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Corequisite: IDPT 521S

BIOC 514S Biotechnology Practicum II 4.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chose taking into consideration the interests and career goals of the student. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: B]

Corequisite: IDPT 526S

BIOC 515S Biotechnology Practicum III 8.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chosen taking into consideration the interests and career goals of the student. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: B] and IDPT 526S [Min Grade: B]

BIOC 516S Biotechnology Practicum IV 4.0 Credits

The Biotechnology practicum is designed to provide hands-on experience with the techniques encountered in didactic courses and the Biochemistry seminar series. Laboratories for the practicum will be chosen taking into consideration the interests and career goals of the student. The student will carry out directed research in the lab of a faculty member with expertise in the techniques employed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: IDPT 521S [Min Grade: B] and IDPT 526S [Min Grade: B]

BIOC 600S Biochemistry Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department. Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 15 times for 100 credits

BIOC 603S Advanced Topics in Biochemistry and Molecular Biology 1.5 Credit

This course will supplement basic information taught in the biomedical sciences first year graduate core curriculum and provide a comprehensive, in-depth analysis of various topics in biochemistry. The course will include a mixture of lectures and literature-based assignments. Lectures are intended to cover topics deemed important for Biochemistry and MCBG students, but which are not covered in depth in the core curriculum. This will include practical aspects of experimental design and execution.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

BIOC 701S MEDICAL BIOCHEMISTRY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated multiple times for credit

BIOC 702S MEDICAL NUTRITION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 850S MEDICAL BIOCHEMISTRY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 860S MED BIOCHEMISTRY REEXAM 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 970S BIOCHEMISTRY RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 9750S RESEARCH-BIOCHEMISTRY-16 WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 9752S RESEARCH-BIOCHEMISTRY - 2WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 9754S RESEARCH-BIOCHEMISTRY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

BIOC 9756S RESEARCH - BIOCHEMISTRY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 9758S RESEARCH-BIOCHEMISTRY- 8WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

BIOC 975S STRUCTURAL & MOLECULAR BIOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 976S BIOCHEMISTRY OF METABOLISM 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 977S PHYSIOLOGICAL CHEMISTRY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

BIOC 999S Special Topics in Biochemistry 1.0-4.0 Credit

This course will focus on graduate level topics in the area of Biochemistry. The exact content, readings, and grading will be determined by the professor on a course by course basis.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 3 times for 16 credits

MS in Medical and Healthcare Simulation

Master of Science: 39.0 semester credits

About the Program

The goal of the MS in Medical Healthcare Simulation program is to educate healthcare professionals using simulation based methodology to bring a new level of standards and rigor in addition to creating new leaders to help shape the future of simulation education. The MS in Medical Healthcare Simulation program is a combination of both required

and elective graduate courses, together with an intensive immersive educational experience. The majority of the educational experience will occur via an e-learning experience with a mandatory simulation laboratory experience.

Program Delivery

The curriculum is planned for a two-year time frame with each group to complete the curriculum as a cohort. However, the program may be extended, if appropriate, to accommodate part-time students or potential conflicts that might arise. These decisions will be determined by the program directors and in consultation with the student's mentor/advisor.

Admission Requirements

For acceptance into the MS in Medical and Healthcare Simulation program, the applicant must have, at a minimum, completed a four-year bachelor's degree, nursing degree program or equivalent, with a preferred GPA of 3.0 and must also have fulfilled all of the requirements for consideration as defined by the program committee.

All students must submit three confidential letters of evaluation and all previous official educational transcripts. If you have taken any standardized test, such as GRE and MCAT, the scores must be submitted for review. No standardized test is required for admission at this time. Each student will be assessed holistically based on the requirements by the program's committee.

As the degree program is directed toward medical simulation the background in medical care is required. The applicant must have graduated from medical school, or have a nursing or Bachelor's Degree or other health professional training (approved by the program director on individual basis) with an interest in simulation. A record of achievement in medical education, as provided by letters of reference, publications, teaching evaluations, or prior specialized training or experience in medical education is desired, but not required.

Degree Requirements

Required Courses

MSMS 501S	Simulation Curriculum and Design I	3.0
MSMS 503S	Biostatistics in Healthcare Literature	3.0
MSMS 504S	Principles of Assessment: Measurement Theory, Assessment Principles & Tools	3.0
MSMS 506S	Debriefing in Simulation	3.0
MSMS 701S	Simulation Laboratory Practicum I	4.0
MSMS 702S	Simulation Laboratory Practicum II	4.0
MSMS 703S	Simulation Laboratory Practicum III	4.0
MSMS 801S	Capstone	3.0

Elective Courses

Students must select a minimum of 12 credits from the following: 12.0

CR 510S	Sponsored Projects Finance	
CR 525S	Scientific Writing and Medical Literature	
CR 550S	Leadership Skills	
CR 635S	Strategic Planning	
MSMS 507S	High Fidelity, Low Fidelity and Task Trainers	
MSMS 508S	Interprofessional Education	
MSMS 511S	Patient Safety and Simulation	

MSMS 600S Adult Learning in Healthcare

Total Credits 39.0

Sample Plan of Study

First Year

Term 1		Credits
MSMS 501S	Simulation Curriculum and Design I	3.0
MSMS 506S	Debriefing in Simulation	3.0
MSMS 701S	Simulation Laboratory Practicum I	4.0
Term Credits		10.0

Term 2

MSMS 503S	Biostatistics in Healthcare Literature	3.0
Two Medical and Healthcare Simulation electives*		6.0
Term Credits		9.0

Second Year

Term 3

MSMS 504S	Principles of Assessment: Measurement Theory, Assessment Principles & Tools	3.0
MSMS 702S	Simulation Laboratory Practicum II	4.0
Medical and Healthcare Simulation elective*		3.0
Term Credits		10.0

Term 4

MSMS 801S	Capstone	3.0
MSMS 703S	Simulation Laboratory Practicum III	4.0
Medical and Healthcare Simulation elective*		3.0
Term Credits		10.0

Total Credit: 39.0

* For a list of Medical and Healthcare Simulation electives, view the program's degree requirements.

Courses

MSMS 501S Simulation Curriculum and Design I 3.0 Credits

This course introduces the student to the principles of simulation curriculum through the development of learning objectives, tasks, activities and assessments. Key elements of simulation center design including building form, room usage and technology will be explored.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 503S Biostatistics in Healthcare Literature 3.0 Credits

This course introduces the basic concepts and techniques in statistical methods as used in educational research and any data analytic setting. It includes techniques for describing and summarizing observations, for assessing associations among variables, and for determining the extent to which chance may be explaining and/or influencing the observed results.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 504S Principles of Assessment: Measurement Theory, Assessment Principles & Tools 3.0 Credits

Examination of the comprehensiveness, validity, precision, feasibility and educational considerations of select assessment methods of learners in health professions education will be explored. Normative and mastery models of learning and implications for the quality of assessment tools under each model will be discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 506S Debriefing in Simulation 3.0 Credits

This course will explore the underlying theories of debriefing in relation to experiential learning and reflective practice. The role of the simulation facilitator will be investigated in providing emotional support and educational benefits for learners.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 507S High Fidelity, Low Fidelity and Task Trainers 3.0 Credits

Student will investigate the various types of tools that can be used for medical simulation. Educational objectives and outcomes will be correlated to the necessary level of fidelity tools used in specific simulation education lessons.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 508S Interprofessional Education 3.0 Credits

This course introduces the student to the team building approach to medical simulation through engagement of health professionals within various areas of the medical setting.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 511S Patient Safety and Simulation 3.0 Credits

The course will investigate the use of medical simulation to develop non-technical skills including: identifying, training and assessing safe behaviors. Individual and group training simulation methods will be identified and analyzed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 600S Adult Learning in Healthcare 3.0 Credits

This course will enable the understanding of the learning methods of adult students. Components of adult teaching include focus on hands-on learning, management of sessions, clear delivery of information and attention the different students' needs and learning styles.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 701S Simulation Laboratory Practicum I 4.0 Credits

This is an intensive introduction course that is a required curriculum component in the Master of Science in Medical and Healthcare Simulation program. Participants will collaborate in interactive simulation exercises to practice technical and non-technical simulation skills. The session will consist of interactive simulation sessions, lectures, discussions, small-group exercises, a group project, and individual assignments.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MSMS 702S Simulation Laboratory Practicum II 4.0 Credits

The content of this course spans over a semester, in which the curriculum is divided into an online portion and an in person seminar requirement for one full week during the course. Successful completion of MSMS 701 is a mandatory pre-requisite prior to enrollment. Participants will build upon the content acquired during the previous online courses in this program and apply knowledge in simulation-based education during interactive simulation exercises to practice technical and non-technical simulation skills. Students will be required to draft, revise, implement and critique a simulation exercise as a group and as an individual project. The session will consist of interactive simulation sessions, lectures, discussions, small-group exercises, a group project, and individual assignments.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MSMS 701S [Min Grade: B-]

MSMS 703S Simulation Laboratory Practicum III 4.0 Credits

This course is a semester long curriculum divided into an online portion and an in person seminar requirement for one full week during the course. MSMS 701S and 702S are mandatory prior to enrollment in this course. Participants will build upon experience acquired in the practical application of the MSMS and collaborate in interactive simulation exercises. Students will choose one of the following practical areas of study to complete the required final practicum course: 1) assessment via simulation, 2) simulation research, 3) Interprofessional simulation or 4) faculty development via simulation. Students will be required to implement and present their final project. The goal of the final practicum is to transform the knowledge learned in the MSMS into practical application and research in simulation education.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MSMS 702S [Min Grade: B-]

MSMS 801S Capstone 3.0 Credits

This course is the culmination of the research skills obtained throughout the program into a capstone project that produces a scholarly project incorporating education and medical simulation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MSMS 703S [Min Grade: B-] (Can be taken Concurrently) MSMS 501S [Min Grade: B-] and MSMS 503S [Min Grade: B-] and MSMS 504S [Min Grade: B-] and MSMS 506S [Min Grade: B-] and MSMS 701S [Min Grade: B-] and MSMS 702S [Min Grade: B-]

Master of Laboratory Animal Science Program

About the Program

Master of Laboratory Animal Science (MLAS): 49.0 semester credits

The School of Biomedical Sciences and Professional Studies offers the Master of Laboratory Animal Science (MLAS) degree. 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. Alternatively, the MLAS degree is also a powerful means to enhance students' credentials for admission to veterinary medical school.

The MLAS program is a full-time, two-year program that begins in August of each year. The first two years of the program consists primarily of classroom instruction, while the last semester is reserved for experiential learning. The program is flexible for traditional and non-traditional students alike due to the availability of evening courses.

For individuals who are currently working in the laboratory animal science field, the MLAS program is available online as well. Please review our website (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AnimalSciencePrograms/OnlineMasterofLaboratoryAnimalScience.aspx>) for specific details about the online program.

Curriculum

The MLAS curriculum consists of basic science courses, laboratory animal science courses, and a practicum. The basic science courses were designed to build a solid foundation required for a successful career in laboratory animal science. The laboratory animal science courses focus on all aspects of laboratory animal science, including facility management. The practicum provides the student with the opportunity to apply the theoretical knowledge they have learned to the field of Laboratory Animal Science. The outcome is a highly trained laboratory animal science professional with a solid foundation in the sciences.

Practicum

MLAS faculty and administration assist the students in identifying and securing practicum sites at universities, biotechnology organizations, and pharmaceutical companies. Practicum sites are available in Pennsylvania, New Jersey, New York, Delaware, Virginia, Kentucky, North Carolina, and Texas. The list expands every year. In many instances, the practicum sites have offered our students a permanent position within their organization upon completion of the MLAS degree.

Career Opportunities

MLAS graduates hold positions in laboratory animal facilities of universities, biotechnology companies, government agencies, and pharmaceutical companies. There they serve as veterinarians, supervisors, managers, IACUC administrators, trainers, educators, consultants, and sales representatives.

Veterinary Medical School

Successful completion of the MLAS program can also significantly improve a student's academic credentials for application to veterinary medical school. Please review our website (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/>

[AnimalSciencePrograms/MasterofLaboratoryAnimalScience.aspx](http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AnimalSciencePrograms/MasterofLaboratoryAnimalScience.aspx)) for a comprehensive list of veterinary medical schools that have been attended by MLAS alumni.

Additional Information

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Drexel College of Medicine also maintains a Master of Laboratory Animal Science (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AnimalSciencePrograms/MasterofLaboratoryAnimalScienceMLASProgram.aspx>) website.

Admission Requirements

Students will be selected on the basis of adequate educational background and veterinary/ research/ animal care experience.

Prerequisite coursework includes: chemistry, biology, organic chemistry, and physics.

Candidates for admission must provide the following credentials:

- Bachelor's degree from an accredited U.S. college or university
- Cumulative GPA of 2.7 or higher
- General Graduate Record Exam (GRE) scores at or above the 50th percentile in all areas obtained within the last 5 years
- Official transcript from all post-secondary institutions attended
- Three letters of reference, two must be from science professors
- Personal statement stating the applicant's academic and professional goals

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

Contact Information:

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Degree Requirements

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 49.0 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

Required Courses

Credits

MSPA 580S	Medical Microbiology I	4.0
MLAS 510S	Clinical Orientation In Laboratory Animal Facilities	1.0
MLAS 523S	Organizational Management	3.0
MLAS 536S	Animal Models for Biomedical Research	1.0
Electives		
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 512S	Graduate Pharmacology	
Term Credits		9.0

Spring

Required Courses

MLAS 520S	Financial Mgmt In Lab Anim Sci	3.0
MLAS 535S	Biology & Care Of Lab Animals	4.0
MLAS 529S	Molecular Genetics	2.0
Term Credits		9.0

Second Year**Fall**

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

Electives

PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 512S	Graduate Pharmacology	
MLAS 513S*	Biochemical Basis of Disease (Upenn)	
MLAS 514S*	Hematopoiesis (Upenn)	
MLAS 545S	Fundamentals of Histology	
Term Credits		9.0

Spring

Required Courses

MLAS 501S	Laboratory Animal Seminar	2.0
MLAS 521S	Arch Eng & Plan For Anim Fac	4.0
MLAS 530S	Biostats In Vet Science	3.0
Term Credits		9.0

Summer

Required Course

MLAS 801S	Laboratory Animal Practicum	12.0
Term Credits		12.0

Total Credit: 48.0

* This is a course taught at the University of Pennsylvania. (Students can take elective courses at the University of Pennsylvania within the University's veterinary curriculum. See the MLAS Program Director for a complete list of courses.)

Master of Science in Academic Medicine

Master of Science: 36.0 semester credits minimum + research-based publication

Additional 25.0 credits for concentration in otolaryngology

About the Program

Exceptional residents often pursue scholarly activities in addition to fulfilling their other residency requirements. This program is designed for those residents who publish research and pursue scholarly activities in addition to their typical residency training, and who desire to pursue careers in clinical education in their field of interest.

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

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.

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.

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.

Admission Requirements

Applications are 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.

Visit the Office of Biomedical Graduate Studies Admissions (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx>) website for more detailed information about applying to the program, including important application dates.

Degree Requirements

A minimum of thirty-six semester 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

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
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 600S	Thesis Defense (taken twice, each time for 9 credits)	18.0
Additional didactic courses included in the Associated Residency Program		6.0
Total Credits		36.0

Required courses for concentration in Otolaryngology

25.0 semester 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
Select two Otolaryngology electives from the following:		6.0
OTO 605S	Laryngology – Voice, Introduction	
OTO 606S	Laryngology – Voice, Advanced	
OTO 607S	Laryngology – Swallowing	
OTO 608S	Temporal Bone Dissection	
OTO 609S	Neurotology	

OTO 610S	Audiology	
OTO 611S	Endocrine Surgery	
OTO 612S	Allergy and Immunology	
OTO 613S	Radiology of the Head and Neck	
OTO 614S	Pathology and Histology	
OTO 615S	Pediatric Otolaryngology, Advanced	
OTO 616S	Otolaryngology Practice	
OTO 617S	Research Methodology and Publication	
OTO 618S	Facial Plastic and Reconstructive Surgery	
OTO 619S	Sleep Disorders	
OTO 620S	Taste and Smell	
OTO 622S	Bronchoesophagology	
Select one Otolaryngology surgery elective from the following:		6.0
OTO 700S	General Otolaryngologic Surgery	
OTO 701S	Otologic Surgery	
OTO 702S	Head and Neck Oncologic Surgery	
OTO 700S	General Otolaryngologic Surgery	
OTO 703S	Pediatric Otolaryngologic Surgery	
OTO 704S	Neurotologic Surgery	
OTO 705S	Laryngologic Surgery	
OTO 706S	Rhinologic Surgery	
OTO 707S	Surgery of the Sinuses	
OTO 708S	Bronchoesophagology	
OTO 709S	Cosmetic Plastic and Reconstructive Surgery	

Total Credits **25.0**

Courses

OTOL 8212S Otolaryngology *** 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

OTOL 8213S OTOLARYNGOLOGY - 3 WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

OTOL 8214S Otolaryngology 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

OTOL 858S OTOLARYNGOLOGY - 2 WEEKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

OTOL 859S OTOLARYNGOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

OTOL 895S OTOLARYNGOLOGY ELECTIVE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

OTOL 9092S OTOLARYNGOLOGY-2WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

OTOL 9094S OTOLARYNGOLOGY ELECTIVE 0.0 Credits**College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**OTOL 9752S RESEARCH-OTOLARYNGOLOGY-2WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Can be repeated 0 times for 0 credits**OTOL 9754S RESEARCH- OTOLARYNGOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Can be repeated 0 times for 0 credits

Master of Science in Biological Science

*83.0 graduate semester credits total**36.0 graduate semester credits + 47.0 MSP certificate credits (both undergraduate and graduate)*

About the Program

The Master of Science in Biological Science (MBS) program is the second year of the Medical Science Preparatory (MSP) program. Students transition into the MBS program after successful completion (3.0 GPA and no courses with grades less than a C) of the MSP program. The curriculum of the MBS program is identical to the Interdepartmental Medical Science certificate program and all the benefits to the student that program offers. The MBS year is offered at both the Philadelphia and Sacramento campus locations.

Additional Information

For more information about the program, visit the College of Medicine Master of Science in Biological Science (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PreMedicalPrograms/MasterofBiologicalScienceMBSProgram.aspx>) web page.

Required MS Courses

IMSP 502S	Medicine and Society I	3.0
IMSP 503S	Medicine and Society II	2.0
IMSP 510S	Medical Biochemistry I	7.5
IMSP 511S	Medical Biochemistry II	0.5
IMSP 520S	Medical Physiology I	3.5
IMSP 521S	Medical Physiology II	3.5
IMSP 540S	Cell Biology & Microanatomy I	5.0
IMSP 541S	Cell Biology and Microanatomy II	3.0
IMSP 560S	Medical Neuroscience	6.0

Summer Research Project

MSPP 550S	Research Project	2.0
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Additional Non-required Courses

IMSP 570S	Medical Immunology *	
IMSP 550S	Medical Nutrition *	

Total Credits **36.0**

* These courses are optional and not necessary for the completion of the MS degree.

Master of Science in Cancer Biology

Master of Science: 40.0-43.0 semester credits

About the Program

The goal of the MS in Cancer Biology program is to provide a master's degree focused on the fundamentals of cancer from an interdisciplinary perspective, including:

- biology and molecular biology of cancer initiation;
- metastasis;
- treatment; and
- bioinformatics/systems biology.

The program is designed to meet the needs of two groups of individuals: (1) new or recent college graduates who wish to increase their marketability for jobs in academic or industrial laboratories through the acquisition of knowledge and skills more developed than obtained through a standard college curriculum; and (2) currently employed technical staff in the pharmaceutical or biotechnology industry (or academia) who wish to advance their position.

Consisting of both classroom and laboratory instruction, the program fills a need to train laboratory personnel in cancer theory and research. Graduates of this program will possess knowledge in both the theoretical as well as the practical level.

Additional Information

Mauricio Reginato, PhD

Program Director

Department of Biochemistry + Molecular Biology

Drexel University College of Medicine

mauricio.reginato@drexelmed.edu

Admission Requirements

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. Students must fulfill all requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee:

- 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, 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), or IELTS.

Students applying to the program will be expected to have undergraduate experience in chemistry, cell biology, biochemistry, and mathematics--including, at a minimum--two semesters each of inorganic chemistry, organic chemistry, physics, calculus and biology.

Visit Drexel University's Graduate Admissions (<http://www.drexel.edu/grad/programs/ducom>) site for additional information regarding specific requirements for applying to the College of Medicine as well as important application dates.

Degree Requirements: Thesis Option

43.0 semester credits

Each semester, throughout the two years, there will be a weekly Cancer Journal Club. Students will also attend the Molecular & Cell Biology & Genetics (MCBG) Seminar series. Each semester contains a research component.

The Thesis Option of this program based on research can be initiated at the end of the first year.

Required Courses

BIOC 510S	Cancer Biology	3.0
BIOC 512S	Advanced Cancer Biology	2.0
CBIO 500S	Core Cancer Topics	2.0
CBIO 503S	Cancer Biology Journal Club	1.0
CBIO 504S	Cancer Biology 1st Lab Rotation	4.0
CBIO 505S	Cancer Biology 2nd Lab Rotation	2.0
CBIO 506S	Cancer Biology Thesis Research	9.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
MCBG 513S	Molec & Cell Biology Seminar	1.0

Suggested Electives *

Select a minimum of 5.0 credits of electives:		
BIOC 508S	Experimental Approaches to Biochemical Problems	4.0
CBIO 501S	Infection, Inflammation and Cancer	2.0
CBIO 508S	Cancer Biomarkers and Therapeutics	2.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 514S	Cell Cycle and Apoptosis	2.0
PHRM 525S	Drug Discovery and Development I	2.0
PBHL 633	Epidemiology of Cancer	2.0

Total Credits 43.0

Degree Requirements: Non-Thesis Option

40.0 semester credits

Required Courses

BIOC 510S	Cancer Biology	3.0
BIOC 512S	Advanced Cancer Biology	2.0
CBIO 500S	Core Cancer Topics	2.0
CBIO 503S	Cancer Biology Journal Club (May be repeated for credit)	1.0
CBIO 504S	Cancer Biology 1st Lab Rotation	4.0
CBIO 505S	Cancer Biology 2nd Lab Rotation	2.0
CBIO 507S	Special Topics in Cancer Biology	9.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0

MCBG 513S	Molec & Cell Biology Seminar	1.0
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Suggested Electives * 4.0

Select a minimum of 4.0 credits of electives.

BIOC 508S	Experimental Approaches to Biochemical Problems	2.0
CBIO 501S	Infection, Inflammation and Cancer	2.0
CBIO 508S	Cancer Biomarkers and Therapeutics	2.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 514S	Cell Cycle and Apoptosis	2.0
PHRM 525S	Drug Discovery and Development I	2.0
PBHL 633	Epidemiology of Cancer	2.0

Total Credits 40.0

* Students can select a course from the list of suggested electives or by approval from the Program Director.

Courses

CBIO 500S Core Cancer Topics 2.0 Credits

The overall goal of Cancer Topics is to provide the student with exposure to cancer topics as they relate to topics covered in the core curriculum. In addition, students will get exposure to cancer-related topics not covered in other required courses.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CBIO 501S Infection, Inflammation and Cancer 2.0 Credits

This course will be an advanced-level comprehensive survey of infectious agents and inflammatory signals that have been linked to the development of various cancers. The molecular mechanisms that underlie viral, bacterial, and parasite associated human cancers as well as inflammation-mediated cell transformation mechanisms will be the focus of lectures and discussions. Sessions will consist of lectures and discussions of assigned reading.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: BIOC 510S [Min Grade: B]

CBIO 503S Cancer Biology Journal Club 1.0 Credit

The overall goal of the cancer journal club is to provide the student with exposure to primary literature of latest high impact research related to cancer research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 4 times for 4 credits

CBIO 504S Cancer Biology 1st Lab Rotation 4.0 Credits

First rotation. Guided research is conducted on a part-time basis for 8-10 week period. Student will choose from a list of labs conducting cancer related research; the focus will be on acquisition of specific laboratory/molecular biology skills in cancer-related research. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CBIO 505S Cancer Biology 2nd Lab Rotation 4.0 Credits

Second rotation. Guided research is conducted on a part-time basis for 8-10 week period. Student will choose from a list of labs conducting cancer related research; the focus will be on acquisition of specific laboratory/molecular biology skills in cancer-related research. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CBIO 506S Cancer Biology Thesis Research 9.0 Credits

Research toward the fulfillment of the masters thesis. Process is monitored by the student's advisor and department, advisory committee or thesis committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 8 times for 18 credits

CBIO 507S Special Topics in Cancer Biology 9.0 Credits

The overall goal of special topics cancer biology is designed as a series of enrichment sessions that employ primary literature to amplify topics and concepts presented in BIOC 509S cancer biology. For non-thesis option in the master's program of cancer biology it will require writing a publication quality review on a cancer biology topic.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 2 times for 18 credits

CBIO 508S Cancer Biomarkers and Therapeutics 2.0 Credits

In this advanced course, students will learn about biomarkers and therapies for human cancers. A topic by topic analysis of key developments and approaches in biomarker discovery and validation along with cancer therapy are presented, with inclusion of pharmacologic, regulatory and basic science perspectives.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Master of Science in Clinical Research Organization and Management

Master of Science: 36.0 semester credits

About the Program

The Master of Science in Clinical Research Organization and Management is an online program designed both for individuals already trained in the area of clinical sciences, as well as for others who desire focused training in the proper conduct of clinical research.

The Master of Science in Clinical Research Organization and Management program 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, epidemiology and biostatistics, ethics-based reasoning for the conduct of research, clinical

trial management and monitoring 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 work with advisors to customize their course plans to meet their career goals.

Program Delivery Options

All Clinical Research (CR) courses are offered solely online. Visit the Drexel University Online site for details.

Additional Information

Sara Perkel, MBA

Director, Graduate Programs in Clinical Research

sara.perkel@drexelmed.edu

215-762-3812

For more information about the program, visit the Master of Science in Clinical Research Organization and Management (<http://drexel.com/crom>) page on the Drexel University Online site.

For information about applying to the program, visit the Drexel University Online Admissions Criteria (<http://www.drexel.com/online-degrees/biomedical-degrees/ms-crom/admissions.aspx>) web page.

Degree Requirements

The Master of Science in Clinical Research Organization and Management program consists of 12 courses (36.0 credits). Any courses offered by the Clinical Research Organization Management program may be applied to fulfill the requirements of this major. No master's thesis is required.

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

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	Intro to Clinical Trials	3.0
CR 609S	INNOVATIVE PRODUCT DEVELOPMENT	3.0
CR 620S	Biotech/Research	3.0

Regulatory Compliance, Ethics and Law

CR 505S	Ethical Issues in Research	3.0
CR 511S	The History of Misconduct in Biomedical Research	3.0
CR 535S	Current Federal Regulatory Issues in Biomedical Research	3.0
CR 555S	COMPLIANCE & MONITORING ISSUES	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	Epidemiology	3.0
CR 520S	Applications of Clinical Research Biostatistics	3.0
CR 560S	Special Topics	3.0
CR 600S	Designing the Clinical Trial	3.0
Clinical Research Management and Safety Surveillance		
CR 512S	Fundamentals of Academic Research Administration	3.0
CR 525S	Scientific Writing and Medical Literature	3.0
CR 625S	Health Policy and Economics	3.0
New Therapeutic Product Business and Strategic Planning		
CR 530S	Tech Transfer	3.0
CR 635S	Strategic Planning	3.0
CR 550S	Leadership Skills	3.0

Courses

CR 500S Epidemiology 3.0 Credits

Epidemiology is at the core of research professions as it is the study of the distribution, determinants, and the course of health related events in populations, and the efficacy and effectiveness of prevention and intervention strategies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 501S Emerging Trends in Medical Device History 3.0 Credits

The goal of this course is to focus on the various trends that impact the research and development process inherent in the medical device industry. Case studies representing several therapeutic categories will be discussed from a business, medical scientific, ethical, regulatory and bio-medical engineering perspective.

College/Department: COM School of Biomedical Sciences Professional Studies

CR 505S Ethical Issues in Research 3.0 Credits

Students explore ethical issues to sound clinical research, review the foundations of regulations for clinical investigations, and to better understand the operational imperatives of Good Clinical Practices.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 510S Sponsored Projects Finance 3.0 Credits

The study of managing and monitoring external funding sources for research projects. Topics include: rules and regulations, proposal preparation and submission, cost accounting standards, salaries and benefits of staff, direct and indirect costs, the costing of equipment and facility use.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 511S The History of Misconduct in Biomedical Research 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 512S Fundamentals of Academic Research Administration 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 513S Pharmaceutical R&D: Business Process and Information Flow 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 514S World Wide Regulatory Submissions 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 515S Intro to Clinical Trials 3.0 Credits

This course introduces regulatory responsibilities of clinical investigators, sponsors, monitors, IRBs, FDA -all those parties intimately involved in clinical research. Information and exercises are designed to reinforce the elements of Good Clinical Practices.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 520S Applications of Clinical Research Biostatistics 3.0 Credits

Examines role of the statistician in clinical research. Course includes a discussion of the language of statistics to facilitate communication with the clinical research project team, basic methods of describing data, fundamentals of probability, simple models and methods of parameter estimation and statistical software packages for reporting data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 525S Scientific Writing and Medical Literature 3.0 Credits

This course teaches the medical professional the ability to read for understanding, and evaluate validity of information a medical or scientific paper. In addition, the student learns how to recognize various types of medical literature and the basics of how to perform a review of the medical literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 530S Tech Transfer 3.0 Credits

The study of leveraging research capabilities with the marketplace and communicating research results for public benefit. Topics to include: the identification, management, development and commercialization of marketable research and technologies. Additional topics include patents and licensing.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 535S Current Federal Regulatory Issues in Biomedical Research 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 545S Pharmaceutical Law 3.0 Credits

Presents principles and practices of the Federal Food, Drug and Cosmetic Act governing the research and development of pharmaceuticals and biologics for both humans and animals including an analysis of legal and social constructs affecting industry and the academic clinical investigator with emphasis on FDA enforcement actions.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 550S Leadership Skills 3.0 Credits

This course is an in-depth analysis of specific human capital, organizational behavior and project management issues facing research facilities as they pertain to larger, integrated organizations. Selected topics include: high impact communications, negotiating, motivation and recognition.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 555S COMPLIANCE & MONITORING ISSUES 3.0 Credits

This course focuses on measuring and improving clinical trial performance as a means of saving time and money, while ensuring quality health care, as well as offering to patients both safe and effective therapeutic products. Students are required to develop milestone efficiencies through the use of process-performance data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 560S Special Topics 3.0 Credits

Individualizes enhancement to core curriculum in research. Students will determine which extracurricular lectures and events they will attend based on their interest and career intent.

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

CR 565S Contemporary Issues in Human Research Protection 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 570S Principles and Practice of Pharmacovigilance 3.0 Credits

This course is an introduction to the ethical, clinical, and regulatory complexities of medication safety and matters thinking skills for improving the quality and effectiveness of drug safety monitoring for both the pharmaceutical industry and its impact on the public.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 600S Designing the Clinical Trial 3.0 Credits

Designers and ethical, clinical, strategic issues surrounding clinical drug research are the focus of this course. Topics include design of trials for Phases one through four, an overview of the statistical component of a clinical trial, monitoring of the trial, and managing clinical data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: CR 515S [Min Grade: C]

CR 609S INNOVATIVE PRODUCT DEVELOPMENT 3.0 Credits

This comprehensive course provides a solid foundation in new therapeutic product research and development for the subsequent courses in the CROM program. This course focuses on the process of drug and medical device development from early research, discovery, and product formulation, through the federal requirements for proving safety and efficacy.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 612S Fundamentals of Compliance 3.0 Credits

The study of the federal bodies and regulations that govern research. Topics include: the rules and regulations surrounding HIPAA and how it affects research on human subjects, the history and current role of the FDA, IACUC, and the IRB within the research arena.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 614S Pharmacotherapy in New Drug R&D 3.0 Credits

Through the use of selected readings, case studies available from the FDA, and Blackboard discussions, this course will integrate preclinical/clinical research pharmaceutical operations along with federal regulatory approval principles, emphasizing the essentials of pharmacokinetic / pharmacodynamic activity of medications as the sound basis for understanding the clinical application of drug therapy with specific populations.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 616S Intro to Therapeutic Products 3.0 Credits

This course is designed to provide an overview of the diverse marketing and advertising practices and strategies of the pharmaceutical industry and their impact on the professional healthcare infrastructure, as well as on the healthcare recipient population. Students will be encouraged to develop skills to crucially evaluate the marketing techniques of the pharmaceutical industry.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 617S Informatics in Pharm Res & Development 3.0 Credits

Using a combination of printed materials, case studies, literature reviews, and on-line discussions, this course will cover past and present contributions of computer applications in pharmaceutical research and development. In addition, the student will be challenged to portend where technological advances may prove to be strategically beneficial in the future.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 620S Biotech/Research 3.0 Credits

The study of the history, use and progression of biological techniques developed through basic research and now how it is applied to research and product development.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 625S Health Policy and Economics 3.0 Credits

The study of the development, analysis and communication of economic data in the context of clinical research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 630S Trans Research 3.0 Credits

The study of the conversion of research into information, resources or tools that can be used by the public to improve overall health and well-being. Students will learn the management and applicability issues in converting basic research discoveries and innovative ideas into clinical trials that lead to better treatment.

College/Department: COM School of Biomedical Sciences Professional Studies

CR 633S Quality Assurance Audits 3.0 Credits

This course provides the student with an in-depth knowledge of compliance and quality assurance issues as well as the related regulations inherent in the drug development process. Students develop auditing plans and strategies for conducting compliance inspections.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 635S Strategic Planning 3.0 Credits

This course introduces the student to the project management and planning process. Topics include: project communications, leadership, objectives, scope, success criteria, procurement, cost estimating, control mechanisms, developing mission statements and devising strategies that turn vision into reality. May be repeated twice for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 999S Special Topics 1.0-3.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

Master of Science in Clinical Research for Health Professionals

Master of Science: 36.0 semester credits

About the Program

The MS in Clinical Research for Health Professionals program is a non-thesis curriculum designed for residents, fellows, and clinicians seeking knowledge in the conduct of translational and pharmaceutical research. The degree often acts as an advanced preparation for independent investigators and other practicing researchers familiar with the industry, 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

While the MS in Clinical Research for Health Professionals program does not require a thesis, the program is consistent with a master's level education that challenges students 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 nine hours research per week for 3.0 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 mentor must be submitted with the student's application for evaluation by the admissions committee and the program director. The appropriateness of the mentor will be evaluated by an adhoc committee whose members come from both the Office of Professional Studies and the Drexel University College of Medicine 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 and to apply, visit the Drexel University Online (<http://drexel.com/crhp>) site.

Additional Information

Sara Perkel, MBA
Director, Graduate Programs in Clinical Research
sara.perkel@drexelmed.edu (sara.perkel@drexel.edu)
215-762-3812

Degree Requirements

The MS in Clinical Research for Health Professionals program requires completing a minimum of 15.0 semester credits, composed of three required courses and two clinical research electives. In addition, students will register for a total of 21.0 research credits.

Curriculum

Select three of the following:	9.0
CR 500S	Epidemiology
CR 515S	Intro to Clinical Trials
CR 520S	Applications of Clinical Research Biostatistics
CR 525S	Scientific Writing and Medical Literature
CR 612S	Fundamentals of Compliance
CR 545S	Pharmaceutical Law
Select two of the following:	6.0
CR 500S	Epidemiology
CR 501S	Emerging Trends in Medical Device History
CR 505S	Ethical Issues in Research
CR 511S	The History of Misconduct in Biomedical Research
CR 512S	Fundamentals of Academic Research Administration
CR 515S	Intro to Clinical Trials
CR 520S	Applications of Clinical Research Biostatistics
CR 525S	Scientific Writing and Medical Literature
CR 535S	Current Federal Regulatory Issues in Biomedical Research
CR 545S	Pharmaceutical Law
CR 565S	Contemporary Issues in Human Research Protection
CR 570S	Principles and Practice of Pharmacovigilance
CR 600S	Designing the Clinical Trial
CR 609S	INNOVATIVE PRODUCT DEVELOPMENT
CR 612S	Fundamentals of Compliance
CR 614S	Pharmacotherapy in New Drug R&D
CR 616S	Intro to Therapeutic Products

CR 617S	Informatics in Pharm Res & Development
CR 620S	Biotech/Research
CR 625S	Health Policy and Economics
CR 999S	Special Topics

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

Total Credits **36.0**

* 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 mentor must be submitted with the student's application. 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 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 program director for additional requirements.

Courses

CR 500S Epidemiology 3.0 Credits

Epidemiology is at the core of research professions as it is the study of the distribution, determinants, and the course of health related events in populations, and the efficacy and effectiveness of prevention and intervention strategies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 501S Emerging Trends in Medical Device History 3.0 Credits

The goal of this course is to focus on the various trends that impact the research and development process inherent in the medical device industry. Case studies representing several therapeutic categories will be discussed from a business, medical scientific, ethical, regulatory and bio-medical engineering perspective.

College/Department: COM School of Biomedical Sciences Professional Studies

CR 505S Ethical Issues in Research 3.0 Credits

Students explore ethical issues to sound clinical research, review the foundations of regulations for clinical investigations, and to better understand the operational imperatives of Good Clinical Practices.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 510S Sponsored Projects Finance 3.0 Credits

The study of managing and monitoring external funding sources for research projects. Topics include: rules and regulations, proposal preparation and submission, cost accounting standards, salaries and benefits of staff, direct and indirect costs, the costing of equipment and facility use.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 511S The History of Misconduct in Biomedical Research 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 512S Fundamentals of Academic Research Administration 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 513S Pharmaceutical R&D: Business Process and Information Flow 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 514S World Wide Regulatory Submissions 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 515S Intro to Clinical Trials 3.0 Credits

This course introduces regulatory responsibilities of clinical investigators, sponsors, monitors, IRBs, FDA -all those parties intimately involved in clinical research. Information and exercises are designed to reinforce the elements of Good Clinical Practices.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 520S Applications of Clinical Research Biostatistics 3.0 Credits

Examines role of the statistician in clinical research. Course includes a discussion of the language of statistics to facilitate communication with the clinical research project team, basic methods of describing data, fundamentals of probability, simple models and methods of parameter estimation and statistical software packages for reporting data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 525S Scientific Writing and Medical Literature 3.0 Credits

This course teaches the medical professional the ability to read for understanding, and evaluate validity of information a medical or scientific paper. In addition, the student learns how to recognize various types of medical literature and the basics of how to perform a review of the medical literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 530S Tech Transfer 3.0 Credits

The study of leveraging research capabilities with the marketplace and communicating research results for public benefit. Topics to include: the identification, management, development and commercialization of marketable research and technologies. Additional topics include patents and licensing.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 535S Current Federal Regulatory Issues in Biomedical Research 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 545S Pharmaceutical Law 3.0 Credits

Presents principles and practices of the Federal Food, Drug and Cosmetic Act governing the research and development of pharmaceuticals and biologics for both humans and animals including an analysis of legal and social constructs affecting industry and the academic clinical investigator with emphasis on FDA enforcement actions.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 550S Leadership Skills 3.0 Credits

This course is an in-depth analysis of specific human capital, organizational behavior and project management issues facing research facilities as they pertain to larger, integrated organizations. Selected topics include: high impact communications, negotiating, motivation and recognition.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 555S COMPLIANCE & MONITORING ISSUES 3.0 Credits

This course focuses on measuring and improving clinical trial performance as a means of saving time and money, while ensuring quality health care, as well as offering to patients both safe and effective therapeutic products. Students are required to develop milestone efficiencies through the use of process-performance data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 560S Special Topics 3.0 Credits

Individualizes enhancement to core curriculum in research. Students will determine which extracurricular lectures and events they will attend based on their interest and career intent.

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

CR 565S Contemporary Issues in Human Research Protection 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 570S Principles and Practice of Pharmacovigilance 3.0 Credits

This course is an introduction to the ethical, clinical, and regulatory complexities of medication safety and matters thinking skills for improving the quality and effectiveness of drug safety monitoring for both the pharmaceutical industry and its impact on the public.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 600S Designing the Clinical Trial 3.0 Credits

Designers and ethical, clinical, strategic issues surrounding clinical drug research are the focus of this course. Topics include design of trials for Phases one through four, an overview of the statistical component of a clinical trial, monitoring of the trial, and managing clinical data.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: CR 515S [Min Grade: C]

CR 609S INNOVATIVE PRODUCT DEVELOPMENT 3.0 Credits

This comprehensive course provides a solid foundation in new therapeutic product research and development for the subsequent courses in the CROM program. This course focuses on the process of drug and medical device development from early research, discovery, and product formulation, through the federal requirements for proving safety and efficacy.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 612S Fundamentals of Compliance 3.0 Credits

The study of the federal bodies and regulations that govern research. Topics include: the rules and regulations surrounding HIPAA and how it affects research on human subjects, the history and current role of the FDA, IACUC, and the IRB within the research arena.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 614S Pharmacotherapy in New Drug R&D 3.0 Credits

Through the use of selected readings, case studies available from the FDA, and Blackboard discussions, this course will integrate preclinical/clinical research pharmaceutical operations along with federal regulatory approval principles, emphasizing the essentials of pharmacokinetic / pharmacodynamic activity of medications as the sound basis for understanding the clinical application of drug therapy with specific populations.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 616S Intro to Therapeutic Products 3.0 Credits

This course is designed to provide an overview of the diverse marketing and advertising practices and strategies of the pharmaceutical industry and their impact on the professional healthcare infrastructure, as well as on the healthcare recipient population. Students will be encouraged to develop skills to crucially evaluate the marketing techniques of the pharmaceutical industry.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 617S Informatics in Pharm Res & Development 3.0 Credits

Using a combination of printed materials, case studies, literature reviews, and on-line discussions, this course will cover past and present contributions of computer applications in pharmaceutical research and development. In addition, the student will be challenged to portend where technological advances may prove to be strategically beneficial in the future.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CR or major is CROM.

CR 620S Biotech/Research 3.0 Credits

The study of the history, use and progression of biological techniques developed through basic research and now how it is applied to research and product development.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 625S Health Policy and Economics 3.0 Credits

The study of the development, analysis and communication of economic data in the context of clinical research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 630S Trans Research 3.0 Credits

The study of the conversion of research into information, resources or tools that can be used by the public to improve overall health and well-being. Students will learn the management and applicability issues in converting basic research discoveries and innovative ideas into clinical trials that lead to better treatment.

College/Department: COM School of Biomedical Sciences Professional Studies

CR 633S Quality Assurance Audits 3.0 Credits

This course provides the student with an in-depth knowledge of compliance and quality assurance issues as well as the related regulations inherent in the drug development process. Students develop auditing plans and strategies for conducting compliance inspections.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 635S Strategic Planning 3.0 Credits

This course introduces the student to the project management and planning process. Topics include: project communications, leadership, objectives, scope, success criteria, procurement, cost estimating, control mechanisms, developing mission statements and devising strategies that turn vision into reality. May be repeated twice for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

CR 999S Special Topics 1.0-3.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

Master of Science in Criminalistic Science

About the Program

Master of Science: 49.0 semester credits

The School of Biomedical Sciences and Professional Studies offers the Master of Science in Criminalistic Science. The Master of Science in Criminalistic Science is designed to introduce students to the basic principles of Criminalistic Science while also providing opportunities to pursue either more traditional and/or more innovative concentrations of study.

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.

Admission Requirements

Applicants must have a bachelor's degree from an accredited US college or university or its equivalent. Official general GRE and/or MCAT scores are required for admission. Typical applicants would have a minimum 2.5 GPA.

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
215.762.4674
thelicia.hill@drexelmed.edu (thelicia.hill@drexel.edu)

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

Degree Requirements

Year One: Fall Semester

FCA 505S	Physical Aspects of Forensic Science	3.0
FCA 507S	Gross Human Skeleton I	1.0
IHS 999S	Special Topics (Introduction to Scientific Writing)	2.0
MFSP 553S	Human Structure Lab	1.0
MFSP 550S	Biological Aspects of the Forensic Sciences	2.0
MFSP 552S	Structure of the Human Body	3.0
MFSP 561S	Techniques of Crime Scene Investigation	3.0
MFSP 575S	Introduction to Criminal Law and Trial Process	3.0

Year I: Spring Semester

FCA 506S	Medico-legal Death Investigation	2.0
FCA 508S	Gross Human Skeleton II	3.0
MFSP 556S	Forensic Anthropology and Topics in Human Identification	3.0
MFSP 559S	Criminal Law and the Court: Use of Evidence I	3.5
MFSP 560S	Criminal Law and the Court: Use of Evidence II	3.5
MFSP 576S	Ethics for the Forensic Scientist	3.0

Year 2: Fall Semester

Ten credits chosen from the following electives:	10.0
MFSP 593S	Cyber Crime
MFSP 563S	Latent Fingerprint Analysis
MFSP 578S	Forensic Photography
MFSP 590S	Homicide Investigation
MFSP 571S	Bloodstain Pattern Analysis
MFSP 568S	Vehicle Accident Reconstruction and Analysis

Year 2: Spring Semester

Twelve credits chosen from the following electives:	12.0
MFSP 562S	Arson and Explosive Analysis
MFSP 565S	Firearms and Tool Mark Analysis
MFSP 566S	Techniques of interview and interrogation
MFSP 569S	Footwear and Tire Track Analysis
MFSP 570S	Nuclear/Biological/Chemical Terrorism

MFSP 591S Criminal Investigative Analysis I

Total Credits**58.0**

Forensic Criminalistic Analy Courses

FCA 505S Physical Aspects of Forensic Science 3.0 Credits

This course is designed to present students with a snapshot of each of the criminalistics disciplines and how they interrelate with each other and with the criminal system. The student will learn the structure of the crime laboratory and how it interrelates to both the criminal investigation and the criminal justice system. Proper investigative techniques and scientific protocols are presented and examined.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

FCA 506S Medico-legal Death Investigation 2.0 Credits

Students will learn the history of pathology as well as the principles of manner, mode and cause of death from a medical standpoint. Postmortem changes after death, along with death from blunt force injury, sharp force injury, asphyxia, gunshot injury and traffic crash injuries will also be studied. Case studies will be presented and discussed to illustrate the lectures in this course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

FCA 507S Gross Human Skeleton I 1.0 Credit

This course provides students with an in-depth familiarity with the gross human skeleton – its bones, their features, and how it develops. Through numerous laboratory exercises, students will be able to handle skeletal material in order to become proficient in the identification of human skeletal remains and differentiate them from those of non-human animals for application. This course focuses on the skull and dentition, whereas FCA-508 focuses on the post-cranial skeleton.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

FCA 508S Gross Human Skeleton II 3.0 Credits

Gross human skeleton is a study of the human skeletal system: its bones, their major parts and features, and development. Through lecture and hands-on laboratory examinations of human osteological material, students learn to identify the bones of the body quickly and be able to easily discriminate between human and non-human skeletal remains whether adult or immature. This course is a direct continuation of FCA-507 (Gross Human Skeleton I), and deals with the post-cranial portion of the skeleton.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: FCA 507S [Min Grade: C] or MFSP 581S [Min Grade: C]

Forensic Science Courses

MFSP 550S Biological Aspects of the Forensic Sciences 2.0 Credits

This course provides an overview of the biological science of forensic pathology, toxicology, anthropology, serological techniques and molecular biology; methods of human identification, time, cause and manner of death; study of the pathology of trauma, sudden and unexpected death; child abuse; acquisition, identification and quantitation of drugs from biological materials.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 551S Human Function 3.0 Credits

This course is designed to provide students with an understanding of the functions and processes required to maintain the stable internal environment required for normal cell function. Several key themes will be examined throughout the course, including homeostasis and various feedback mechanisms. Each organ system of the body is examined from a physiological standpoint, building upon concepts illustrating how these systems are functionally integrated. This course is closely coordinated with MFSP-552S (Structure of the Human Body), to facilitate an understanding of physiology as it relates to human anatomy.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 552S Structure of the Human Body 3.0 Credits

This course is designed to provide students with a solid basis in human anatomy. The structural basis of the body's organ systems are examined and discussed – from the cellular to the tissue to the gross level. This course is closely coordinated with MFSP-551S (Human Function), enabling students who simultaneously matriculate into both to enjoy an integrated presentation of the structure and function of the human body. Anatomic complexes and key structural details of relevance to forensic science are discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 553S Human Structure Lab 1.0 Credit

The Human Structure lab enables students taking MFSP-522S (Structure of the Human Body) to examine human anatomical specimens including gross anatomical dissections and microscopic images. Structures of particular importance to the forensic professional are emphasized.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 554S Principles of Forensic Pathology 4.0 Credits

This course is a review of forensic pathology; human identification, time of death, injury causation and analysis, and determination of cause and manner of death. Includes pathology of natural diseases, application of related fields such as forensic toxicology, anthropology and odontology. Integration of scene evident to allow for scene reconstruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 555S Forensic Sciences Summer Practicum 3.0 Credits

The practicum will be conducted at a variety of sites where students will be able to get "hand's on" exposure to a broad variety of forensic and/or clinical medicine venues in which forensic science principles are applied.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 556S Forensic Anthropology and Topics in Human Identification 3.0 Credits

Discussion of human osteological remains for the purpose of distinguishing human from non-human skeletal identification, injury causation, time of death, and natural disease. Excavation techniques, site reconstruction, taphonomy, and human paleopathology are introduced.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Prerequisites: (MFSP 581S [Min Grade: C] and MFSP 582S [Min Grade: C]) or (FCA 507S [Min Grade: C] and FCA 508S [Min Grade: C])

MFSP 557S Drug Chemistry 2.0 Credits

Review of the chemistry, biology and pharmacodynamic principles associated with forensic toxicology, with emphasis upon the forensic aspects of alcohol (ethanol), illicit drugs and selected prescription/over-the-counter pharmaceuticals. Separation techniques, means of drug identification and qualitative vs. confirmatory quantitative analytical procedures are discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 558S Instrumental Analysis 2.0 Credits

A continuation of MFSP 557S (Drug Chemistry). Review of the chemistry, biology and pharmacodynamic principles associated with forensic toxicology, with emphasis upon the forensic aspects of alcohol (ethanol), illicit drugs and selected prescription/over-the-counter pharmaceuticals. Separation techniques, means of drug identification and qualitative vs. confirmatory quantitative analytical procedures are discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Prerequisites: MFSP 557S [Min Grade: C]

MFSP 559S Criminal Law and the Court: Use of Evidence I 3.5**Credits**

A discussion of those procedural rules affecting the collection and use of physical evidence in a court of law, with emphasis upon court opinions defining search and seizure and admissibility of evidence. Court opinions are illustrated through the introduction of relevant case studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 575S [Min Grade: C]

MFSP 560S Criminal Law and the Court: Use of Evidence II 3.5**Credits**

A continuation of MFSP 559S. A discussion of those procedural rules affecting the collection and use of physical evidence in a court of law, with emphasis upon court opinions defining search and seizure and admissibility of evidence. Court opinions are illustrated through the introduction of relevant case studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Prerequisites: MFSP 559S [Min Grade: C]

MFSP 561S Techniques of Crime Scene Investigation 3.0 Credits

Introduction to the crime scene, with emphasis upon scene protection, means of documentation and evidence identification/collection. Chain-of-custody procedures, evidence submission/retention. Biohazard issued and legal considerations are addressed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 562S Arson and Explosive Analysis 3.0 Credits

Chemistry of fire and relevant terminology for fire scene investigation. Points of origin, detection of accelerants, collection preservation of arson evidence, flammable residues are addressed. Introduction to the science of explosives, review of the collection and analysis of explosive residues/debris. Case students and techniques used in arson/explosion scene reconstruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: (MFSP 550S [Min Grade: C] and MFSP 552S [Min Grade: C] and MFSP 556S [Min Grade: C] and MFSP 560S [Min Grade: C])

MFSP 563S Latent Fingerprint Analysis 3.0 Credits

This course reviews the fundamental principles of fingerprinting, with discussion of the history, means of fingerprint classification, and the utilization of Automated Fingerprint Identification Systems. Techniques utilized in the development of fingerprints at the crime scene and fingerprint preservation are addressed, as are relevant case studies and probability analysis applications.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 565S Firearms and Tool Mark Analysis 3.0 Credits

The study of class and individualizing characteristics of surface features of inanimate objects and their impressions. The course will examine firearms analysis, including bullet and cartridge comparisons, analysis of gunpowder residues, and the collection and preservation of such evidence. Presentation of such evidence in a court room setting is addressed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 566S Techniques of interview and interrogation 3.0 Credits

The current principles used in the art of interviewing and interrogation are examined and discussed. The most popular principles and schools of thought on the topics are presented to provide students with a multifaceted background. The polygraph and criminal personality profiling are covered.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 567S Basic Techniques for the Analysis of Biomolecules 3.0 Credits

This course introduces students to basic laboratory techniques used in the analysis of biomolecules. Lectures will reinforce students' understanding of the biochemistry of the major classes of macromolecules, techniques used in their analysis, and applications of those techniques with some emphasis on forensic applications. In addition, students will gain hands-on experience with molecular techniques used to quantify and characterize DNA and proteins.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 568S Vehicle Accident Reconstruction and Analysis 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 569S Footwear and Tire Track Analysis 3.0 Credits

Utilization of the study of class individualizing characteristics of surface features as applied to footwear patterns and tire track impressions. means of documentation, recovery and analysis as they pertain to the totality of the crime scene are emphasized utilizing relevant studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 570S Nuclear/Biological/Chemical Terrorism 3.0 Credits

Identification of and historical precedents for nuclear, biological and chemical agents utilized as terrorist weapons are examined and discussed, along with the development and current accessibility of nuclear weapons for terrorist purposes. Monitoring/detection of equipment/personnel and protective equipment are addressed. The multi-agency concept in responding to terrorist incidents is examined as are the international implications.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 571S Bloodstain Pattern Analysis 3.0 Credits

Provides a background in the terminology, pattern recognition, and physical principles involved in bloodstain analysis. Documentation and proper collection of stain samples are covered along with the ability to accurately reconstruct the events that occur at a crime scene involving bloodshed. There will be discussion/application of contemporary serologic techniques to case studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 572S Forensic Research Project I 3.0 Credits

This is the first of a three-part course series representing a progression in fulfilling the research project requirement for graduation from the Master of Science in Forensic Science program. During this first course, students will actively begin their research. Weekly conferences with an advisor will assist students in troubleshooting any problems as they arise early in the project. It is anticipated that the research project will be well underway and that a large portion of the data necessary to complete the project will have been obtained by the completion of this first course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is FS.

MFSP 573S Forensic Research Project II 5.0 Credits

This is the second of a three-part course series representing a progression in fulfilling the research project requirement for graduation from the Master of Science in Forensic Science program. During this second course, students will complete all data collection and should have conducted a large proportion of their data analysis. Weekly conferences with an advisor will monitor student progress and mentor completion of this phase of the research project.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 572S [Min Grade: C]

MFSP 574S Forensic Research Paper 1.0 Credit

Will assist students in organizing, writing, and preparing research paper which represents the culmination of an original research project in the forensic and/or biomedical sciences, required for graduation from the MFS program.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 573S [Min Grade: C]

MFSP 575S Introduction to Criminal Law and Trial Process 3.0 Credits

Students learn the principles to substantive criminal law. After exploring preliminary issues such as: why we have criminal law; where the rules of criminal law come from; how to find the rules; and how the statutes containing the rules must be written; elements of all crimes are studied – actions, means, reasons, and causation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 576S Ethics for the Forensic Scientist 2.0 Credits

Ethics for the Forensic Scientist will cover the requirements and the implementation of the ethical behavior in the daily work place, legal system, and law enforcement.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 577S Genetics for the Forensic Scientist 2.0 Credits

This course provides an understanding of the fundamental concepts of genetic science with an emphasis on the molecular basis of genetic traits, patterns and mechanisms of inheritance of genetic traits including human diseases, and the analysis of gene frequencies in populations. Particular attention given to how the forensic scientist uses genetic information and probabilities of inheritance in the identification of individuals based on DNA evidence.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 578S Forensic Photography 3.0 Credits

Students will learn and apply principles of photography in both the film and digital form. Within the field of forensic science, the use and understanding of photography is essential. The areas of aerial, underwater and macro photography as used to document and present criminal investigations are complex and complicated. A full understanding of light and photographic equipment is accomplished through practical exercises.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 579S Forensic Microbiology 2.0 Credits

This lecture based course introduces various aspects of the emerging field of microbiology. The first section will cover basic virology, bacteriology, fungal and protozoa. The second section will focus on the most important organisms and toxins for biocrimes and bioterrorism. Lastly, modern methodology in forensic microbiology will be discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 580S Principles of Immunology 2.0 Credits

This lecture addresses the immune system. The first section will provide an overview of basic immunologic concepts, such as cellular and soluble components, their interaction and crucial methodology. The second part will discuss how the immune system reacts to specific challenges with a special focus on infectious disease.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 581S Human Osteology and Calcified Tissue Biology I 3.0 Credits

This course consists of the study of cartilage, bone, dental and other related tissues and the human skeletal system they comprise. Lectures and laboratories provide students with a detailed knowledge of the gross and microscopic structure of the human skeleton and the tissues interfacing directly with it throughout life.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 582S Human Osteology and Calcified Tissue Biology II 2.0 Credits

A direct continuation of MFSP-581S, this course continues the study of cartilage, bone, dental and other related tissues and the human skeletal system they comprise. Lectures and laboratories provide students with a detailed knowledge of the gross and microscopic structure of the human skeleton and the tissues interfacing directly with it throughout life.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 581S [Min Grade: C]

MFSP 583S The Autopsy in Clinical Forensic Medicine 2.0 Credits

This course will address the origins of the autopsy, its historical and contemporary importance in medical practice, and its use both as a means of medical quality control and for facilitating medico-legal death investigation. Systemic anatomy/pathology, relevant autopsy techniques and the “virtual autopsy” will be highlighted.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 554S [Min Grade: C]

MFSP 584S Introduction to Forensic Radiology 2.0 Credits

Course provides a foundation of the history of radiology and basic technological advancements within the field. Subsequent lectures will address radiologic approaches to the assessment of child abuse, elder abuse and various types of inflicted trauma. Applications to human identification challenges and other forensic concerns will be presented.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 552S [Min Grade: C] and (MFSP 581S [Min Grade: C] and MFSP 582S [Min Grade: C] or FCA 507S [Min Grade: C] and FCA 508S [Min Grade: C])

MFSP 585S Clinical Forensic Emergency Medicine and Traumatology 2.0 Credits

This course bridges forensic techniques and knowledge to the care of living patients. Lectures and skills sessions will provide students with knowledge about abuse and injury as well as the forensic considerations of these patients when caring for them in the emergency department/trauma center. The course will also review the presentation and management of the trauma patient in the resuscitation area.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 586S Introduction to Forensic Pediatrics 3.0 Credits

Introductory lectures will focus upon general pediatrics, neonatal and infant assessment and normal child development. Subsequent topics will address the evaluation, treatment and prevention of child abuse and neglect, with emphasis upon diagnosis of inflicted trauma, sexual abuse, psychological abuse, medical neglect and Munchausen by proxy.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 587S Introduction to Forensic Psychology 3.0 Credits

Initial lectures will address clinical psychiatry foundations, its history and recent neurological, biochemical and pharmacologic innovations. Subsequent topic areas will focus upon competency to stand trial issues, defenses based on psychiatric illnesses, approaches to sentencing recommendations, risk assessment and management of repeat offenders and assessment of the learning disabled offender.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 588S Special Topics in Cell Biology 2.0 Credits

This course covers special topics in cell biology by student presentations and discussions of journal articles covering current research in the field. In addition to presentations, students will write a paper reviewing one of the topics discussed during the course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 589S Forensic DNA Analysis 3.0 Credits

This course combines scientific background with hands-on technical training for DNA analysis in the forensic context. Lectures will cover the science underlying techniques employing DNA. Through laboratory work, students will familiarize themselves with techniques essential for modern forensic science, such as DNA isolation, restriction analysis, hybridization, RFLP and PCR.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 567S [Min Grade: C]

MFSP 590S Homicide Investigation 3.0 Credits

This course examines, discusses and reviews the protocols and methodologies of investigation of the most serious of all crimes. The student will learn the tactics, procedures and forensic techniques involved in a competent, professional and scientific death scene investigation involving the manner, mode and course of death.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 591S Criminal Investigative Analysis 3.0 Credits

The course will review the nature of criminal behavior and the factors that tend to lead to the common behaviors that can be profiled. Profiles will be developed and applied to a wide variety of violent crimes including murder, rape, and arson. The organized and disorganized patterned behavior of serial offenders will be examined.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 592S Forensic Graduate Seminar 1.5 Credit

This course is designed to have multiple working professionals within the forensic science disciplines make formal presentations on timely topics of interest to the student body. During the second half of the course, the students are required to research topics of current interest within the forensic sciences and give a formal presentation to the student body. Presentations include PowerPoint and poster format.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 593S Cyber Crime 3.0 Credits

Principles of handwriting analysis, printing, and duplication procedures, with discussion of paper manufacture, fiber analysis, and techniques utilized to assess document alterations will be covered. Discussion will cover computer technology, principal means of cyber crime and identity theft, and techniques for detection and prevention of the same.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 599 Special Topics 1.0-6.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MFSP 599S Special Topics 10.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 999S Special Topics 1.0-6.0 Credit

Special Topics in Forensic Science.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Master of Science in Drexel Pathway to Medical School

55.0 - 64.0 semester credits

About the Program

After successful completion of the Certificate in Drexel Pathway to Medical School program, some students may decide to pursue a Master of Science degree.

The following course list indicates the two portions of the program: the initial certificate requirements, as well as the following 27.0 credits required to be awarded an MS in Drexel Pathway to Medical School.

Required Courses

Summer Enrichment Program

DPMS 500S	Medical Science Preparation	1.0
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Fall Semester

IMSP 520S	Medical Physiology I	3.5
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IMSP 512S	Medical Biochemistry	8.0
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PHRM 512S	Graduate Pharmacology	3.0
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Select one of the following, depending on Track:		3.0-6.0
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MSPP 404S	Concepts in Science and Verbal Reasoning I (Track I students)	
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IMSP 570S	Medical Immunology (Track II students)	
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Spring Semester

IMSP 503S	Medicine and Society II	2.0
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MSPP 513S	Special Topics in Anatomy	4.0
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IMSP 521S	Medical Physiology II	3.5
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MSPP 405S	Concepts in Science and Verbal Reasoning II (For Track I students)	6.0
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Total Credits		34.0-37.0
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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:

Required Courses

Summer Research Project

MSPP 550S	Research Project	2.0
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Fall Semester

IMSP 502S	Medicine and Society I	3.0
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IMSP 540S	Cell Biology & Microanatomy I	5.0
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IMSP 550S	Medical Nutrition	1.0
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IMSP 570S	Medical Immunology (For letter grade)	3.0
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Spring Semester

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

Select one of the following:		2.0
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MSPP 505S	Lab Tech in Bioch & Molec Biol (Offered in fall)	
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MMSP 510S	Lab Tech In Bioc & Molec Biol (Offered in spring)	
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Total Credits		27.0
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Master of Science in Drug Discovery and Development

Master of Science: 38.0 semester credits

About the Program

The MS in Drug Discovery and Development program 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 and 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 (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms.aspx>) page.

Admission Requirements

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. Students must fulfill all requirements for consideration as defined by the Drexel University College of Medicine Biomedical Graduate Education Committee:

- 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, 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), or IELTS.

Students applying to the program will be expected to have undergraduate experience in chemistry, cell biology, biochemistry, and mathematics--

including, at a minimum--two semesters each of inorganic chemistry, organic chemistry, physics, calculus and biology.

Visit Drexel University's Graduate Admissions (<http://www.drexel.edu/grad/programs/ducom>) site for additional information regarding specific requirements for applying to the College of Medicine as well as important application dates.

For additional information on how to apply, visit Drexel's Admissions page for Biomedical Graduate Studies (<http://www.drexel.edu/grad/programs/ducom/apply>).

Degree Requirements

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

IDPT 500S	Responsible Conduct of Research	2.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
or IDPT 501S	Biostatistics I	
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	Research in Drug Discovery and Development	4.0
PHGY 503S	GRADUATE PHYSIOLOGY	4.0
PHRM 502S	Current Topics i Pharm & Phys	1.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 517S	Advanced Topics in Pharmacology	1.0
Electives *		14.0

Elective Options

MIIM 521S	Biotechniques I
MIIM 524S	Vaccines and Vaccine Development
MIIM 530S	Fundamentals of Molecular Medicine I
MIIM 531S	Fundamentals of Molecular Medicine II
MLAS 536S	Animal Models for Biomedical Research
NEUR 508S	Graduate Neuroscience I
MIIM 508S	Immunology I
BIOC 510S	Cancer Biology
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG
PHRM 503S	Pharm & Phys 1st Lab Rotation
PHRM 507S	Prin of Neuropharmacology
PHRM 518S	New Frontiers in Therapy
PHRM 519S	Methods in Biomedical Research
Quarter Elective Course Options (must be approved by advisor)	
BIO 631	Bioinformatics I
MGMT 685	Implementing Strategies Using Project Teams
MGMT 910	Readings in Strategic Management
PROJ 501	Introduction to Project Management
PROJ 535	International Project Management
PBHL 530	Principles of Epidemiology
BMES 604	Pharmacogenomics
MGMT 940	Seminar in Organizational Behavior

ORGB 625 Leadership and Professional Development

Total Credits

38.0

* Courses that are not listed above may be taken as electives only with the approval of the program director.

Courses

PHRM 502S Current Topics i Pharm & Phys 1.0 Credit

Current topics in experimental pharmacology are presented via a journal club alternating with research presentations. In addition to active student participation, all members of the department of pharmacology and physiology (research assistants, postdoctoral fellows and faculty) participate.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

PHRM 503S Pharm & Phys 1st Lab Rotation 4.0 Credits

First rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 504S Pharm & Phys 2nd Lab Rotation 4.0 Credits

Second rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 505S Pharm & Phys 3rd Lab Rotation 4.0 Credits

Third rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 507S Prin of Neuropharmacology 3.0 Credits

This course covers basic concepts in Neuropharmacology, all of the major neurotransmitter systems, behavioral pharmacology and addition, approaches to molecular and cellular physiology including photoactivated biomolecules, electrophysiology, phosphorylation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 512S Graduate Pharmacology 3.0 Credits

This team taught course provides a basic knowledge of the pharmacologic mechanisms of action, effects on organ systems, routes of administration, pharmacokinetics, therapeutic uses, adverse reactions, contraindications, and drug interactions of drugs.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 516S Advanced Topics in Physiology 1.0 Credit

PHRM516S is presented in several formats throughout the semester to discuss cellular physiology, neurophysiology, muscle physiology, cardiovascular physiology, pulmonary physiology, gastrointestinal physiology, endocrinology, and renal physiology. These formats include review of past scientific findings that led to the current understanding of a physiological principle, journal club style format, self-directed problem sheets, development of a working model based on past and present scientific knowledge, and point/counter-point discussions where students debate pros and cons of a controversy in physiology.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Corequisite: PHGY 503S

PHRM 517S Advanced Topics in Pharmacology 1.0 Credit

This course will expand upon the Graduate Pharmacology course for graduate students enrolled in Graduate Pharmacology 512S. The intent is to provide more in-depth coverage of selected topics that will be beneficial to students pursuing a career where pharmacology is a principle component of training, education and/or employment.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Corequisite: PHRM 512S

PHRM 518S New Frontiers in Therapy 1.0 Credit

This course will provide a glimpse of what could revolutionize diagnosis and treatment with emphasis on personalized medicine. Scientific impact, technical challenges, and sociopolitical repercussions will be discussed. Students will be required to write a research proposal in NIH format and are expected to participate in peer review.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 519S Methods in Biomedical Research 1.0 Credit

A primary goal for this course is to introduce Pharmacology & Physiology graduate students to the breadth of techniques used within the Department. Students will gain insight into not only some of the technical aspects of a variety of methods, but also how to critically examine techniques in both their own research and the literature for strengths, weaknesses and limits. At the end of the course, students should have a greater appreciation for the modalities used outside of their own labs, and an understanding of how those technologies are moving biomedical research forward.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 520S Internship in Drug Discovery and Development 4.0 Credits

The Internship in Drug Discovery and Development provides the student with a unique opportunity to apply the principles and skills learned in the classroom and acquire valuable professional experience and critical insight in a specific field. The internship is integrated into the curriculum such that it complements classroom activities and permits the student to explore an area of interest that they may ultimately pursue as a career path. Students are paired with experienced professionals who supervise their work and act as mentors and advisors. Internships can be arranged with an extensive network of pharmaceutical corporations, biotechnology companies, foundations and universities in the region as well as Drexel University itself.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: PHRM 512S [Min Grade: C] and PHGY 503S [Min Grade: C] and PHRM 525S [Min Grade: C]

PHRM 521S Intensive Internship in Drug Discovery and Development 9.0 Credits

The Intensive Internship in Drug Discovery and Development provides the student with a unique opportunity to apply the principles and skills learned in the classroom and acquire valuable professional experience and critical insight in a specific field. The internship is integrated into the curriculum such that it complements classroom activities and permits the student to explore an area of interest that they may ultimately pursue as a career path. Students are paired with experienced professionals who supervise their work and act as mentors and advisors. Internships can be arranged with an extensive network of pharmaceutical corporations, biotechnology companies, foundations and universities in the region as well as Drexel University itself.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: PHRM 512S [Min Grade: C] and PHGY 503S [Min Grade: C] and PHRM 525S [Min Grade: C]

PHRM 525S Drug Discovery and Development I 3.0 Credits

This course, the first of two, will provide in-depth exposure to the concepts and processes involved in drug discovery and development as practiced in the biopharmaceutical industry cover all facets from target identification through to the submission of the investigational New Drug Application (IND). Current unmet medical needs and case histories from difference therapeutic areas will be reviewed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 526S Drug Discovery and Development II 3.0 Credits

This course will provide in-depth exposure to the concepts and processes involved in drug discovery and development as practiced in the biopharmaceutical industry. It will follow the first course (Drug Discovery and Development I) and will cover all aspects from roval process to the submission of the NDA to regulatory approval and post-marketing surveillance.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: PHRM 525S [Min Grade: B]

PHRM 600S Pharmacology Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department, Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

PHRM 602S RESEARCH METHODS IN PHARMACOLOGY 2.0 Credits

A research course in which the student participates in several research projects under the direction of different staff members in order to become familiar with the specific areas of expertise of the faculty. This course emphasizes not only experimental methods but also the conceptual bases for investigating current problems in pharmacology.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 605S Research in Drug Discovery and Development 4.0 Credits

This course is designed to provide opportunities for the student to pursue research in the area of drug discovery and development. This can be done either in an academic or pharmaceutical laboratory under the supervision of a mentor. An alternative or an additional aspect can be the conduct of research for this thesis that is not laboratory research but library research based on an approved topic for the thesis requirement. Both alternatives, laboratory or library research must be approved by the course directors.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 751S MEDICAL PHARMACOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 823S CARDIOVASCULAR PHARMACOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 895S PHARMACOLOGY RESEARCH 0.0 Credits

Repeat Status: Not repeatable for credit

PHRM 9092S PHARMACOLOGY - ELECTIVE - 2WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 9094S PHARMACOLOGY -ELECTIVE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

PHRM 9750S RESEARCH-PHARMACOLOGY-16 wks 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 9754S PHARMACOLOGY RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 999S Special Topics in Pharmacology & Physiology 1.0-4.0 Credit

This is a special topics course that will focus on graduate level topics in the area of Pharmacology & Physiology. The exact content, readings, and grading will be determined by the professor on a course by course basis.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 3 times for 16 credits

Master of Science in Forensic Science

About the Program

Master of Science: 60.5 semester credits

The School of Biomedical Sciences and Professional Studies offers the Master of Science in Forensic Science. The MS in Forensic Science is designed to provide students with a solid foundation within the forensic sciences, while at the same time encouraging growth and leadership in new and emerging applications within the field. The program offers students the opportunity to concentrate within one of three major areas of forensic science: criminalistics; molecular biology; or clinical forensic medicine.

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 program provides an 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 program progresses 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 (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/ForensicScienceProfessionalPrograms/MasterofForensicScienceMFSPProgram.aspx>) web page.

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 2.5 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 \$65.00 fee
- Official transcripts for each college or university where coursework was attempted or taken
- Three letters of evaluation
- Official MCAT and/or GRE test scores

Contact information

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

Ms. Thelicia Hill
215.762.4674
thelicia.hill@drexelmed.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

Degree Requirements

Requirements

Year I: Fall Semester

IHS 999S	Special Topics (Introduction to Scientific Writing)	2.0
MFSP 550S	Biological Aspects of the Forensic Sciences	2.0
MFSP 551S	Human Function	3.0
MFSP 552S	Structure of the Human Body	3.0
MFSP 553S	Human Structure Lab	1.0
MFSP 561S	Techniques of Crime Scene Investigation	3.0
MFSP 575S	Introduction to Criminal Law and Trial Process	3.0
MFSP 581S	Human Osteology and Calcified Tissue Biology I	3.0

Year I: Spring Semester

MFSP 554S	Principles of Forensic Pathology	4.0
MFSP 556S	Forensic Anthropology and Topics in Human Identification	3.0
MFSP 557S	Drug Chemistry	2.0
MFSP 558S	Instrumental Analysis	2.0
MFSP 559S	Criminal Law and the Court: Use of Evidence I	3.5
MFSP 560S	Criminal Law and the Court: Use of Evidence II	3.5
MFSP 582S	Human Osteology and Calcified Tissue Biology II	3.0

Year I: Summer Semester

MFSP 555S	Forensic Sciences Summer Practicum	3.0
MFSP 572S	Forensic Research Project I	3.0
MFSP 576S	Ethics for the Forensic Scientist	3.0
Select 3 credits from the following electives:		3.0

MFSP 569S Footwear and Tire Track Analysis

MFSP 578S Forensic Photography

MFSP 593S Cyber Crime

Year 2, Fall Semester

MFSP 592S	Forensic Graduate Seminar	1.5
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MFSP 572S	Forensic Research Project I	3.0
Select four credits of electives. Suggested electives include:		4.0
MFSP 578S	Forensic Photography	
MFSP 593S	Cyber Crime	

Concentration Electives

Students select six credits from the categories below. Not all credits must be from the same concentration. 6.0

Criminalistic Concentration

MFSP 562S	Arson and Explosive Analysis	
MFSP 563S	Latent Fingerprint Analysis	
MFSP 565S	Firearms and Tool Mark Analysis	
MFSP 566S	Techniques of interview and interrogation	
MFSP 568S	Vehicle Accident Reconstruction and Analysis	
MFSP 569S	Footwear and Tire Track Analysis	
MFSP 570S	Nuclear/Biological/Chemical Terrorism	
MFSP 571S	Bloodstain Pattern Analysis	
MFSP 590S	Homicide Investigation	
MFSP 591S	Criminal Investigative Analysis I	

Molecular Biology Concentration

MFSP 567S	Basic Techniques for the Analysis of Biomolecules	
MFSP 577S	Genetics for the Forensic Scientist	
MFSP 579S	Forensic Microbiology	
MFSP 580S	Principles of Immunology	
MFSP 588S	Special Topics in Cell Biology	
MFSP 589S	Forensic DNA Analysis	

Clinical Forensic Science Concentration

MFSP 583S	The Autopsy in Clinical Forensic Medicine	
MFSP 584S	Introduction to Forensic Radiology	
MFSP 585S	Clinical Forensic Emergency Medicine and Traumatology	
MFSP 586S	Introduction to Forensic Pediatrics	
MFSP 587S	Introduction to Forensic Psychology	

Total Credits **67.5**

Courses

MFSP 550S Biological Aspects of the Forensic Sciences 2.0 Credits

This course provides an overview of the biological science of forensic pathology, toxicology, anthropology, serological techniques and molecular biology; methods of human identification, time, cause and manner of death; study of the pathology of trauma, sudden and unexpected death; child abuse; acquisition, identification and quantitation of drugs from biological materials.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 551S Human Function 3.0 Credits

This course is designed to provide students with an understanding of the functions and processes required to maintain the stable internal environment required for normal cell function. Several key themes will be examined throughout the course, including homeostasis and various feedback mechanisms. Each organ system of the body is examined from a physiological standpoint, building upon concepts illustrating how these systems are functionally integrated. This course is closely coordinated with MFSP-552S (Structure of the Human Body), to facilitate an understanding of physiology as it relates to human anatomy.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 552S Structure of the Human Body 3.0 Credits

This course is designed to provide students with a solid basis in human anatomy. The structural basis of the body's organ systems are examined and discussed – from the cellular to the tissue to the gross level. This course is closely coordinated with MFSP-551S (Human Function), enabling students who simultaneously matriculate into both to enjoy an integrated presentation of the structure and function of the human body. Anatomic complexes and key structural details of relevance to forensic science are discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 553S Human Structure Lab 1.0 Credit

The Human Structure lab enables students taking MFSP-522S (Structure of the Human Body) to examine human anatomical specimens including gross anatomical dissections and microscopic images. Structures of particular importance to the forensic professional are emphasized.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 554S Principles of Forensic Pathology 4.0 Credits

This course is a review of forensic pathology; human identification, time of death, injury causation and analysis, and determination of cause and manner of death. Includes pathology of natural diseases, application of related fields such as forensic toxicology, anthropology and odontology. Integration of scene evident to allow for scene reconstruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 555S Forensic Sciences Summer Practicum 3.0 Credits

The practicum will be conducted at a variety of sites where students will be able to get “hand's on” exposure to a broad variety of forensic and/or clinical medicine venues in which forensic science principles are applied.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 556S Forensic Anthropology and Topics in Human Identification 3.0 Credits

Discussion of human osteological remains for the purpose of distinguishing human from non-human skeletal identification, injury causation, time of death, and natural disease. Excavation techniques, site reconstruction, taphonomy, and human paleopathology are introduced.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Prerequisites: (MFSP 581S [Min Grade: C] and MFSP 582S [Min Grade: C]) or (FCA 507S [Min Grade: C] and FCA 508S [Min Grade: C])

MFSP 557S Drug Chemistry 2.0 Credits

Review of the chemistry, biology and pharmacodynamic principles associated with forensic toxicology, with emphasis upon the forensic aspects of alcohol (ethanol), illicit drugs and selected prescription/over-the-counter pharmaceuticals. Separation techniques, means of drug identification and qualitative vs. confirmatory quantitative analytical procedures are discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 558S Instrumental Analysis 2.0 Credits

A continuation of MFSP 557S (Drug Chemistry). Review of the chemistry, biology and pharmacodynamic principles associated with forensic toxicology, with emphasis upon the forensic aspects of alcohol (ethanol), illicit drugs and selected prescription/over-the-counter pharmaceuticals. Separation techniques, means of drug identification and qualitative vs. confirmatory quantitative analytical procedures are discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Prerequisites: MFSP 557S [Min Grade: C]

MFSP 559S Criminal Law and the Court: Use of Evidence I 3.5 Credits

A discussion of those procedural rules affecting the collection and use of physical evidence in a court of law, with emphasis upon court opinions defining search and seizure and admissibility of evidence. Court opinions are illustrated through the introduction of relevant case studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 575S [Min Grade: C]

MFSP 560S Criminal Law and the Court: Use of Evidence II 3.5 Credits

A continuation of MFSP 559S. A discussion of those procedural rules affecting the collection and use of physical evidence in a court of law, with emphasis upon court opinions defining search and seizure and admissibility of evidence. Court opinions are illustrated through the introduction of relevant case studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Prerequisites: MFSP 559S [Min Grade: C]

MFSP 561S Techniques of Crime Scene Investigation 3.0 Credits

Introduction to the crime scene, with emphasis upon scene protection, means of documentation and evidence identification/collection. Chain-of-custody procedures, evidence submission/retention. Biohazard issued and legal considerations are addressed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 562S Arson and Explosive Analysis 3.0 Credits

Chemistry of fire and relevant terminology for fire scene investigation. Points of origin, detection of accelerants, collection preservation of arson evidence, flammable residues are addressed. Introduction to the science of explosives, review of the collection and analysis of explosive residues/debris. Case students and techniques used in arson/explosion scene reconstruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: (MFSP 550S [Min Grade: C] and MFSP 552S [Min Grade: C] and MFSP 556S [Min Grade: C] and MFSP 560S [Min Grade: C])

MFSP 563S Latent Fingerprint Analysis 3.0 Credits

This course reviews the fundamental principles of fingerprinting, with discussion of the history, means of fingerprint classification, and the utilization of Automated Fingerprint Identification Systems. Techniques utilized in the development of fingerprints at the crime scene and fingerprint preservation are addressed, as are relevant case studies and probability analysis applications.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 565S Firearms and Tool Mark Analysis 3.0 Credits

The study of class and individualizing characteristics of surface features of inanimate objects and their impressions. The course will examine firearms analysis, including bullet and cartridge comparisons, analysis of gunpowder residues, and the collection and preservation of such evidence. Presentation of such evidence in a court room setting is addressed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 566S Techniques of interview and interrogation 3.0 Credits

The current principles used in the art of interviewing and interrogation are examined and discussed. The most popular principles and schools of thought on the topics are presented to provide students with a multifaceted background. The polygraph and criminal personality profiling are covered.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 567S Basic Techniques for the Analysis of Biomolecules 3.0 Credits

This course introduces students to basic laboratory techniques used in the analysis of biomolecules. Lectures will reinforce students' understanding of the biochemistry of the major classes of macromolecules, techniques used in their analysis, and applications of those techniques with some emphasis on forensic applications. In addition, students will gain hands-on experience with molecular techniques used to quantify and characterize DNA and proteins.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 568S Vehicle Accident Reconstruction and Analysis 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 569S Footwear and Tire Track Analysis 3.0 Credits

Utilization of the study of class individualizing characteristics of surface features as applied to footwear patterns and tire track impressions. means of documentation, recovery and analysis as they pertain to the totality of the crime scene are emphasized utilizing relevant studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 570S Nuclear/Biological/Chemical Terrorism 3.0 Credits

Identification of and historical precedents for nuclear, biological and chemical agents utilized as terrorist weapons are examined and discussed, along with the development and current accessibility of nuclear weapons for terrorist purposes. Monitoring/detection of equipment/personnel and protective equipment are addressed. The multi-agency concept in responding to terrorist incidents is examined as are the international implications.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 571S Bloodstain Pattern Analysis 3.0 Credits

Provides a background in the terminology, pattern recognition, and physical principles involved in bloodstain analysis. Documentation and proper collection of stain samples are covered along with the ability to accurately reconstruct the events that occur at a crime scene involving bloodshed. There will be discussion/application of contemporary serologic techniques to case studies.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 572S Forensic Research Project I 3.0 Credits

This is the first of a three-part course series representing a progression in fulfilling the research project requirement for graduation from the Master of Science in Forensic Science program. During this first course, students will actively begin their research. Weekly conferences with an advisor will assist students in troubleshooting any problems as they arise early in the project. It is anticipated that the research project will be well underway and that a large portion of the data necessary to complete the project will have been obtained by the completion of this first course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is FS.

MFSP 573S Forensic Research Project II 5.0 Credits

This is the second of a three-part course series representing a progression in fulfilling the research project requirement for graduation from the Master of Science in Forensic Science program. During this second course, students will complete all data collection and should have conducted a large proportion of their data analysis. Weekly conferences with an advisor will monitor student progress and mentor completion of this phase of the research project.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 572S [Min Grade: C]

MFSP 574S Forensic Research Paper 1.0 Credit

Will assist students in organizing, writing, and preparing research paper which represents the culmination of an original research project in the forensic and/or biomedical sciences, required for graduation from the MFS program.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 573S [Min Grade: C]

MFSP 575S Introduction to Criminal Law and Trial Process 3.0 Credits

Students learn the principles to substantive criminal law. After exploring preliminary issues such as: why we have criminal law; where the rules of criminal law come from; how to find the rules; and how the statutes containing the rules must be written; elements of all crimes are studied – actions, means, reasons, and causation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 576S Ethics for the Forensic Scientist 2.0 Credits

Ethics for the Forensic Scientist will cover the requirements and the implementation of the ethical behavior in the daily work place, legal system, and law enforcement.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 577S Genetics for the Forensic Scientist 2.0 Credits

This course provides an understanding of the fundamental concepts of genetic science with an emphasis on the molecular basis of genetic traits, patterns and mechanisms of inheritance of genetic traits including human diseases, and the analysis of gene frequencies in populations. Particular attention given to how the forensic scientist uses genetic information and probabilities of inheritance in the identification of individuals based on DNA evidence.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 578S Forensic Photography 3.0 Credits

Students will learn and apply principles of photography in both the film and digital form. Within the field of forensic science, the use and understanding of photography is essential. The areas of aerial, underwater and macro photography as used to document and present criminal investigations are complex and complicated. A full understanding of light and photographic equipment is accomplished through practical exercises.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 579S Forensic Microbiology 2.0 Credits

This lecture based course introduces various aspects of the emerging field of microbiology. The first section will cover basic virology, bacteriology, fungal and protozoa. The second section will focus on the most important organisms and toxins for biocrimes and bioterrorism. Lastly, modern methodology in forensic microbiology will be discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 580S Principles of Immunology 2.0 Credits

This lecture addresses the immune system. The first section will provide an overview of basic immunologic concepts, such as cellular and soluble components, their interaction and crucial methodology. The second part will discuss how the immune system reacts to specific challenges with a special focus on infectious disease.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 581S Human Osteology and Calcified Tissue Biology I 3.0 Credits

This course consists of the study of cartilage, bone, dental and other related tissues and the human skeletal system they comprise. Lectures and laboratories provide students with a detailed knowledge of the gross and microscopic structure of the human skeleton and the tissues interfacing directly with it throughout life.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 582S Human Osteology and Calcified Tissue Biology II 2.0 Credits

A direct continuation of MFSP-581S, this course continues the study of cartilage, bone, dental and other related tissues and the human skeletal system they comprise. Lectures and laboratories provide students with a detailed knowledge of the gross and microscopic structure of the human skeleton and the tissues interfacing directly with it throughout life.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 581S [Min Grade: C]

MFSP 583S The Autopsy in Clinical Forensic Medicine 2.0 Credits

This course will address the origins of the autopsy, its historical and contemporary importance in medical practice, and its use both as a means of medical quality control and for facilitating medico-legal death investigation. Systemic anatomy/pathology, relevant autopsy techniques and the "virtual autopsy" will be highlighted.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 554S [Min Grade: C]

MFSP 584S Introduction to Forensic Radiology 2.0 Credits

Course provides a foundation of the history of radiology and basic technological advancements within the field. Subsequent lectures will address radiologic approaches to the assessment of child abuse, elder abuse and various types of inflicted trauma. Applications to human identification challenges and other forensic concerns will be presented.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 552S [Min Grade: C] and (MFSP 581S [Min Grade: C] and MFSP 582S [Min Grade: C] or FCA 507S [Min Grade: C] and FCA 508S [Min Grade: C])

MFSP 585S Clinical Forensic Emergency Medicine and Traumatology 2.0 Credits

This course bridges forensic techniques and knowledge to the care of living patients. Lectures and skills sessions will provide students with knowledge about abuse and injury as well as the forensic considerations of these patients when caring for them in the emergency department/trauma center. The course will also review the presentation and management of the trauma patient in the resuscitation area.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 586S Introduction to Forensic Pediatrics 3.0 Credits

Introductory lectures will focus upon general pediatrics, neonatal and infant assessment and normal child development. Subsequent topics will address the evaluation, treatment and prevention of child abuse and neglect, with emphasis upon diagnosis of inflicted trauma, sexual abuse, psychological abuse, medical neglect and Munchausen by proxy.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 587S Introduction to Forensic Psychology 3.0 Credits

Initial lectures will address clinical psychiatry foundations, its history and recent neurological, biochemical and pharmacologic innovations. Subsequent topic areas will focus upon competency to stand trial issues, defenses based on psychiatric illnesses, approaches to sentencing recommendations, risk assessment and management of repeat offenders and assessment of the learning disabled offender.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 588S Special Topics in Cell Biology 2.0 Credits

This course covers special topics in cell biology by student presentations and discussions of journal articles covering current research in the field. In addition to presentations, students will write a paper reviewing one of the topics discussed during the course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 589S Forensic DNA Analysis 3.0 Credits

This course combines scientific background with hands-on technical training for DNA analysis in the forensic context. Lectures will cover the science underlying techniques employing DNA. Through laboratory work, students will familiarize themselves with techniques essential for modern forensic science, such as DNA isolation, restriction analysis, hybridization, RFLP and PCR.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MFSP 567S [Min Grade: C]

MFSP 590S Homicide Investigation 3.0 Credits

This course examines, discusses and reviews the protocols and methodologies of investigation of the most serious of all crimes. The student will learn the tactics, procedures and forensic techniques involved in a competent, professional and scientific death scene investigation involving the manner, mode and course of death.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 591S Criminal Investigative Analysis 3.0 Credits

The course will review the nature of criminal behavior and the factors that tend to lead to the common behaviors that can be profiled. Profiles will be developed and applied to a wide variety of violent crimes including murder, rape, and arson. The organized and disorganized patterned behavior of serial offenders will be examined.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

MFSP 592S Forensic Graduate Seminar 1.5 Credit

This course is designed to have multiple working professionals within the forensic science disciplines make formal presentations on timely topics of interest to the student body. During the second half of the course, the students are required to research topics of current interest within the forensic sciences and give a formal presentation to the student body. Presentations include PowerPoint and poster format.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 593S Cyber Crime 3.0 Credits

Principles of handwriting analysis, printing, and duplication procedures, with discussion of paper manufacture, fiber analysis, and techniques utilized to assess document alterations will be covered. Discussion will cover computer technology, principal means of cyber crime and identity theft, and techniques for detection and prevention of the same.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 599 Special Topics 1.0-6.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MFSP 599S Special Topics 10.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MFSP 999S Special Topics 1.0-6.0 Credit

Special Topics in Forensic Science.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CRSC or major is FS or major is IHS.

Master of Science in Histotechnology

Master of Science: 47.0 semester credits

About the Program

The School of Biomedical Sciences and Professional Studies offers the Master of Science in Histotechnology program. This one-year (12-month) program combines academic studies with a clinical practicum to prepare the students to perform complex tissue specimen preparations

in the histology laboratory. The program provides advanced training and is designed to enable graduates to work as highly qualified histotechnologists under the supervision of pathologists.

Coursework includes histology, biochemistry, advanced histotechnology, anatomy, physiology, microbiology, medical ethics, laboratory management and leadership skills. 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.

Program Accreditation

The *National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)* has established national standards for Histotechnology training programs. The standards include both didactic course work and clinical experiences necessary to properly educate a Histotechnologist. The Master of Histotechnology program at Drexel University College of Medicine is accredited by NAACLS. Visit the NAACLS (<http://www.naacls.org>) website for more information about the professional activities of this organization.

Professional Certification

The *American Society for Clinical Pathology Board of Certification (ASCP BOC)* has established a national certification program for Histotechnologists. Graduates of the Master of Histotechnology program are eligible to sit for the national certification examination for Histotechnology. Visit the ASCP BOC (<http://www.ascp.org/Board-of-Certification>) website to read more about the certification program and the professional activities of this organization.

Professional Affiliation

The *National Society for Histotechnology (NSH)* is a non-profit organization, committed to the advancement of Histotechnology, its practitioners and quality standards of practice through leadership, education and advocacy. Visit the NSH website to read more about the professional activities of this organization.

Career Opportunities

Histotechnologists are employed in community hospitals, academic centers such as medical schools and university hospitals, private pathology laboratories, medical research centers, government hospitals. Additional opportunities are available in clinical and industrial research, veterinary pathology, marine biology and forensic pathology.

For more information about this program, visit the College of Medicine's Master of Science in Histotechnology (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AlliedHealthProfessionPrograms/HistotechnologyProgram.aspx>) page.

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 includes 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 one of the program director's 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.

Candidates for admission must provide the following credentials:

- Completed application form
- Resume
- Official Transcripts from all schools attended or where coursework was attempted or taken
- Official General 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?

The application and supporting material must be received no later than the program deadline date.

For further information, contact:

Tina Rader
 Master of Histotechnology 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
 (215) 762-4113
 tina.rader@drexelmed.edu

Degree Requirements

Required Courses

MFSP 551S	Human Function	3.0
MFSP 552S	Structure of the Human Body	3.0
MFSP 553S	Human Structure Lab	1.0
MHPP 500S	Advanced Histotechnology	4.0
MHPP 502S	Histotechnology Capstone Project	3.0
MHPP 503S	Histotechnology Practicum	9.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
MSPA 540S	Histotechnology I	3.0
MSPA 560S	Medical Ethics	2.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPP 511S	Concepts in Bioch & Cell Biolo	4.0
Total Credits		47.0

Sample Plan of Study

First Year

Fall		Credits
MLAS 545S	Fundamentals of Histology	3.0
MSPA 520S	Medical Terminology	3.0
MSPA 540S	Histotechnology I	3.0

MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPP 511S	Concepts in Bioch & Cell Biolo	4.0
Term Credits		16.0

Spring

MFSP 551S	Human Function	3.0
MFSP 552S	Structure of the Human Body	3.0
MFSP 553S	Human Structure Lab	1.0
MHPP 500S	Advanced Histotechnology	4.0
MHPP 502S	Histotechnology Capstone Project	3.0
MSPA 580S	Medical Microbiology I	4.0
Term Credits		18.0

Summer

MHPP 503S	Histotechnology Practicum	9.0
MSPA 510S	Laboratory Management	2.0
MSPA 560S	Medical Ethics	2.0
Term Credits		13.0

Total Credit: 47.0

Courses

MHPP 500S Advanced Histotechnology 4.0 Credits

In depth study of routine and advanced techniques associated with the histology laboratory.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MSPA 540S

MHPP 501S Anatomy for Histotechnologists 4.0 Credits

Provides students with a comprehensive introduction to human gross anatomy. The structure of the human body is explained from a systematic standpoint with emphasis on how structures form complexes of clinical importance.

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MHPP 502S Histotechnology Capstone Project 3.0 Credits

This course will give students the opportunity to integrate the theory and the practical experiences from the previous semesters. Students will investigate a new technology technique or current issue involving histotechnology and apply the knowledge and skills developed in courses and practicum to produce a paper or technical project that supports their position. This course is the culmination of the programs courses and the practicum and will be considered the official written comprehensive examination.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MSPA 540S and MHPP 500S and MHPP 503S

MHPP 503S Histotechnology Practicum 9.0 Credits

The clinical Practicum is designed to allow the students to apply knowledge and techniques learned during their didactic courses in a clinical hospital setting. It allows the student the opportunity to perform routine as well as specialized histotechnology techniques under the supervision of a qualified histotechnologist.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: MSPA 540S and MSPA 520S and MSPA 590S and MLAS 545S and MHPP 500S and MHPP 501S and MSPA 581S and MHPP 502S

Master of Science in Immunology

Master of Science: 36.0 semester credits

About the Program

The MS in Immunology is designed to prepare students for careers in basic discovery, translational, and clinical research pertaining to infectious and inflammatory disease and other immunologic problems pursued in government, industry and academic environments.

The focus of the program will be to train participants in various aspects of research related to immunology and inflammatory disease, in particular, research and development relevant to new immunodiagnosics, immunotherapeutics, and vaccines to prevent and/or treat infectious diseases such as HIV/AIDS, hepatitis, influenza, malaria, and other viral, bacterial, parasitic, and fungal pathogens.

Special attention will be given to the study of:

- immunotherapeutic and vaccine target identification;
- immune response mechanisms;
- immunomodulators and immune response modifiers;
- vaccine discovery and development;
- immunologic redundancy; and
- innate and adaptive immune escape mechanisms.

Expertise in animal model development and use, basic discovery, and biological containment laboratories will also be emphasized.

The MS in Immunology encompasses two years of required and elective courses and a comprehensive research internship completed during the two-year training program. The internship will encompass three specific areas of research:

- the basic discovery of innate and adaptive immune response mechanisms;
- the translational research centered in therapeutic and prevention vaccine development or the development of immunomodulatory strategies; and
- the clinical immunology research arena.

The program is designed for applicants from a number of different academic and career backgrounds, allowing for flexibility for incoming students at a variety of levels. Most course work is offered in the late-afternoon or evenings. In addition to the standard pathway, students may complete their degree requirements in a more compact time frame, or

they may select a part-time pathway to permit the simultaneous pursuit of other activities.

Admission Requirements

For acceptance into the Master of Science in Immunology program, the applicant must have completed a four-year biology or chemistry-based BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

- # Official transcripts from all colleges and universities attended
- # A current Curriculum Vitae (C.V.) or resume
- # References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research and professional experience.

For additional information regarding application deadlines, the online application process, and specific requirements for applying to the College of Medicine, visit Drexel University's Graduate Admissions (<http://www.drexel.edu/grad/programs/ducom>) site.

Admission Requirements

For acceptance into the Master of Science in Immunology program, the applicant must have completed a four-year biology or chemistry-based BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

- Official transcripts from all colleges and universities attended
- A current *curriculum vitae* (CV) or resume

- References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research and professional experience.

For additional information regarding application deadlines, the online application process, and specific requirements for applying to the College of Medicine, visit Drexel University's Graduate Admissions (<http://www.drexel.edu/grad/programs/ducom/immunology>) site.

Degree Requirements

Courses encompass the fundamental requirements to establish a solid grounding in microbiology and infectious disease, immunology, biochemistry, genetics, and molecular biology.

Research experiences will form a large component of the training program, with the possibility of completing the degree with or without a thesis document.

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
MIIM 527S	Immunology, Immunopathology & Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	3.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fund. Mol. Med. III	2.0
MIIM 533S	Fundamentals in Molecular Medicine V	1.0
MIIM 534S	Fund. Molecular Med. VI	1.0
MIIM 606S	Micro & Immuno Seminar	1.0
MIIM 546S	Introduction to Immunology	2.0
MIIM 651S	Research Internship in Immunology	6.0
MIIM 654S	Clinical Correlations in Immunology	3.0

To complete the MS in Immunology degree, 36.0 credits must be accrued. Students may choose from a menu of additional electives, depending on their academic goals.

Possible Electives

MIIM 502S	Micro & Immuno. Journal Club
MIIM 521S	Biotechniques I
MIIM 522S	Biotechniques II
MIIM 524S	Vaccines and Vaccine Development
MIIM 525S	Principles of Biocontainment
MIIM 526S	Animal Models in Biotechnology

MIIM 527S	Immunology, Immunopathology & Infectious Diseases
MIIM 540S	Viruses and Viral Infections
MIIM 541S	Bacteria and Bacterial Infections
MIIM 542S	Mycology, Fungal Infections and Antibiotics
MIIM 543S	Parasitology and Parasitic Diseases
MIIM 555S	Molec. Mech. Of Micro. Path
MIIM 607S	IMMUNOLOGY II
MIIM 612S	MOLEC MECH OF VIRAL PATHOGENSI
MIIM 615S	EXPERIMENTAL THERAPEUTICS
MIIM 630S	Advanced Molecular Biology
MIIM 613S	Emerging Infectious Diseases

Total Credits

36.0

Courses

MIIM 500S MEDICAL MICROBIOLOGY 5.0 Credits

This course offers detailed discussion of immunology and all aspects of the major infectious diseases of bacterial, viral, parasitic and mycotic origins. The course, although designed for medical students, also accommodates graduate students, who will be required to complete additional assignments.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 501S MEDICAL IMMUNOLOGY 2.0-3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 502S Micro & Immuno. Journal Club 1.0 Credit

Faculty members rotate in directing this weekly session devoted to increasing the critical analysis skills of students, providing experience in oral presentation of data, increasing student awareness of various sources of literature, and exposing students to current areas of importance in microbiology and immunology. Recent topic themes have included T-cell immunoregulation, molecular virology, regulatory and safety requirements in microbiology research, lymphokines and cytokines, neuroendocrine immunology, bacteriocins, molecular biology of parasites, and regulation of humoral immune responses.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 9 times for 999 credits

MIIM 504S Micro. & Immuno. 1st Rotation 4.0 Credits

First laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 505S Micro. & Immuno. 2nd Rotation 4.0 Credits

Second laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 506S Micro. & Immuno. 3rd Rotation 4.0 Credits

Third laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 508S Immunology I 3.0 Credits

This is a graduate level introductory course that will cover basic principles of immunology. The format is a lecture series with student participation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 509S PRINCIPLES IN IMMUNOLOGY 2.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 510S CLINICAL IMMUNOLOGY 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 511S FUNDAMENTALS MED MICROBIOLOGY 2.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 512S Molecular Pathogenesis I 3.0 Credits

This course is designed to convey to graduate students basic concepts concerning the molecular mechanisms of disease caused by pathogenic microorganisms. The course will utilize information derived from in vitro tissue culture and in vivo animal model systems as well as studies performed in humans to enhance students understanding of diseases caused by bacteria, fungi, parasites and viruses. The immune response and other host defense mechanisms will also be examined as an integral part of this course. The course is designed to compliment the first year graduate core curriculum and will strive to develop analytical thought processes. The student will learn to identify gaps in knowledge, formulate important and experimentally approachable questions, and develop sound hypotheses to direct the generation of new scientific discoveries. The development of sound specific aims and experimental design will also be emphasized.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 513S MOLECULAR PATHOGENSIS II 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 521S Biotechniques I 2.0 Credits

This course will introduce the molecular, cellular and computational methods that underlie modern biotechnology, drug discovery and development. The strengths and limitations of the procedures will be considered, and their suitability for either a basic or industrial research setting will be evaluated.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 522S Biotechniques II 2.0 Credits

The course, along with the companion course Biotechniques I (MIIM 521S) will introduce the molecular, cellular and computational methods that underlie biotechnology, drug discovery and development. The strengths and limitations of the procedures will be considered, and their suitability for either a basic or industrial research setting will be evaluated.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 523S Molecular Virology 2.0 Credits

This course will provide a comprehensive overview of the molecular aspects of viral pathogenesis, using various host-virus interactions as models.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 524S Vaccines and Vaccine Development 3.0 Credits

This course will provide information pertaining to the history of vaccines, the principles of vaccine design, the concepts of induction of the immune protection, and the choice of vaccine types. Emphasis will be given to current and future methods for vaccine design, and approved tests for safety and efficacy. The concepts of prophylactic and therapeutic vaccines will be discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 525S Principles of Biocontainment 1.0 Credit

This course will provide an overview of the classification of biological hazards, and the principles of biocontainment, based upon these classifications. The course will further provide both conceptual and practical information regarding working with controlled agents, collection and storage of biohazardous materials, the practicalities of working in biocontainment facilities, and the design considerations for biocontainment in the laboratory and in the field.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 526S Animal Models in Biotechnology 1.0 Credit

The course will focus on the ethical and practical utilization of animal models in biomedical research, with emphasis given to their use in biomedical research. The course will discuss the history of animal research, the requirements for generating inbred animal lines, the development of transgenic models, and the utilization of disease-specific models. Emphasis will be given to experimental designs and the justification of animal models.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 527S Immunology, Immunopathology & Infectious Diseases 3.0 Credits

The course will provide the basic knowledge of immunity from the organism to the cellular level. The subject matter will focus upon how the immune system elicits protection against invasion by pathogenic organisms, and how these same responses may be damaging to the host.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 530S Fundamentals of Molecular Medicine I 2.0-3.0 Credits

The course, along with courses Fundamentals in Molecular Medicine III (MIIM-532) and Fundamentals in Molecular Medicine IV (MIIM-527) will provide an overview of key topics in biochemistry, molecular biology and genetics. The courses will serve as the vehicle to provide basic information central to the concepts of Molecular Medicine, and will be taught in the evenings to provide sufficient flexibility for enrollees currently employed in the biologically related fields.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 531S Fundamentals of Molecular Medicine II 2.0 Credits

The course, along with the companion Fundamentals in Molecular Medicine I (MIIM-530) will provide an overview of key topics in biochemistry, molecular biology and genetics. It will serve as an alternative to the Core Curriculum and will be offered only in the evenings, with preference given to enrollees in the Master of Science in Molecular Medicine. Emphasis will be placed on the areas that are the foundation of modern bioscience.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 532S Fund. Mol. Med. III 2.0 Credits

The course, along with courses Fundamentals in Molecular Medicine I (MIIM-530) and Fundamentals in Molecular Medicine II (MIIM-531) will provide an overview of key topics in biochemistry, molecular biology and genetics. The courses will serve as the vehicle to provide basic information central to the concepts of Molecular Medicine, and will be taught in the evenings to provide sufficient flexibility for enrollees currently employed in the biologically related fields.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 533S Fundamentals in Molecular Medicine V 1.0 Credit

The course will involve the reading, summary and criticism of a paper from the primary literature in a Journal Club format. Students will, in consultation with instructors teaching particular topics in the MIIM-531 Fundamentals of Molecular Medicine III course, choose a paper related to that topic and prepare an oral presentation that will be discussed in class. All students participating in the class will be expected to have read the paper and be prepared for detailed discussion.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 534S Fund. Molecular Med. VI 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 540S Viruses and Viral Infections 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of viruses and viral infections, introducing concepts that relate to viral structure, replication and infection. The important aspects of viral infection, pathology and treatment will be a focus of the lectures devoted to individual virus types. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 541S Bacteria and Bacterial Infections 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of bacteria and bacterial infections, introducing concepts that relate to organism structure, replication and infections. The important aspects of bacterial infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 542S Mycology, Fungal Infections and Antibiotics 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of fungi and fungal infections, introducing concepts that relate to microorganism structure, replication and infection. The important aspects of fungal infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 543S Parasitology and Parasitic Diseases 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of parasites & parasitic infections, introducing concepts that relate to microorganism structure, replication & infection. The important aspects of parasite infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 545S Introduction to Infectious Diseases 4.0 Credits

This course will provide a comprehensive introduction to Medical Microbiology and infectious Diseases. The basis for the course will be the recorded video of the medical microbiology lectures delivered to the medical students, which will be accessed and viewed by the enrolled students during the weeks identified in the schedule. At the end of each week, a review and discussion period (3 hours) will be moderated by one or more faculty members familiar with the material covered by the lectures viewed during the week.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 546S Introduction to Immunology 2.0 Credits

This course will provide a comprehensive introduction to Medical Immunology. The basis for the course will be the recorded video of the medical immunology lectures delivered to the medical students, which will be accessed and viewed by the enrolled students during the weeks identified in the schedule. At the end of each week, a review and discussion period (3 hours) will be moderated by one or more faculty members familiar with the material covered by the lectures viewed during the week.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 555S Molec. Mech. Of Micro. Path 3.0 Credits

An advanced graduate course involving presentation and in depth discussion of recent and historical literature on the molecular and cellular mechanisms of bacterial pathogenesis. Prerequisite: a previous bacterial pathogenesis or medical microbiology course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 600S Micro.&Immuno Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department, Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MIIM 602S SPECIAL TOPICS IN IMMUNOLOGY 3.0 Credits

This course is designed for a small group of advanced students of immunology. Each student will investigate a selected area of immunology that he or she will then present to the group for discussion and analysis. The student's knowledge of the subject should be based on personal laboratory experience and literature review.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 604S Special Topics in Virology 3.0 Credits

Emphasis is directed toward the study of mammalian virus-host interaction at the cellular level.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 606S Micro & Immuno Seminar 1.0 Credit

Faculty and students meet in an informal way to discuss selected subjects, hear guest lecturers or explore topics related to the biomedical sciences of interest to the group.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MIIM 607S IMMUNOLOGY II 3.0 Credits

This is an advanced course in immunology covering various aspects of contemporary cellular and molecular biology. It consists of some didactic sessions followed by reading and discussion of current literature. The prerequisites for this course are a graduate level course in immunology and permission of the instructor.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 610S SPECIAL TOPICS IN MICRO & IMMUNOLOGY 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 612S MOLEC MECH OF VIRAL PATHOGENESIS 2.0 Credits

This is a review course dealing with recent advances in viral pathogenesis. Current literature will be examined in lecture and discussion format.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 613S Emerging Infectious Diseases 2.0 Credits

This is an advanced course covering aspects of the emergence and spread of infectious agents, including species jumping, mutation and global transport. In addition, students will learn about recently emerged agents (HIV, HCV, etc.) as well as possible future outbreaks or reemergence of viral, bacterial, parasitic and novel agents.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 615S EXPERIMENTAL THERAPEUTICS 2.0 Credits

In this advanced course, students will learn about experimental and emerging therapies for human disease, emphasizing infectious disease. Analysis of key developments and approaches in drug design representative of experimental therapeutics is presented, with inclusion of pharmacologic, regulatory and basic science perspectives.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 621S Biotechniques and Laboratory Research I 3.0 Credits

This elective course will provide students with the option to experience an academic research laboratory setting, in contrast to the industrial setting provided through the Research Internship (MIIM 650S), offered as part of the Masters of Science in Molecular Medicine. This course should be attractive to students considering additional graduate or professional school training. It will also incorporate the practical application of biotechniques to research problems.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

Prerequisites: MIIM 521S [Min Grade: B]

MIIM 622S Biotechniques and Laboratory Research II 3.0 Credits

This elective course will provide students with the option to experience an academic research laboratory setting, in contrast to the industrial setting provided through the Research Internship (MIIM 650S), offered as part of the Masters of Science in Molecular Medicine. This course should be attractive to students considering additional graduate or professional school training. It will also incorporate the practical application of biotechniques to research problems.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

Prerequisites: MIIM 522S [Min Grade: B]

MIIM 630S Advanced Molecular Biology 2.0 Credits

Advanced level course (lecture and discussions) of topics of current interest in the area of molecular biology and molecular genetics. Topics vary in different years and may include aspects of both lower eukaryotic systems and mammalian systems. May be repeated once for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 2 credits

MIIM 640S EFFECTIVE TEACHING SKILLS 1.0 Credit

This eight-week course is designed to help doctoral candidates in the biomedical science become better teachers. Participants are introduced to behaviors and techniques used by effective teachers and are given the opportunity to make several presentations. Each presentation is videotaped and positive feedback is given to the presenter by other members of the class.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 650S Research Internship 6.0 Credits

The concept of the Research Internship is to provide practical experience using the concepts and the techniques encountered during the academic lecture series. Laboratories for the internship will be chosen on the basis of their applicability to the Biotechnology Industrial setting. The laboratories may be located within the College of Medicine or within the Industrial Partners to the MS-MM degree program.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 651S Research Internship in Immunology 6.0 Credits

This course represents a research internship in three different laboratories focusing upon research in the field of immunology. The three laboratories will be a basic research laboratory, a translational research laboratory, and a clinical research laboratory. Each laboratory experience will be for six weeks, or 18 weeks for the entire research internship, representing approximately 500 hours of research experience, equivalent to 6 credits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 12 credits

MIIM 652S Research Internship in Infectious Diseases 6.0 Credits

This course represents a research internship in three different laboratories focusing upon research in the field of infectious diseases. The three laboratories will be a basic research laboratory, a translational research laboratory, and a clinical research laboratory. Each laboratory experience will be for six weeks, or 18 weeks for the entire research internship, representing approximately 500 hours of research experience, equivalent to 6 credits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 12 credits

MIIM 653S Clinical Correlations in Infectious Disease 3.0 Credits

This course will serve as an advanced learning experience to correlate the basic aspects of infection with the clinical aspects of diagnosis and treatment. The course will introduce concepts that relate to understanding how the clinical aspects of infectious diseases can be translated into basic research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 654S Clinical Correlations in Immunology 3.0 Credits

This course will serve as an advanced learning experience to correlate the basic aspects of immunology & immunopathology with the clinical aspects of diagnosis and treatment. The course will introduce concepts that relate to understanding how the clinical aspects of abnormal immune responses and immunodeficiencies can be translated into basic research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 701S MEDICAL IMMUNOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 9 times for 999 credits

MIIM 751S MEDICAL MICROBIOLOGY 0.0 Credits**College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**MIIM 760S MICROBIOLOGY IMMUNOLOGY RESEAR 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**MIIM 895S MICROBIOLOGY RESEARCH 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**MIIM 9094S MICROBIOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**MIIM 9750S RESEARCH-MICROBIO&IMMUNO 12WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Can be repeated 0 times for 0 credits**MIIM 9754S Microbiology Research 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**MIIM 9758S RESEARCH-MICROBIO&IMMUNO 8WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**MIIM 999S Special Topics in Microbiology and Immunology 1.0-4.0 Credit**

Special Topics in Microbiology and Immunology.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Can be repeated 3 times for 16 credits

Master of Science in Infectious Disease

Master of Science: 36.0 semester credits

About the Program

The Master of Science in Infectious Disease program provides graduate-level training in various aspects of basic, translational, and clinical research related to infectious disease. Emphasis is placed on research and development efforts focused on new diagnostics, therapeutics, and vaccines used to prevent and/or treat infectious diseases such as HIV/AIDS, hepatitis, influenza, malaria, and other diseases caused by viral, bacterial, parasitic, and fungal pathogens.

Special attention is given to the study of therapeutic and vaccine target identification, the discovery and development of drugs and vaccines, and a greater understanding of resistance and immune escape mechanisms that reduce treatment effectiveness.

The program encompasses two years of required and elective graduate courses as well as a comprehensive research internship to be completed during the course of the training program. The internship encompasses three specific areas of research in the field of infectious disease:

- basic discovery involving infectious bacterial, viral, fungal, or parasitic pathogens that cause human disease;
- translational research focused on the development of new approaches to diagnose, prevent, or treat infectious diseases; and
- clinical infectious disease research.

Elective courses available to students in the program provide knowledge and expertise in areas relevant to infectious disease research, such as animal model use in biotechnology, emerging infectious diseases, vaccines and vaccine development, biotechniques and laboratory research, and principles of biocontainment.

The program is designed to prepare students for careers in infectious disease in government, industry, and academic environments. The program is ideally suited for enhancing the scientific credentials of recent college graduates, early career scientists, premedical students, industrial employees, and clinical laboratory technicians.

Although most students will complete the program in two years, some may opt to enroll on a part-time basis, taking up to four years to complete the degree program. While the program can be completed without a dissertation, a thesis option is available. Most courses are offered during the late afternoon or early evening to accommodate students who may be employed in the biotechnology, pharmaceutical, and biomedical arenas and want to enroll on a part-time basis. Selected courses are offered both live and online, providing the student the flexibility to enroll in one or the other.

Admission Requirements

For acceptance into the Master of Science in Infectious Disease program, the applicant must have completed a four-year biology or chemistry-related BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

- Official transcripts from all colleges and universities attended
- A current *curriculum vitae* (cv) or resume
- References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research or professional experiences.

Visit the Master of Science in Infectious Disease (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/InfectiousDisease.aspx>) program website for more detailed information. For additional information regarding application deadlines, the online application process, and specific requirements for applying to the College of Medicine, visit Drexel University's Graduate Admissions (<http://www.drexel.edu/grad/programs/ducom/infectious-diseases>) site.

Degree Requirements

Required Courses

IDPT 501S	Biostatistics I	2.0
IDPT 500S	Responsible Conduct of Research	2.0
MIIM 527S	Immunology, Immunopathology & Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	2.0-3.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fund. Mol. Med. III	2.0
MIIM 533S	Fundamentals in Molecular Medicine V	1.0
MIIM 545S	Introduction to Infectious Diseases	5.0
MIIM 534S	Fund. Molecular Med. VI	1.0
MIIM 606S	Micro & Immuno Seminar	1.0
MIIM 652S	Research Internship in Infectious Diseases	6.0
MIIM 653S	Clinical Correlations in Infectious Disease	3.0

Electives

MIIM 521S	Biotechniques I	6.0-15.0
MIIM 522S	Biotechniques II	
MIIM 523S	Molecular Virology	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
MIIM 526S	Animal Models in Biotechnology	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology, Fungal Infections and Antibiotics	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 621S	Biotechniques and Laboratory Research I	
MIIM 622S	Biotechniques and Laboratory Research II	

Total Credits

36.0-46.0

Master of Science in Interdisciplinary Health Sciences

About the Program

The School of Biomedical Sciences and Professional Studies offers the Master of Science degree in Interdisciplinary Health Sciences. Students already participating in the Interdisciplinary Health Science (IHS), Medical Science Preparatory (MSP), or Drexel Pathway to Medical School (DPMS) certificate programs who qualify (see admissions guidelines (<http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/InterdisciplinaryHealthSciences.aspx>)) and wish to obtain additional,

more focused education within the medically related health sciences can earn a Master of Science degree through this program. 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 a chosen area of focus in greater depth.

After successful completion of the Interdisciplinary Health Sciences, Medical Science Preparatory, or Drexel Pathway to Medical School programs, students matriculating into the MIHS program complete a research project and elect coursework primarily from a declared area of specialization in the biomedical sciences. The program's advanced educational experience confers a unique training and perspective that is well-suited to understanding the numerous complexities and professional interrelationships of the current health care system. Upon completion, students will have a strong, integrated view of the medical sciences—providing numerous advantages to graduates, whether utilizing the degree as a springboard for further professional education or subsequently entering the healthcare workforce.

During their participation in the MIHS year of the program, students will complete a minimum of 24.0 additional credit hours of graduate course work (for a total minimum of 48 hours in entire 2 year program) including a final research project and 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 the program, visit the College of Medicine's MS in Interdisciplinary Health Sciences (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/MasterofScienceInterdisciplinaryHealthScience.aspx>) page.

Admission Requirements

There are two routes of entry into the Master of Interdisciplinary Health Sciences (MIHS) program. US citizens or permanent residents are required to first successfully complete the Interdisciplinary Health Science or Medical Science Preparatory program and then may transition into the MIHS program. International students are required to enter the Master of Interdisciplinary Health Sciences program directly, which consists of the IHS year followed by the MIHS year.

Upon admission to the MIHS year, students will be required to declare a concentration track. See the College's curriculum (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/PremedicalPrograms/MasterofScienceInterdisciplinaryHealthScience.aspx>) page for more details about the concentrations.

For more information about applying to the program, visit the College of Medicine's MS in Interdisciplinary Health Science Admissions (<http://www.drexelmed.edu/Home/Admissions/ProfessionalStudiesintheHealthSciences/InterdisciplinaryHealthSciences.aspx>) page.

Degree Requirements

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 24.0 additional credit hours of graduate course work. Students select a concentration track, and complete a final

research paper. Students may take courses from other areas that are relevant to their concentration. For additional guidance on the research paper requirements, students should contact the MIHS Program Director.

Fall

Interdisciplinary Health Science Core Course	3.0
Concentration Track Courses (See Below)	9.0

Spring

MLAS 530S Biostats In Vet Science	3.0
Concentration Track Courses (See Below)	9.0

Total Credits **24.0**

Concentration Tracks

Clinical Research, Management and Laboratory Skills 18.0

Select six from the following:

CR 620S Biotech/Research	
CR 625S Health Policy and Economics	
CR 614S Pharmacotherapy in New Drug R&D	
MLAS 520S Financial Mgmt In Lab Anim Sci	
MLAS 523S Organizational Management	
MSPA 510S Laboratory Management	
MSPA 520S Medical Terminology	
MSPA 590S Leadership Skills for the Medical Profession	
MSPA 560S Medical Ethics	
MLAS 535S Biology & Care Of Lab Animals	
MLAS 536S Animal Models for Biomedical Research	
PHRM 525S Drug Discovery and Development I	

Total Credits **18.0**

Biochemical and Pharmacologic Principles 18.0

Select six of the following:

MLAS 513S Biochemical Basis of Disease (Upenn)	
MLAS 529S Molecular Genetics	
MMSP 530S Selected Topic in Pharmacology	
MSPP 511S Concepts in Bioch & Cell Biolo	
MSPP 515S Biological Function & Regulati	
MFSP 550S Biological Aspects of the Forensic Sciences	
PHRM 512S Graduate Pharmacology	
PHRM 525S Drug Discovery and Development I	
PHGY 503S GRADUATE PHYSIOLOGY	

Total Credits **18.0**

Concepts in Anatomy and Pathology 18.0

Select six of the following:

MFSP 556S Forensic Anthropology and Topics in Human Identification	
MFSP 554S Principles of Forensic Pathology	
MFSP 582S Human Osteology and Calcified Tissue Biology II	
MLAS 513S Biochemical Basis of Disease (Upenn)	
MLAS 531S Embryology	
MLAS 536S Animal Models for Biomedical Research	
MLAS 545S Fundamentals of Histology	
MSPA 550S Applied Anatomic Pathology	
MSPA 570S Medical Pathology I	

MSPA 571S Medical Pathology II	
MSPP 513S Special Topics in Anatomy	

Total Credits **18.0**

Laboratory Techniques 18.0

Select six of the following:

MFSP 578S Forensic Photography	
MLAS 535S Biology & Care Of Lab Animals	
MLAS 536S Animal Models for Biomedical Research	
MLAS 545S Fundamentals of Histology	
MSPA 520S Medical Terminology	
MSPA 540S Histotechnology I	
MSPA 580S Medical Microbiology I	
MSPA 571S Medical Pathology II	
MSPA 560S Medical Ethics	

Total Credits **18.0**

Medical Science

Required Courses for this Concentration

IMSP 502S Medicine and Society I	3.0
IMSP 503S Medicine and Society II	2.0
IMSP 520S Medical Physiology I	3.5
IMSP 521S Medical Physiology II	3.5
IMSP 540S Cell Biology & Microanatomy I	5.0
IMSP 541S Cell Biology and Microanatomy II	3.0
IMSP 560S Medical Neuroscience	6.0

Total Credits **26.0**

Medical Technology (Concentration is under development)

For more information, visit the College of Medicine's Professional Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/Programs.aspx>) programs page.

Master of Science in Medical Science

About the Program

Students successfully completing the Interdepartmental Medical Science program have the option of entering the Master of Science in Medical Science program the following year. The Master of Science degree requires non-thesis clinical or bench-top research. Students may register for one of the second year medical school courses offered through this program. This program is offered at both the Philadelphia and Sacramento campus locations.

Additional Information

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
215.762.4692
medicalsciences@drexelmed.edu

Degree Requirements

Students begin the program by successfully completing the first year (34.0 credits) of the Interdepartmental Medical Science Certificate (<https://nextcatalog.drexel.edu/graduate/schoolofbiomedicalsciences/interdepartmentalmedicalsciencecert>) program.

To fulfill requirements for the MS in Medical Science, students conduct either bench-top or clinical research with a Primary Investigator. Students who have a 3.00 or higher GPA may take one second-year medical school course and 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 Master of Science degree.

MMSP 501S	Research in Medical Science I	6.0
MMSP 502S	Research in Medical Science II	6.0
MMSP 503S	Research Seminar I	1.0
MMSP 504S	Research Seminar II	1.0
Students select 6.0 additional credits of graduate level science courses* with the approval of the Program.		6.0
Select one of the following:		2.0-3.0
CR 520S	Applications of Clinical Research Biostatistics	
IDPT 501S	Biostatistics I	
MLAS 530S	Biostats In Vet Science	

Total Credits **22.0-23.0**

* Students select 6.0 credits in biological science coursework at the graduate level. IMSP 550S and IMSP 570S cannot be counted toward these credits since these courses are optional in the Interdepartmental Medical Science Certificate portion of the program.

Master of Science in Pathologists' Assistant

91.0 semester credits

About the Program

The School of Biomedical Sciences and Professional Studies offers the Master of Science in Pathologists' Assistant (PathA). The 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 PathA program offers 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 clinical rotations offering progressively responsible experience in autopsy and surgical pathology. These rotations are supplemented with informal classroom education.

Program Accreditation

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 (<http://www.naacls.org>) website for more information about the professional activities of this organization.

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 (<http://www.ascp.org/Board-of-Certification>) website 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 (<http://www.pathologistsassistants.org>) website for more additional information about 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 (<http://www.drexelmed.edu/Home/AcademicPrograms/ProfessionalStudiesintheHealthSciences/AlliedHealthProfessionPrograms/PathologistsAssistantPathAProgram.aspx>) program's web page.

Admission Requirements

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 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.

Candidates for admission must provide the following credentials:

- Completed application form
- Resume
- Official transcripts from all college or university attended or where coursework was attempted or taken
- Official General 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:

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 Pathologists' Assistant (FAAPA)
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 215-762-4692
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Degree Requirements

Required Courses

MFSP 551S	Human Function	3.0
MLAS 531S	Embryology	3.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 500S	Gross Anatomy	5.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
MSPA 530S	Biomedical Photography	4.0
MSPA 540S	Histotechnology I	3.0
MSPA 541S	Histotechnology II	3.0
MSPA 550S	Applied Anatomic Pathology	4.0
MSPA 560S	Medical Ethics	2.0
MSPA 570S	Medical Pathology I	6.0
MSPA 571S	Medical Pathology II	4.0
MSPA 580S	Medical Microbiology I	4.0

MSPA 581S	Medical Microbiology II	3.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPA 600S	Surgical Pathology I	6.0
MSPA 601S	Surgical Pathology II	6.0
MSPA 602S	Surgical Pathology III	6.0
MSPA 610S	Autopsy Pathology I	6.0
MSPA 611S	Autopsy Pathology II	6.0
MSPA 612S	Autopsy Pathology III	6.0
Total Credits		91.0

Plan of Study

First Year

Term 1		Credits
MLAS 531S	Embryology	3.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 500S	Gross Anatomy	5.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
Term Credits		16.0

Term 2

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

Term 3

MFSP 551S	Human Function	3.0
MSPA 541S	Histotechnology II	3.0
MSPA 550S	Applied Anatomic Pathology	4.0
MSPA 571S	Medical Pathology II	4.0
MSPA 581S	Medical Microbiology II	3.0
Term Credits		17.0

Second Year

Term 4

MSPA 560S	Medical Ethics	2.0
MSPA 600S	Surgical Pathology I	6.0
MSPA 610S	Autopsy Pathology I	6.0
Term Credits		14.0

Term 5

MSPA 601S	Surgical Pathology II	6.0
MSPA 611S	Autopsy Pathology II	6.0
Term Credits		12.0

Term 6

MSPA 602S	Surgical Pathology III	6.0
MSPA 612S	Autopsy Pathology III	6.0
Term Credits		12.0

Total Credit: 91.0

Required Courses

MFSP 551S	Human Function	3.0
MLAS 531S	Embryology	3.0
MLAS 545S	Fundamentals of Histology	3.0
MSPA 500S	Gross Anatomy	5.0
MSPA 510S	Laboratory Management	2.0
MSPA 520S	Medical Terminology	3.0
MSPA 530S	Biomedical Photography	4.0
MSPA 540S	Histotechnology I	3.0
MSPA 541S	Histotechnology II	3.0
MSPA 550S	Applied Anatomic Pathology	4.0
MSPA 560S	Medical Ethics	2.0
MSPA 570S	Medical Pathology I	6.0
MSPA 571S	Medical Pathology II	4.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 581S	Medical Microbiology II	3.0
MSPA 590S	Leadership Skills for the Medical Profession	3.0
MSPA 600S	Surgical Pathology I	6.0
MSPA 601S	Surgical Pathology II	6.0
MSPA 602S	Surgical Pathology III	6.0
MSPA 610S	Autopsy Pathology I	6.0
MSPA 611S	Autopsy Pathology II	6.0
MSPA 612S	Autopsy Pathology III	6.0
Total Credits		91.0

Microbiology and Immunology

Master of Science: 36.0-48.0 semester credits

Doctor of Philosophy: 96.0 semester credits

About the Program

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 (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/MicrobiologyImmunology.aspx>) website.

MS Degree Requirements: Non-Thesis Option

MS without thesis: 36.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	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	Micro & Immuno. Journal Club	1.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	MOLECULAR PATHOGENESIS II	3.0
MIIM 606S	Micro & Immuno Seminar	1.0

Suggested Electives *

Select three of the following:		9.0
MIIM 504S	Micro. & Immuno. 1st Rotation	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	
MIIM 607S	IMMUNOLOGY II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 630S	Advanced Molecular Biology	

Total Credits

38.0

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

MS Degree Requirements: Thesis Option

MS with thesis: 48.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	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	Micro & Immuno. Journal Club	1.0
MIIM 504S	Micro. & Immuno. 1st Rotation	4.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	MOLECULAR PATHOGENSIS II	3.0
MIIM 600S	Micro.&Immuno Thesis Research	9.0
MIIM 606S	Micro & Immuno Seminar	1.0

Suggested Electives *

MIIM 505S	Micro. & Immuno. 2nd Rotation	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	
MIIM 607S	IMMUNOLOGY II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 630S	Advanced Molecular Biology	

Total Credits **47.0**

* No electives are required for the MS with Thesis option. This list includes suggested electives, however additional courses from the Biograduate Medical programs may also be taken. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

PhD Degree Requirements

PhD: 96.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	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	Micro & Immuno. Journal Club	1.0
MIIM 504S	Micro. & Immuno. 1st Rotation	4.0
MIIM 505S	Micro. & Immuno. 2nd Rotation	4.0
MIIM 506S	Micro. & Immuno. 3rd Rotation	4.0
MIIM 508S	Immunology I	3.0

MIIM 512S	Molecular Pathogenesis I	3.0
MIIM 513S	MOLECULAR PATHOGENSIS II	3.0
MIIM 600S	Micro.&Immuno Thesis Research	9.0
MIIM 606S	Micro & Immuno Seminar	1.0

Suggested Electives *

Select two of the following:

MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 604S	Special Topics in Virology	
MIIM 607S	IMMUNOLOGY II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 630S	Advanced Molecular Biology	

Total Credits **61.0**

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

Courses

MIIM 500S MEDICAL MICROBIOLOGY 5.0 Credits

This course offers detailed discussion of immunology and all aspects of the major infectious diseases of bacterial, viral, parasitic and mycotic origins. The course, although designed for medical students, also accommodates graduate students, who will be required to complete additional assignments.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 501S MEDICAL IMMUNOLOGY 2.0-3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 502S Micro & Immuno. Journal Club 1.0 Credit

Faculty members rotate in directing this weekly session devoted to increasing the critical analysis skills of students, providing experience in oral presentation of data, increasing student awareness of various sources of literature, and exposing students to current areas of importance in microbiology and immunology. Recent topic themes have included T-cell immunoregulation, molecular virology, regulatory and safety requirements in microbiology research, lymphokines and cytokines, neuroendocrine immunology, bacteriocins, molecular biology of parasites, and regulation of humoral immune responses.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 9 times for 999 credits

MIIM 504S Micro. & Immuno. 1st Rotation 4.0 Credits

First laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 505S Micro. & Immuno. 2nd Rotation 4.0 Credits

Second laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 506S Micro. & Immuno. 3rd Rotation 4.0 Credits

Third laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 508S Immunology I 3.0 Credits

This is a graduate level introductory course that will cover basic principles of immunology. The format is a lecture series with student participation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 509S PRINCIPLES IN IMMUNOLOGY 2.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 510S CLINICAL IMMUNOLOGY 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 511S FUNDAMENTALS MED MICROBIOLOGY 2.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 512S Molecular Pathogenesis I 3.0 Credits

This course is designed to convey to graduate students basic concepts concerning the molecular mechanisms of disease caused by pathogenic microorganisms. The course will utilize information derived from in vitro tissue culture and in vivo animal model systems as well as studies performed in humans to enhance students understanding of diseases caused by bacteria, fungi, parasites and viruses. The immune response and other host defense mechanisms will also be examined as an integral part of this course. The course is designed to compliment the first year graduate core curriculum and will strive to develop analytical thought processes. The student will learn to identify gaps in knowledge, formulate important and experimentally approachable questions, and develop sound hypotheses to direct the generation of new scientific discoveries. The development of sound specific aims and experimental design will also be emphasized.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 513S MOLECULAR PATHOGENSIS II 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 521S Biotechniques I 2.0 Credits

This course will introduce the molecular, cellular and computational methods that underlie modern biotechnology, drug discovery and development. The strengths and limitations of the procedures will be considered, and their suitability for either a basic or industrial research setting will be evaluated.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 522S Biotechniques II 2.0 Credits

The course, along with the companion course Biotechniques I (MIIM 521S) will introduce the molecular, cellular and computational methods that underlie biotechnology, drug discovery and development. The strengths and limitations of the procedures will be considered, and their suitability for either a basic or industrial research setting will be evaluated.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 523S Molecular Virology 2.0 Credits

This course will provide a comprehensive overview of the molecular aspects of viral pathogenesis, using various host-virus interactions as models.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 524S Vaccines and Vaccine Development 3.0 Credits

This course will provide information pertaining to the history of vaccines, the principles of vaccine design, the concepts of induction of the immune protection, and the choice of vaccine types. Emphasis will be given to current and future methods for vaccine design, and approved tests for safety and efficacy. The concepts of prophylactic and therapeutic vaccines will be discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 525S Principles of Biocontainment 1.0 Credit

This course will provide an overview of the classification of biological hazards, and the principles of biocontainment, based upon these classifications. The course will further provide both conceptual and practical information regarding working with controlled agents, collection and storage of biohazardous materials, the practicalities of working in biocontainment facilities, and the design considerations for biocontainment in the laboratory and in the field.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 526S Animal Models in Biotechnology 1.0 Credit

The course will focus on the ethical and practical utilization of animal models in biomedical research, with emphasis given to their use in biomedical research. The course will discuss the history of animal research, the requirements for generating inbred animal lines, the development of transgenic models, and the utilization of disease-specific models. Emphasis will be given to experimental designs and the justification of animal models.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 527S Immunology, Immunopathology & Infectious Diseases 3.0 Credits

The course will provide the basic knowledge of immunity from the organism to the cellular level. The subject matter will focus upon how the immune system elicits protection against invasion by pathogenic organisms, and how these same responses may be damaging to the host.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 530S Fundamentals of Molecular Medicine I 2.0-3.0 Credits

The course, along with courses Fundamentals in Molecular Medicine III (MIIM-532) and Fundamentals in Molecular Medicine IV (MIIM-527) will provide an overview of key topics in biochemistry, molecular biology and genetics. The courses will serve as the vehicle to provide basic information central to the concepts of Molecular Medicine, and will be taught in the evenings to provide sufficient flexibility for enrollees currently employed in the biologically related fields.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 531S Fundamentals of Molecular Medicine II 2.0 Credits

The course, along with the companion Fundamentals in Molecular Medicine I (MIIM-530) will provide an overview of key topics in biochemistry, molecular biology and genetics. It will serve as an alternative to the Core Curriculum and will be offered only in the evenings, with preference given to enrollees in the Master of Science in Molecular Medicine. Emphasis will be placed on the areas that are the foundation of modern bioscience.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 532S Fund. Mol. Med. III 2.0 Credits

The course, along with courses Fundamentals in Molecular Medicine I (MIIM-530) and Fundamentals in Molecular Medicine II (MIIM-531) will provide an overview of key topics in biochemistry, molecular biology and genetics. The courses will serve as the vehicle to provide basic information central to the concepts of Molecular Medicine, and will be taught in the evenings to provide sufficient flexibility for enrollees currently employed in the biologically related fields.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 533S Fundamentals in Molecular Medicine V 1.0 Credit

The course will involve the reading, summary and criticism of a paper from the primary literature in a Journal Club format. Students will, in consultation with instructors teaching particular topics in the MIIM-531 Fundamentals of Molecular Medicine III course, choose a paper related to that topic and prepare an oral presentation that will be discussed in class. All students participating in the class will be expected to have read the paper and be prepared for detailed discussion.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 534S Fund. Molecular Med. VI 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 540S Viruses and Viral Infections 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of viruses and viral infections, introducing concepts that relate to viral structure, replication and infection. The important aspects of viral infection, pathology and treatment will be a focus of the lectures devoted to individual virus types. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 541S Bacteria and Bacterial Infections 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of bacteria and bacterial infections, introducing concepts that relate to organism structure, replication and infections. The important aspects of bacterial infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 542S Mycology, Fungal Infections and Antibiotics 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of fungi and fungal infections, introducing concepts that relate to microorganism structure, replication and infection. The important aspects of fungal infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 543S Parasitology and Parasitic Diseases 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of parasites Y parasitic infections, introducing concepts that relate to microorganism structure, replication & infection. The important aspects of parasite infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 545S Introduction to Infectious Diseases 4.0 Credits

This course will provide a comprehensive introduction to Medical Microbiology and infectious Diseases. The basis for the course will be the recorded video of the medical microbiology lectures delivered to the medical students, which will be accessed and viewed by the enrolled students during the weeks identified in the schedule. At the end of each week, a review and discussion period (3 hours) will be moderated by one or more faculty members familiar with the material covered by the lectures viewed during the week.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 546S Introduction to Immunology 2.0 Credits

This course will provide a comprehensive introduction to Medical Immunology. The basis for the course will be the recorded video of the medical immunology lectures delivered to the medical students, which will be accessed and viewed by the enrolled students during the weeks identified in the schedule. At the end of each week, a review and discussion period (3 hours) will be moderated by one or more faculty members familiar with the material covered by the lectures viewed during the week.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 555S Molec. Mech. Of Micro. Path 3.0 Credits

An advanced graduate course involving presentation and in depth discussion of recent and historical literature on the molecular and cellular mechanisms of bacterial pathogenesis. Prerequisite: a previous bacterial pathogenesis or medical microbiology course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 600S Micro.&Immuno Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department, Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MIIM 602S SPECIAL TOPICS IN IMMUNOLOGY 3.0 Credits

This course is designed for a small group of advanced students of immunology. Each student will investigate a selected area of immunology that he or she will then present to the group for discussion and analysis. The student's knowledge of the subject should be based on personal laboratory experience and literature review.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 604S Special Topics in Virology 3.0 Credits

Emphasis is directed toward the study of mammalian virus-host interaction at the cellular level.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 606S Micro & Immuno Seminar 1.0 Credit

Faculty and students meet in an informal way to discuss selected subjects, hear guest lecturers or explore topics related to the biomedical sciences of interest to the group.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MIIM 607S IMMUNOLOGY II 3.0 Credits

This is an advanced course in immunology covering various aspects of contemporary cellular and molecular biology. It consists of some didactic sessions followed by reading and discussion of current literature. The prerequisites for this course are a graduate level course in immunology and permission of the instructor.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 610S SPECIAL TOPICS IN MICRO & IMMUNOLOGY 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 612S MOLECULAR MECHANISMS OF VIRAL PATHOGENESIS 2.0 Credits

This is a review course dealing with recent advances in viral pathogenesis. Current literature will be examined in lecture and discussion format.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 613S Emerging Infectious Diseases 2.0 Credits

This is an advanced course covering aspects of the emergence and spread of infectious agents, including species jumping, mutation and global transport. In addition, students will learn about recently emerged agents (HIV, HCV, etc.) as well as possible future outbreaks or reemergence of viral, bacterial, parasitic and novel agents.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 615S EXPERIMENTAL THERAPEUTICS 2.0 Credits

In this advanced course, students will learn about experimental and emerging therapies for human disease, emphasizing infectious disease. Analysis of key developments and approaches in drug design representative of experimental therapeutics is presented, with inclusion of pharmacologic, regulatory and basic science perspectives.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 621S Biotechniques and Laboratory Research I 3.0 Credits

This elective course will provide students with the option to experience an academic research laboratory setting, in contrast to the industrial setting provided through the Research Internship (MIIM 650S), offered as part of the Masters of Science in Molecular Medicine. This course should be attractive to students considering additional graduate or professional school training. It will also incorporate the practical application of biotechniques to research problems.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

Prerequisites: MIIM 521S [Min Grade: B]

MIIM 622S Biotechniques and Laboratory Research II 3.0 Credits

This elective course will provide students with the option to experience an academic research laboratory setting, in contrast to the industrial setting provided through the Research Internship (MIIM 650S), offered as part of the Masters of Science in Molecular Medicine. This course should be attractive to students considering additional graduate or professional school training. It will also incorporate the practical application of biotechniques to research problems.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

Prerequisites: MIIM 522S [Min Grade: B]

MIIM 630S Advanced Molecular Biology 2.0 Credits

Advanced level course (lecture and discussions) of topics of current interest in the area of molecular biology and molecular genetics. Topics vary in different years and may include aspects of both lower eukaryotic systems and mammalian systems. May be repeated once for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 2 credits

MIIM 640S EFFECTIVE TEACHING SKILLS 1.0 Credit

This eight-week course is designed to help doctoral candidates in the biomedical science become better teachers. Participants are introduced to behaviors and techniques used by effective teachers and are given the opportunity to make several presentations. Each presentation is videotaped and positive feedback is given to the presenter by other members of the class.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 650S Research Internship 6.0 Credits

The concept of the Research Internship is to provide practical experience using the concepts and the techniques encountered during the academic lecture series. Laboratories for the internship will be chosen on the basis of their applicability to the Biotechnology Industrial setting. The laboratories may be located within the College of Medicine or within the Industrial Partners to the MS-MM degree program.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 651S Research Internship in Immunology 6.0 Credits

This course represents a research internship in three different laboratories focusing upon research in the field of immunology. The three laboratories will be a basic research laboratory, a translational research laboratory, and a clinical research laboratory. Each laboratory experience will be for six weeks, or 18 weeks for the entire research internship, representing approximately 500 hours of research experience, equivalent to 6 credits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 12 credits

MIIM 652S Research Internship in Infectious Diseases 6.0 Credits

This course represents a research internship in three different laboratories focusing upon research in the field of infectious diseases. The three laboratories will be a basic research laboratory, a translational research laboratory, and a clinical research laboratory. Each laboratory experience will be for six weeks, or 18 weeks for the entire research internship, representing approximately 500 hours of research experience, equivalent to 6 credits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 12 credits

MIIM 653S Clinical Correlations in Infectious Disease 3.0 Credits

This course will serve as an advanced learning experience to correlate the basic aspects of infection with the clinical aspects of diagnosis and treatment. The course will introduce concepts that relate to understanding how the clinical aspects of infectious diseases can be translated into basic research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 654S Clinical Correlations in Immunology 3.0 Credits

This course will serve as an advanced learning experience to correlate the basic aspects of immunology & immunopathology with the clinical aspects of diagnosis and treatment. The course will introduce concepts that relate to understanding how the clinical aspects of abnormal immune responses and immunodeficiencies can be translated into basic research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 701S MEDICAL IMMUNOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 9 times for 999 credits

MIIM 751S MEDICAL MICROBIOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 760S MICROBIOLOGY IMMUNOLOGY RESEAR 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 895S MICROBIOLOGY RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 9094S MICROBIOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 9750S RESEARCH-MICROBIO&IMMUNO 12WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

MIIM 9754S Microbiology Research 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 9758S RESEARCH-MICROBIO&IMMUNO 8WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 999S Special Topics in Microbiology and Immunology 1.0-4.0 Credit

Special Topics in Microbiology and Immunology.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 3 times for 16 credits

Molecular Medicine

About the Program

The Master of Science in Molecular Medicine program provides training in the academic, research and entrepreneurial aspects of the biomedical sciences with an emphasis on translational research in the development of therapeutics and vaccines. This flexible program, offered in the early evening, has been designed to both enhance the academic credentials of individuals currently employed in industrial or educational pursuits, and to offer an opportunity for an *entré* degree for individuals interested in following a career in the biomedical industrial sciences.

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 thesis 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.

Admission Requirements

For acceptance into the Master of Science in Molecular Medicine program, the applicant must have completed a four-year biology or chemistry-based BA or BS degree program with undergraduate coursework in biology, microbiology, immunology, chemistry, biochemistry, mathematics, and/or other related subjects. Although a minimum cumulative grade point average (GPA) of 3.00 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

To be considered for acceptance, an applicant must provide the following as part of a complete online application for admission:

- Official transcripts from all colleges and universities attended
- A current *curriculum vitae* (CV) or resume
- References from at least three instructors or professionals

Although standardized test scores are not required for admission, official copies of scores from the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT) will be considered if submitted as part of the application.

International applicants (non-United States citizens) must meet the same requirements for admission as students from the United States. In addition to the above requirements, applicants whose native language is not English must demonstrate the ability to speak, write, and understand the English language by submitting an acceptable score from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Acceptance into the program will be decided by considering the sum of the applicant's undergraduate curriculum, cumulative GPA, GRE/MCAT scores, recommendation letters, and relevant research or professional experiences.

For additional information about the program, view the MS in Molecular Medicine (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/MolecularMedicine.aspx>) page on the College of Medicine's website.

Degree Requirements

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, students should work with their program advisor.

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
MIIM 540S	Viruses and Viral Infections	2.0
MIIM 541S	Bacteria and Bacterial Infections	2.0
MIIM 542S	Mycology, Fungal Infections and Antibiotics	2.0
MIIM 543S	Parasitology and Parasitic Diseases	2.0
MIIM 527S	Immunology, Immunopathology & Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	2.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fund. Mol. Med. III	2.0
MIIM 533S	Fundamentals in Molecular Medicine V	1.0
MIIM 534S	Fund. Molecular Med. VI	1.0
MIIM 606S	Micro & Immuno 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	12.0
MIIM 522S	Biotechniques II	
MIIM 523S	Molecular Virology	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
MIIM 526S	Animal Models in Biotechnology	
MIIM 555S	Molec. Mech. Of Micro. Path	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	EXPERIMENTAL THERAPEUTICS	
MIIM 621S	Biotechniques and Laboratory Research I	
MIIM 622S	Biotechniques and Laboratory Research II	
MIIM 650S	Research Internship	

Total Credits **36.0**

Courses

MIIM 500S MEDICAL MICROBIOLOGY 5.0 Credits

This course offers detailed discussion of immunology and all aspects of the major infectious diseases of bacterial, viral, parasitic and mycotic origins. The course, although designed for medical students, also accommodates graduate students, who will be required to complete additional assignments.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 501S MEDICAL IMMUNOLOGY 2.0-3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 502S Micro & Immuno. Journal Club 1.0 Credit

Faculty members rotate in directing this weekly session devoted to increasing the critical analysis skills of students, providing experience in oral presentation of data, increasing student awareness of various sources of literature, and exposing students to current areas of importance in microbiology and immunology. Recent topic themes have included T-cell immunoregulation, molecular virology, regulatory and safety requirements in microbiology research, lymphokines and cytokines, neuroendocrine immunology, bacteriocins, molecular biology of parasites, and regulation of humoral immune responses.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 9 times for 999 credits

MIIM 504S Micro. & Immuno. 1st Rotation 4.0 Credits

First laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 505S Micro. & Immuno. 2nd Rotation 4.0 Credits

Second laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 506S Micro. & Immuno. 3rd Rotation 4.0 Credits

Third laboratory rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during the spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 508S Immunology I 3.0 Credits

This is a graduate level introductory course that will cover basic principles of immunology. The format is a lecture series with student participation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 509S PRINCIPLES IN IMMUNOLOGY 2.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 510S CLINICAL IMMUNOLOGY 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 511S FUNDAMENTALS MED MICROBIOLOGY 2.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

MIIM 512S Molecular Pathogenesis I 3.0 Credits

This course is designed to convey to graduate students basic concepts concerning the molecular mechanisms of disease caused by pathogenic microorganisms. The course will utilize information derived from in vitro tissue culture and in vivo animal model systems as well as studies performed in humans to enhance students understanding of diseases caused by bacteria, fungi, parasites and viruses. The immune response and other host defense mechanisms will also be examined as an integral part of this course. The course is designed to compliment the first year graduate core curriculum and will strive to develop analytical thought processes. The student will learn to identify gaps in knowledge, formulate important and experimentally approachable questions, and develop sound hypotheses to direct the generation of new scientific discoveries. The development of sound specific aims and experimental design will also be emphasized.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 513S MOLECULAR PATHOGENSIS II 3.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 521S Biotechniques I 2.0 Credits

This course will introduce the molecular, cellular and computational methods that underlie modern biotechnology, drug discovery and development. The strengths and limitations of the procedures will be considered, and their suitability for either a basic or industrial research setting will be evaluated.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 522S Biotechniques II 2.0 Credits

The course, along with the companion course Biotechniques I (MIIM 521S) will introduce the molecular, cellular and computational methods that underlie biotechnology, drug discovery and development. The strengths and limitations of the procedures will be considered, and their suitability for either a basic or industrial research setting will be evaluated.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 523S Molecular Virology 2.0 Credits

This course will provide a comprehensive overview of the molecular aspects of viral pathogenesis, using various host-virus interactions as models.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 524S Vaccines and Vaccine Development 3.0 Credits

This course will provide information pertaining to the history of vaccines, the principles of vaccine design, the concepts of induction of the immune protection, and the choice of vaccine types. Emphasis will be given to current and future methods for vaccine design, and approved tests for safety and efficacy. The concepts of prophylactic and therapeutic vaccines will be discussed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 525S Principles of Biocontainment 1.0 Credit

This course will provide an overview of the classification of biological hazards, and the principles of biocontainment, based upon these classifications. The course will further provide both conceptual and practical information regarding working with controlled agents, collection and storage of biohazardous materials, the practicalities of working in biocontainment facilities, and the design considerations for biocontainment in the laboratory and in the field.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 526S Animal Models in Biotechnology 1.0 Credit

The course will focus on the ethical and practical utilization of animal models in biomedical research, with emphasis given to their use in biomedical research. The course will discuss the history of animal research, the requirements for generating inbred animal lines, the development of transgenic models, and the utilization of disease-specific models. Emphasis will be given to experimental designs and the justification of animal models.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 527S Immunology, Immunopathology & Infectious Diseases 3.0 Credits

The course will provide the basic knowledge of immunity from the organism to the cellular level. The subject matter will focus upon how the immune system elicits protection against invasion by pathogenic organisms, and how these same responses may be damaging to the host.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 530S Fundamentals of Molecular Medicine I 2.0-3.0 Credits

The course, along with courses Fundamentals in Molecular Medicine III (MIIM-532) and Fundamentals in Molecular Medicine IV (MIIM-527) will provide an overview of key topics in biochemistry, molecular biology and genetics. The courses will serve as the vehicle to provide basic information central to the concepts of Molecular Medicine, and will be taught in the evenings to provide sufficient flexibility for enrollees currently employed in the biologically related fields.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 531S Fundamentals of Molecular Medicine II 2.0 Credits

The course, along with the companion Fundamentals in Molecular Medicine I (MIIM-530) will provide an overview of key topics in biochemistry, molecular biology and genetics. It will serve as an alternative to the Core Curriculum and will be offered only in the evenings, with preference given to enrollees in the Master of Science in Molecular Medicine. Emphasis will be placed on the areas that are the foundation of modern bioscience.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 532S Fund. Mol. Med. III 2.0 Credits

The course, along with courses Fundamentals in Molecular Medicine I (MIIM-530) and Fundamentals in Molecular Medicine II (MIIM-531) will provide an overview of key topics in biochemistry, molecular biology and genetics. The courses will serve as the vehicle to provide basic information central to the concepts of Molecular Medicine, and will be taught in the evenings to provide sufficient flexibility for enrollees currently employed in the biologically related fields.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 533S Fundamentals in Molecular Medicine V 1.0 Credit

The course will involve the reading, summary and criticism of a paper from the primary literature in a Journal Club format. Students will, in consultation with instructors teaching particular topics in the MIIM-531 Fundamentals of Molecular Medicine III course, choose a paper related to that topic and prepare an oral presentation that will be discussed in class. All students participating in the class will be expected to have read the paper and be prepared for detailed discussion.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 534S Fund. Molecular Med. VI 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 540S Viruses and Viral Infections 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of viruses and viral infections, introducing concepts that relate to viral structure, replication and infection. The important aspects of viral infection, pathology and treatment will be a focus of the lectures devoted to individual virus types. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 541S Bacteria and Bacterial Infections 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of bacteria and bacterial infections, introducing concepts that relate to organism structure, replication and infections. The important aspects of bacterial infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 542S Mycology, Fungal Infections and Antibiotics 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of fungi and fungal infections, introducing concepts that relate to microorganism structure, replication and infection. The important aspects of fungal infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 543S Parasitology and Parasitic Diseases 2.0 Credits

This course serves as an introduction to the basic aspects of the biology of parasites Y parasitic infections, introducing concepts that relate to microorganism structure, replication & infection. The important aspects of parasite infection, pathology and treatment will be a focus of the lectures devoted to individual microorganisms. Classes will consist of both standard lecture formats and discussion of assigned readings drawn from primary literature.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 545S Introduction to Infectious Diseases 4.0 Credits

This course will provide a comprehensive introduction to Medical Microbiology and infectious Diseases. The basis for the course will be the recorded video of the medical microbiology lectures delivered to the medical students, which will be accessed and viewed by the enrolled students during the weeks identified in the schedule. At the end of each week, a review and discussion period (3 hours) will be moderated by one or more faculty members familiar with the material covered by the lectures viewed during the week.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 546S Introduction to Immunology 2.0 Credits

This course will provide a comprehensive introduction to Medical Immunology. The basis for the course will be the recorded video of the medical immunology lectures delivered to the medical students, which will be accessed and viewed by the enrolled students during the weeks identified in the schedule. At the end of each week, a review and discussion period (3 hours) will be moderated by one or more faculty members familiar with the material covered by the lectures viewed during the week.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 555S Molec. Mech. Of Micro. Path 3.0 Credits

An advanced graduate course involving presentation and in depth discussion of recent and historical literature on the molecular and cellular mechanisms of bacterial pathogenesis. Prerequisite: a previous bacterial pathogenesis or medical microbiology course.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 600S Micro.&Immuno Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department, Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MIIM 602S SPECIAL TOPICS IN IMMUNOLOGY 3.0 Credits

This course is designed for a small group of advanced students of immunology. Each student will investigate a selected area of immunology that he or she will then present to the group for discussion and analysis. The student's knowledge of the subject should be based on personal laboratory experience and literature review.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 604S Special Topics in Virology 3.0 Credits

Emphasis is directed toward the study of mammalian virus-host interaction at the cellular level.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 606S Micro & Immuno Seminar 1.0 Credit

Faculty and students meet in an informal way to discuss selected subjects, hear guest lecturers or explore topics related to the biomedical sciences of interest to the group.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

MIIM 607S IMMUNOLOGY II 3.0 Credits

This is an advanced course in immunology covering various aspects of contemporary cellular and molecular biology. It consists of some didactic sessions followed by reading and discussion of current literature. The prerequisites for this course are a graduate level course in immunology and permission of the instructor.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 610S SPECIAL TOPICS IN MICRO & IMMUNOLOGY 1.0 Credit

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 612S MOLECULAR MECHANISMS OF VIRAL PATHOGENESIS 2.0 Credits

This is a review course dealing with recent advances in viral pathogenesis. Current literature will be examined in lecture and discussion format.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 613S Emerging Infectious Diseases 2.0 Credits

This is an advanced course covering aspects of the emergence and spread of infectious agents, including species jumping, mutation and global transport. In addition, students will learn about recently emerged agents (HIV, HCV, etc.) as well as possible future outbreaks or reemergence of viral, bacterial, parasitic and novel agents.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 615S EXPERIMENTAL THERAPEUTICS 2.0 Credits

In this advanced course, students will learn about experimental and emerging therapies for human disease, emphasizing infectious disease. Analysis of key developments and approaches in drug design representative of experimental therapeutics is presented, with inclusion of pharmacologic, regulatory and basic science perspectives.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 621S Biotechniques and Laboratory Research I 3.0 Credits

This elective course will provide students with the option to experience an academic research laboratory setting, in contrast to the industrial setting provided through the Research Internship (MIIM 650S), offered as part of the Masters of Science in Molecular Medicine. This course should be attractive to students considering additional graduate or professional school training. It will also incorporate the practical application of biotechniques to research problems.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

Prerequisites: MIIM 521S [Min Grade: B]

MIIM 622S Biotechniques and Laboratory Research II 3.0 Credits

This elective course will provide students with the option to experience an academic research laboratory setting, in contrast to the industrial setting provided through the Research Internship (MIIM 650S), offered as part of the Masters of Science in Molecular Medicine. This course should be attractive to students considering additional graduate or professional school training. It will also incorporate the practical application of biotechniques to research problems.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

Prerequisites: MIIM 522S [Min Grade: B]

MIIM 630S Advanced Molecular Biology 2.0 Credits

Advanced level course (lecture and discussions) of topics of current interest in the area of molecular biology and molecular genetics. Topics vary in different years and may include aspects of both lower eukaryotic systems and mammalian systems. May be repeated once for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 2 credits

MIIM 640S EFFECTIVE TEACHING SKILLS 1.0 Credit

This eight-week course is designed to help doctoral candidates in the biomedical science become better teachers. Participants are introduced to behaviors and techniques used by effective teachers and are given the opportunity to make several presentations. Each presentation is videotaped and positive feedback is given to the presenter by other members of the class.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 650S Research Internship 6.0 Credits

The concept of the Research Internship is to provide practical experience using the concepts and the techniques encountered during the academic lecture series. Laboratories for the internship will be chosen on the basis of their applicability to the Biotechnology Industrial setting. The laboratories may be located within the College of Medicine or within the Industrial Partners to the MS-MM degree program.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is MMED.

MIIM 651S Research Internship in Immunology 6.0 Credits

This course represents a research internship in three different laboratories focusing upon research in the field of immunology. The three laboratories will be a basic research laboratory, a translational research laboratory, and a clinical research laboratory. Each laboratory experience will be for six weeks, or 18 weeks for the entire research internship, representing approximately 500 hours of research experience, equivalent to 6 credits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 12 credits

MIIM 652S Research Internship in Infectious Diseases 6.0 Credits

This course represents a research internship in three different laboratories focusing upon research in the field of infectious diseases. The three laboratories will be a basic research laboratory, a translational research laboratory, and a clinical research laboratory. Each laboratory experience will be for six weeks, or 18 weeks for the entire research internship, representing approximately 500 hours of research experience, equivalent to 6 credits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 12 credits

MIIM 653S Clinical Correlations in Infectious Disease 3.0 Credits

This course will serve as an advanced learning experience to correlate the basic aspects of infection with the clinical aspects of diagnosis and treatment. The course will introduce concepts that relate to understanding how the clinical aspects of infectious diseases can be translated into basic research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 654S Clinical Correlations in Immunology 3.0 Credits

This course will serve as an advanced learning experience to correlate the basic aspects of immunology & immunopathology with the clinical aspects of diagnosis and treatment. The course will introduce concepts that relate to understanding how the clinical aspects of abnormal immune responses and immunodeficiencies can be translated into basic research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

MIIM 701S MEDICAL IMMUNOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 9 times for 999 credits

MIIM 751S MEDICAL MICROBIOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 760S MICROBIOLOGY IMMUNOLOGY RESEAR 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 895S MICROBIOLOGY RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 9094S MICROBIOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 9750S RESEARCH-MICROBIO&IMMUNO 12WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

MIIM 9754S Microbiology Research 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 9758S RESEARCH-MICROBIO&IMMUNO 8WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

MIIM 999S Special Topics in Microbiology and Immunology 1.0-4.0 Credit

Special Topics in Microbiology and Immunology.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 3 times for 16 credits

Molecular Pathobiology

MS without thesis: 36.0-48.0 semester credits

Doctor of Philosophy: 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 (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx>) 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 (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/MolecularPathobiology.aspx>) website.

MS Degree Requirements: Thesis Option

MS with thesis: 48.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	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	PATHOLOGY 1ST LAB ROTATION	4.0
PATH 503S	Pathology Journal Club	1.0
PATH 509S	Pathologic Processes	3.0
PATH 600S	Pathology Thesis Research	9.0
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	4.0

Suggested Electives *

Select at least one of the following: 4.0

ANAT 602S	MEDICAL NEUROSCIENCE	
BIOC 510S	Cancer Biology	
MIIM 500S	MEDICAL MICROBIOLOGY	
NEUR 508S	Graduate Neuroscience I	
NEUR 607S	INTEGRATED NEUROSCIENCE	
PATH 505S	PATHOLOGY 2ND LAB ROTATION	
PATH 506S	PATHOLOGY 3RD LAB ROTATION	
PHGY 503S	GRADUATE PHYSIOLOGY	

Total Credits 48.0

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) program.

MS Degree Requirements: Non-Thesis Option

MS without thesis: 39.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	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	Pathology Journal Club	1.0
PATH 509S	Pathologic Processes	3.0
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	4.0

Suggested Electives * 10.0

Select three of the following:

ANAT 602S	MEDICAL NEUROSCIENCE	
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BIOC 510S	Cancer Biology	
MIIM 500S	MEDICAL MICROBIOLOGY	
NEUR 508S	Graduate Neuroscience I	
NEUR 607S	INTEGRATED NEUROSCIENCE	
PATH 502S	PATHOLOGY 1ST LAB ROTATION	
PATH 505S	PATHOLOGY 2ND LAB ROTATION	
PATH 506S	PATHOLOGY 3RD LAB ROTATION	
PHGY 503S	GRADUATE PHYSIOLOGY	

Total Credits 36.0

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

PhD Degree Requirements

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.

96.0 semester credits

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	Responsible Conduct of Research	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	PATHOLOGY 1ST LAB ROTATION	4.0
PATH 503S	Pathology Journal Club	1.0
PATH 505S	PATHOLOGY 2ND LAB ROTATION	4.0
PATH 506S	PATHOLOGY 3RD LAB ROTATION	4.0
PATH 509S	Pathologic Processes	3.0
PATH 600S	Pathology Thesis Research	9.0
PATH 601S	CELL MOL PATHBIO CANCER ANGIOG	4.0

Suggested Electives *

Select a minimum of two courses from the following: 44.0

ANAT 602S	MEDICAL NEUROSCIENCE	
BIOC 510S	Cancer Biology	
MIIM 500S	MEDICAL MICROBIOLOGY	
NEUR 508S	Graduate Neuroscience I	
NEUR 607S	INTEGRATED NEUROSCIENCE	

PHGY 503S GRADUATE PHYSIOLOGY

Total Credits 96.0

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) program.

Courses**PATH 502S PATHOLOGY 1ST LAB ROTATION 4.0 Credits**

First rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PATH 503S Pathology Journal Club 1.0 Credit

Students enroll for a minimum of four semesters for this twice monthly meeting.

College/Department: COM School of Biomedical Sciences Professional Studies

PATH 505S PATHOLOGY 2ND LAB ROTATION 4.0 Credits

Second rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PATH 506S PATHOLOGY 3RD LAB ROTATION 4.0 Credits

Third rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PATH 507S MEDICAL PATHOLOGY PART 1 7.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PATH 509S Pathologic Processes 3.0 Credits

An abridged pathology course focusing primarily on aspects of general pathology (inflammation, wound healing and repair, immunopathology and autoimmunity, coagulation, vascular biology, and principles of neoplasia). Histopathology and cytology will be introduced. This course is a subset of PATH-507-05 Medical Pathology I geared toward the needs of graduate students.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PATH 600S Pathology Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department, Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

PATH 601S CELL MOL PATHBIO CANCER ANGIOG 4.0 Credits

An advanced course addressing the cell and molecular processes associated with the biology of cancer progression. Major topics include cytogenetic abnormalities, the role and function of oncogenes and tumor suppressor genes, growth factor receptor interactions, cell cycle control and regulation of cell death, angiogenesis and the role of the extracellular matrix, viruses and cancer, tumor immunobiology, and tumor metastases. Although didactic in nature, the course requires extensive exposure to the current literature on topics at the forefront of cancer research.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PATH 751S PATHOLOGY AND LABORATORY MEDICINE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PATH 819S ANATOMIC PATH & LAB MED- 3 WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PATH 820S ANATOMIC PATH & LAB MED- 1 WK 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PATH 8214S LABORATORY MEDICINE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PATH 821S ANATOMIC PATHOLOGY- 2 WEEKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PATH 8222S ANATOMIC PATHOLOGY - 2 WEEKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

PATH 8224S ANATOMIC PATHOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

PATH 822S ANATOMIC PATHOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PATH 8232S CLINICAL PATHOLOGY- 2 WEEKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

PATH 8234S Clinical Pathology 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PATH 823S CLINICAL PATHOLOGY 0.0 Credits**College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 8242S Diagnostic Cytology*** 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Can be repeated 0 times for 0 credits**PATH 8244S DIAGNOSTIC CYTOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 824S CLINICAL PATHOLOGY-2 WEEKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 825S DIAGNOSTIC CYTOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 826S ANATOMIC PATH & LAB MEDICINE 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 828S DIAGNOSTIC CYTOLOGY - 2 WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 829S PATHOLOGY SUBSPECIALTY - 2 WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 8311S ANATOMIC PATH & LAB MED - 1 WK 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 8312S ANATOMIC PATH & LAB MED - 2WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 8313S ANATOMIC PATH & LAB MED- 3WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 8314S Anatomic Path & Lab Medicine 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 8412S PATHOLOGY SUBSPECIALTY- 2 WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 8414S PATHOLOGY SUBSPECIALTY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 9092S Forensic Pathology - 2wks 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 9094S ELECTIVE - PATHOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 955S LABORATORY MEDICINE 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 956S PATHOLOGY RESEARCH 2 WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 9752S RESEARCH - PATHOLOGY - 2WKS 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 9754S RESEARCH - PATHOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**PATH 9756S RESEARCH-PATHOLOGY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit

Molecular and Cell Biology and Genetics

*Master of Science: 36.0-48.0 semester credits**Doctor of Philosophy: 96.0 semester credits*

About the Program

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

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

Additional Information

For more information about the program, contact:

Caitlin Kaltenbach
Academic Coordinator
Biomedical Graduate and Postgraduate Studies
Drexel University College of Medicine
2900 Queen Lane Suite G24

Philadelphia, PA 19129-1096
215.991.8146
caitlin.kaltenbach@drexelmed.edu

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 Admissions (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx>) 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 (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/MolecularCellBiologyGenetics.aspx>) website.

MS Degree Requirements: Thesis Option

48.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 600S	Thesis Defense	9.0
MCBG 501S	MCBG 1st Lab Rotation	4.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 512S	MCBG Journal Club	1.0
MCBG 513S	Molec & Cell Biology Seminar	1.0
MCBG 600S	MCBG Thesis Research	9.0

Advanced Electives 6.0

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.

Total Credits 48.0

MS Degree Requirements: Non-Thesis Option

36.0 semester credits

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
MCBG 501S	MCBG 1st Lab Rotation	4.0
MCBG 502S	MCBG 2nd Lab Rotation	4.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 512S	MCBG Journal Club	1.0
MCBG 513S	Molec & Cell Biology Seminar	1.0

Advanced Electives 4.0

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

Total Credits 36.0

PhD Degree Requirements

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.

96.0 semester hours

Required Courses

IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	2.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MCBG 501S	MCBG 1st Lab Rotation	4.0
MCBG 502S	MCBG 2nd Lab Rotation	4.0

MCBG 503S	MCBG 3rd Lab Rotation	4.0
MCBG 506S	ADVANCED CELL BIOLOGY	2.0
MCBG 512S	MCBG Journal Club	1.0
MCBG 513S	Molec & Cell Biology Seminar	1.0
MCBG 600S	MCBG Thesis Research	9.0

Advanced Electives

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.

Total Credits **50.0**

Courses**IDPT 500S Responsible Conduct of Research 2.0 Credits**

This two credit course is offered once a year, usually in the spring semester, one evening a week. It is presented using lecture, discussion and problem-based curriculum approaches, with associated requested readings in texts. Some topics additionally require web-based exercises and quizzes. Graduate students, postdoctoral researchers and faculty discuss current issues of scientific integrity that all scientists encounter in their research. Solutions to hypothetical and real research challenges and ethical dilemmas are discussed and debated by trainees and faculty. Course sessions and discussions are led by a team of faculty leaders, including department head, deans and provosts. Grades are based on quizzes, class participation, web-based exercises, a term paper and a PowerPoint presentation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 0 times for 0 credits

IDPT 501S Biostatistics I 2.0 Credits

Introduction to the theory of probability, frequency distribution, correlation's and regression analysis, probability, chi-square and analysis of variance, applications of statistics in the laboratory.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 9 times for 999 credits

IDPT 503S SEARCHING BIOMEDICAL LITERATUR 1.0 Credit

This course surveys information sources in the library (books, journals, computer "finding tools"), with primary focus on finding biomedical journal articles via MEDLINE. Search planning is emphasized, including points on using Medical Subject Headings and precautions when searching title/abstract words. Resources for keeping up with the literature and maintaining personal files are briefly mentioned.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 505S BIOMEDICAL RESEARCH 9.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 506S BIostatISTICS II 2.0 Credits

Graduate Biostatistics II picks up where Biostatistics I leaves off. It teaches applications of commonly-used techniques in greater depth, with the intended audience being individuals who will be using statistics considerably in their work. This course includes one and two-way ANOVAs (and post hoc tests), multivariate techniques, power analysis, and other methods. The basic of the SPSS computer program is taught as well.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 507S Teaching Practicum I 1.0-4.0 Credit

The goal of this practicum is to provide mentored teaching experiences for graduate students enrolled in the biomedical science programs of the COM. Graduate students in COM programs can meet practicum requirements in a variety of teaching venues including but not limited to tutoring, laboratory instruction, conferences, and lectures in medical school and graduate program-specific courses. Eligible teaching experiences also include instruction for high school and undergraduate students. Credits for each practicum will be awarded according to preparation time and contact hours. 1 credit hr = 16hrs of instruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 508S Teaching Practicum II 1.0-4.0 Credit

The goal of this practicum is to provide mentored teaching experiences for graduate students enrolled in the biomedical science programs of the COM. Graduate students in COM programs can meet practicum requirements in a variety of teaching venues including but not limited to tutoring, laboratory instruction, conferences, and lectures in medical school and graduate program-specific courses. Eligible teaching experiences also include instruction for high school and undergraduate students. Credits for each practicum will be awarded according to preparation time and contact hours. 1 credit hr = 16hrs of instruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 509S Teaching Practicum III 1.0-4.0 Credit

The goal of this practicum is to provide mentored teaching experiences for graduate students enrolled in the biomedical science programs of the COM. Graduate students in COM programs can meet practicum requirements in a variety of teaching venues including but not limited to tutoring, laboratory instruction, conferences, and lectures in medical school and graduate program-specific courses. Eligible teaching experiences also include instruction for high school and undergraduate students. Credits for each practicum will be awarded according to preparation time and contact hours. 1 credit hr = 16hrs of instruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 521S Molecular Structure and Metabolism 5.0 Credits

Introduction to the fundamental concepts of biochemistry and molecular biology. Topics covered include the structure and function of biomolecules such as proteins, nucleic acids, carbohydrates, and lipids; enzymes; membrane transport phenomena; second messenger signaling; prokaryotic and eukaryotic DNA replication; transcription and translation; protein processing and trafficking; and intermediary metabolism.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 524S Molecular Genetics 0.0 Credits

The goal of the molecular genetics core course is to familiarize students with the underlying mechanisms regulating the inheritance of genetic material. In addition, students will be introduced to genetic methodologies used to manipulate, interpret and define gene function.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 525S Immunology 0.0 Credits

Topics will include cells of the immune system and their development and function, antigen/antibody interactions and the generation of antibody diversity, the major histocompatibility complex, humoral immunity, cell-mediated immunity, transplantation immunology, and immune dysfunction and disease. immune mechanisms.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 526S Cells to Systems 5.0 Credits

Cells to Systems provides a foundation in cell biology, with topics in cytoskeleton, cell adhesion, membrane biology, endocytosis, intracellular signaling, cell cycle, cell growth (cancer), cell senescence, cell death (apoptosis), and genetic methodologies. A final section covers integrative topics on complex biological systems operating in intact organisms.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 528S Cell Biology II 0.0 Credits

This module covers basic membrane transport processes, the ionic basis of membrane excitability, various types of ion channels, the process and role of endocytosis in cell function, step in folding of nascent proteins and protein degradation, protein import into various organelles including the nucleus, ER and mitochondria, and protein processing and trafficking the Golgi.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 531S Integ of Bio Func in Organ Sys 0.0 Credits

This module will provide an introduction to aspects of endocrinology, cardiovascular physiology, and central nervous system function as a means of illustrating the integration of molecular and cellular biological functions in the intact organism.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 532S SUMMER MAKE-UP MED BIOCHEM 7.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 536S Molecular Genetics 1.5 Credit

The goal of the molecular genetics core course is to familiarize students with the underlying mechanisms regulating the inheritance of genetic material. In addition, students will be introduced to genetic methodologies used to manipulate, interpret and define gene function.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 537S Immunology 1.5 Credit

Topics will include cells of the immune system and their development and function, antigen/antibody interactions and the generation of antibody diversity, the major histocompatibility complex, humoral immunity, cell-mediated immunity, transplantation immunology, and immune dysfunction and disease immune mechanisms.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 542S Integ of Bio Func in Org Sys 2.0 Credits

This module will provide an introduction to aspects of endocrinology, cardiovascular physiology, and central nervous system function as a means of illustrating the integration of molecular and cellular biological functions in the intact organism.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 550S Biochemistry and Biophysics 5.0 Credits

This course includes the fundamentals of metabolism, enzymology, protein synthesis and structure, and molecular biology taught from neuroscience perspective. In addition, there are lectures on biophysics of ion channels, and neuronal circuits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 600S Thesis Defense 9.0 Credits

Students who have complete all course work and research requirements, but have not defended their thesis, may carry a status of "Registered for Thesis Defense Only". This registration carries no credit, has no fee and students receive no grade. Students may only be registered for thesis defense for no more than two semesters. Students may not be registered for this category if they are registered for any other graduate courses.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 9 times for 999 credits

IDPT 601S Optional Rotation 4.0 Credits

Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 7001S Professionalism in Medicine 1 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 7002S Professionalism in Medicine 2 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 7003S Professionalism in Medicine 3 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 7004S Professionalism in Medicine 4 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 703S HUMAN SEXUALITY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 9 times for 999 credits

IDPT 706S PHYSICIAN AND PATIENT 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 710S PIL FALL SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 720S PIL WINTER SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 730S PIL SPRING SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 740S PIL SUMMER SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 750S PIL FALL SESSION II 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 751S INTR TO GERIATRICS/GERONTOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 752S INTRODUCTION TO AMBULATORY MEDICINE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 760S PIL WINTER SESSION II 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 770S PIL SPRING SESSION II 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 800S Register for Degree Only 9.0 Credits

This is a course designated to allow students who recently defended the opportunity to finish up any loose ends while maintaining the graduate student status. Students can only register for this course after they have defended their thesis.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 801S CLINICAL PRACTICE EXAM (S/U) 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 802S FOURTH YEAR RESEARCH COURSE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 821S INTERDEPT. ELECT.-NUTRITION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 822S ACADEMIC ELECTIVE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 823S MD/MPH RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 824S MD/Ph.D RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 850S Literature Review Non-Thesis MS 4.0 Credits

Literature Review of a specific topic directed at fulfillment of the degree requirement for a scholarly paper by non-thesis master's students. Progress is monitored by student's advisor and advisory committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 2 times for 8 credits

IDPT 901S CLINICAL EXAM PREP 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 990S INDEPENDENT STUDY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 991S INDEPENDENT STUDY 2 0.0 Credits

College/Department: College of Medicine

IDPT 992S INDEPENDENT STUDY 3 0.0 Credits

College/Department: College of Medicine

IDPT 997S SUMMER ENRICHMENT PROGRAM 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 998S TERM ACTIVATOR 0.0 Credits**College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**IDPT 999S Special Topics in Biomedical Sciences 1.0-4.0 Credit**

Special Topics in Biomedical Sciences.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Can be repeated 3 times for 16 credits

Neuroscience

*Master of Science: 36.0 - 48.0 semester credits**Doctor of Philosophy: 96.0 semester credits*

About the Program

The College of Medicine School of Biomedical Sciences and Professional Studies offers an interdepartmental and multidisciplinary graduate program in Neuroscience leading to MS and PhD degrees. The program provides a vibrant research component for both MS and PhD degrees leading to published scientific work in reputable journals, as well as training in the panoply of research and presentation skills required to conduct and disseminate the research. Students are provided with a curriculum of integrated courses that include the essentials for biomedical research as well as courses that span cellular, developmental, systems, and behavioral neurosciences, as well as neuroanatomy and injury and disease of the nervous system. Upon completing these programs, students pursue careers in academic, governmental, or industrial settings.

The MS in Neuroscience Program

The MS program provides students a broad background in neuroscience and the techniques used in neuroscience research. In addition to the thesis-based MS program, Drexel offers a non-thesis degree program in which students can earn the degree without a research project by taking additional classes and writing a literature review paper. Students who wish to continue their graduate training after the MS degree 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 as well as original research leading to published thesis work. Laboratory rotations begin in the fall of the first year.

For more information, visit the College of Medicine's Neuroscience Program (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/Neuroscience.aspx>) web site.

Admission Requirements

Students interested in cellular, systems (including neuro-engineering) and behavioral neuroscience are encouraged to apply. There are no minimal requirements but applicants should be competitive with regard to grades, GRE scores, research experience, and letters of recommendation. Applicants are encouraged to use email to contact any of the faculty of the program with whom they may share scientific interests to discuss their suitability to the program and/or potential projects in relevant laboratories.

The Drexel University College of Medicine: School of Biomedical Sciences and Professional Studies 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 College of Medicine's Biomedical Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx>) website.

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 to 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 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 Degree Requirements: Non-Thesis Option

*MS without thesis: 36.0 semester credits***Required Courses**

ANAT 501S	Neurobiology Topics I	2.0
ANAT 602S	MEDICAL NEUROSCIENCE	6.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or IDPT 550S	Biochemistry and Biophysics	
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 609S	Graduate Neuroscience II	4.0
NEUR 508S	Graduate Neuroscience I	2.5

Advanced Neuroscience Course

Select at least one of the following:	1.0-4.0
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NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	MOTOR SYSTEMS	
Additional Suggested Electives		
Suggested Electives (min. 2.5 credits) *		2.5
MCBG 506S	ADVANCED CELL BIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHGY 503S	GRADUATE PHYSIOLOGY	
Total Credits		36.0-39.0

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

MS Degree Requirements: Thesis Option

MS with thesis: 48.0 minimum semester credits

Required Courses		
ANAT 501S	Neurobiology Topics I	2.0
or PHRM 502S	Current Topics i Pharm & Phys	
ANAT 602S	MEDICAL NEUROSCIENCE	6.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or IDPT 550S	Biochemistry and Biophysics	
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 508S	Graduate Neuroscience I	2.5
NEUR 600S	Neuroscience Thesis Research	9.0
NEUR 609S	Graduate Neuroscience II	4.0
Advanced Neuroscience Course		
Select at least one of the following:		1.0-4.0
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	MOTOR SYSTEMS	
Suggested Electives *		
MCBG 506S	ADVANCED CELL BIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHGY 503S	GRADUATE PHYSIOLOGY	
Total Credits		55.5-58.5

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

PhD Degree Requirements

Students are required to complete 96.0 credits; for additional graduation requirements, refer to the Biomedical Graduate Studies Handbook and the Neuroscience Program Policies and Procedures (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/Neuroscience.aspx>) .

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.

Required Courses		
ANAT 501S	Neurobiology Topics I	1.0-2.0
or PHRM 502S	Current Topics i Pharm & Phys	
ANAT 602S	MEDICAL NEUROSCIENCE	6.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or IDPT 550S	Biochemistry and Biophysics	
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 Rotatin	4.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 600S	Neuroscience Thesis Research (multiple semesters, as required)	54.0-72.0
NEUR 609S	Graduate Neuroscience II	4.0
Advanced Neuroscience Course		
Select at least one of the following:		1.0-4.0
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	MOTOR SYSTEMS	
Suggested Electives *		
MCBG 506S	ADVANCED CELL BIOLOGY	
PHRM 512S	Graduate Pharmacology	
PHGY 503S	GRADUATE PHYSIOLOGY	
PHRM 507S	Prin of Neuropharmacology	

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies.aspx>) programs.

Courses

NEUR 500S Statistics for Neuro/Pharm Research 2.0 Credits

This course will provide hands on instruction in how research data are managed and analyzed in neurobiological research. Studies will acquire a basic statistical knowledge with emphasis on application to data sets similar to what they can expect to encounter in their thesis research. Instruction in the use of statistical programs will be included.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 501S Neuroscience 1st Lab Rotation 4.0 Credits

First laboratory rotation. Guided research is conducted on a part-time basis for two or three 10-16 week periods. Rotations are generally conducted during fall, spring and summer of the first and second years. An oral presentation highlighting the background, rationale, methods, results and discussion of the research activity is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 502S Neuroscience 2nd Lab Rotation 4.0 Credits

Second laboratory rotation. Guided research is conducted on a part-time basis for two or three 10-16 week periods. Rotations are generally conducted during fall, spring and summer of the first and second years. An oral presentation highlighting the background, rationale, methods, results and discussion of the research activity is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 503S Neuroscience 3rd Lab Rotatin 4.0 Credits

Third laboratory rotation. Guided research is conducted on a part-time basis for two or three 10-16 week periods. Rotations are generally conducted during fall, spring and summer of the first and second years. An oral presentation highlighting the background, rationale, methods, results and discussion of the research activity is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 505S ADVANCED MOLECULAR NEUROBIOL. 1.0 Credit

This is a graduate course aimed to discuss basic concepts and state-of-the-art techniques in molecular neurobiology. The course also serves as a form for all members of the Graduate Program in Neurobiology, including faculty, graduate and post-doctoral students, and technical staff, to discuss recent developments in molecular neurobiology. The class meets once a month. Some meetings focus on basic concepts and recent findings in the field, whereas others examine novel biotechniques. The discussion is led by a speaker, who in most cases is a faculty member from the Department of Neurobiology and Anatomy. Occasionally, specialists from other institutions are invited to speak on a particular subject. Students taking the course for credits will be asked to lead one section in a related subject of their choice. Full attendance is required.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 506S NEUROSCIENCE 2ND ROTATION RES. 4.0 Credits

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

NEUR 507 Neuroscience I 3.0 Credits

NEUR 507 is the first of two courses that provide a foundation in the structure and function of the nervous system. Clinical correlations relate the material to effective clinical practice and provide a neurophysiological basis for pathological entities described in the student's clinical neurology courses and commonly encountered in the clinic.

College/Department: College of Nursing Health Professions

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is PT or major is RHAB.

NEUR 508 Neuroscience II 2.0 Credits

The course is designed to provide the student with a strong foundation in the structure and function of the nervous system. Clinical correlations are provided throughout the course to: 1). underscore the necessity for understanding the material for effective clinical practice and 2). provide a neurophysiological basis for various pathological entities described in their clinical neurology courses and commonly encountered in the clinic.

College/Department: College of Nursing Health Professions

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is PT or major is RHAB.

NEUR 508S Graduate Neuroscience I 2.5 Credits

This course is offered to incoming first year Neuroscience graduate students and covers the basic tenets of Developmental Neuroscience as well as providing a historical context to the progression of Neuroscience as a field of study.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 511S Advanced Cellular and Developmental Neuroscience 1.0 Credit

This course provides didactic teaching and in-depth discussion of topics in cellular and developmental neuroscience. Topics will emphasize the most recent and contemporary issues in the field.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 512S Advanced Systems and Behavioral Neuroscience 1.5 Credit

This course provides an in-depth understanding of cellular and systems neurophysiology. Topics include: basic mechanisms, emergent network activities, sensory processing, and models of learning and memory. May be repeated once for credit.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 1 times for 3 credits

NEUR 534 Neuroscience 3.0 Credits

This course describes: structure and functions of the human central nervous system; neurons; basic topography of the spinal cord and brain; major sensory and motor pathways; higher cortical functions. Neurological deficits resulting from stroke, brain trauma and other neuropathological processes; as well as implications for rehabilitation and psychotherapy are presented.

College/Department: College of Nursing Health Professions

Repeat Status: Not repeatable for credit

Restrictions: Can enroll if major is CATX.

NEUR 600S Neuroscience Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department, Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

NEUR 605S NEUROSCIENCE THESIS RESEARCH 8.0 Credits

Repeat Status: Not repeatable for credit

NEUR 607S INTEGRATED NEUROSCIENCE 4.0 Credits

This is a core course required of all graduate students in the Neuroscience Program. The prerequisite is completion of Medical Neuroscience. The course meets twice weekly during the fall semester for 2 hour sessions, which include a mix of lecture and discussion. The course emphasizes critical evaluation of experimental methods used for investigation problems in the organization and function of the central nervous system. One major goal of the course is to teach the students a system approach to analyzing the CNS control of behavior and physiology. The topics that are chosen to illustrate these principles of organization include sensorimotor integration; CNS development; neurochemical anatomy: sites and mechanism underlying regulation if ingestion, responses to stress and sexual behavior: central mechanisms of award, learning and memory: and recovery of function after CNS damage. An important second goal is to relate activity at the systems level to underlying cellular and molecular mechanisms. These strategies discussed throughout the course but especially in development; genetic basis of psychopathology: CNS injury and recovery; and use of molecular techniques for modulating behavior. The students are required to write four papers covering information from four separate blocks of the course and one final paper comparing the uses of transgenic knockouts, inducible knockouts and antisense approaches for studying a system of the student's choice. These papers are read by the faculty and defended by the students.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 0 times for 0 credits

NEUR 609S Graduate Neuroscience II 4.0 Credits

Graduate Neuroscience II is didactic in nature with neurological disease as the basis for understanding concepts in Cellular Neuroscience (module I), Systems Neuroscience (module II) and Behavioral Neuroscience (module III).

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 615S ADVANCED SPEC. TOPICS IN NEURO 1.0-3.0 Credit

Graduate students present current research papers in the general areas of systems and behavioral neurobiology.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 634S MOTOR SYSTEMS 4.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

NEUR 8214S NEUROSCIENCE SENIOR ELECTIVE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

NEUR 900S NEUROSCIENCE RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

NEUR 901S NEUROSCIENCE SENIOR ELECTIVE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

NEUR 9096S ELECTIVE - NEUROSCIENCE 6WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

NEUR 9750S RESEARCH - NEUROSCIENCE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

NEUR 9754S RESEARCH - NEUROSCIENCE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

NEUR 999S Special Topics in Neuroscience 1.0-4.0 Credit

This is a special topics course that will focus on graduate level topics in the area of Neuroscience. The exact content, readings, and grading will be determined by the professor on a course by course basis.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 3 times for 16 credits

Pharmacology and Physiology

Master of Science: 43.0-60.0 semester credits

Doctor of Philosophy: 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 accepted co-author manuscript and one submitted first-author manuscript in peer-reviewed journals 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 Graduate Studies (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Admissions/MastersandDoctoral.aspx>) website.

MS/PhD Degree Requirements

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 (<http://www.drexelmed.edu/Home/AcademicPrograms/BiomedicalGraduateStudies/Programs/MastersDoctoralPrograms/PharmacologyPhysiology.aspx>) page.

MS Program Requirements

MS Degree Requirements: Non-Thesis Option

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
or NEUR 500S	Statistics for Neuro/Pharm Research	
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 i Pharm & Phys	1.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHGY 503S	GRADUATE PHYSIOLOGY	4.0
Advanced Pharmacology and Physiology electives		4.0
Students are required to select a minimum of three advanced electives. Students normally consult with their committee to select advanced electives.		9.0
Total Credits		43.0

MS Degree Requirements: Thesis Option

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
or NEUR 500S	Statistics for Neuro/Pharm Research	
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 i Pharm & Phys	1.0
PHRM 503S	Pharm & Phys 1st Lab Rotation	4.0
PHRM 504S	Pharm & Phys 2nd Lab Rotation	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 600S	Pharmacology Thesis Research	9.0
PHGY 503S	GRADUATE PHYSIOLOGY	4.0
Advanced Pharmacology and Physiology Electives		
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.		8.0
Total Credits		60.0

PhD Program Requirements

PhD Degree Requirements

Required Courses		
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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	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
or NEUR 500S	Statistics for Neuro/Pharm Research	
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 i Pharm & Phys	1.0
PHRM 503S	Pharm & Phys 1st Lab Rotation	4.0
PHRM 504S	Pharm & Phys 2nd Lab Rotation	4.0
PHRM 505S	Pharm & Phys 3rd Lab Rotation	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 600S	Pharmacology Thesis Research	9.0
PHGY 503S	GRADUATE PHYSIOLOGY	4.0

Advanced Pharmacology and Physiology Electives

Students are required to select a minimum of two advanced electives. 8.0 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 Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Biomedical Graduate Studies programs.

Total Credits **96.0**

Interdepartmental Courses

IDPT 500S Responsible Conduct of Research 2.0 Credits

This two credit course is offered once a year, usually in the spring semester, one evening a week. It is presented using lecture, discussion and problem-based curriculum approaches, with associated requested readings in texts. Some topics additionally require web-based exercises and quizzes. Graduate students, postdoctoral researchers and faculty discuss current issues of scientific integrity that all scientists encounter in their research. Solutions to hypothetical and real research challenges and ethical dilemmas are discussed and debated by trainees and faculty. Course sessions and discussions are led by a team of faculty leaders, including department head, deans and provosts. Grades are based on quizzes, class participation, web-based exercises, a term paper and a PowerPoint presentation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 0 times for 0 credits

IDPT 501S Biostatistics I 2.0 Credits

Introduction to the theory of probability, frequency distribution, correlation's and regression analysis, probability, chi-square and analysis of variance, applications of statistics in the laboratory.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 9 times for 999 credits

IDPT 503S SEARCHING BIOMEDICAL LITERATUR 1.0 Credit

This course surveys information sources in the library (books, journals, computer "finding tools"), with primary focus on finding biomedical journal articles via MEDLINE. Search planning is emphasized, including points on using Medical Subject Headings and precautions when searching title/abstract words. Resources for keeping up with the literature and maintaining personal files are briefly mentioned.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 505S BIOMEDICAL RESEARCH 9.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 506S BIOSTATISTICS II 2.0 Credits

Graduate Biostatistics II picks up where Biostatistics I leaves off. It teaches applications of commonly-used techniques in greater depth, with the intended audience being individuals who will be using statistics considerably in their work. This course includes one and two-way ANOVAs (and post hoc tests), multivariate techniques, power analysis, and other methods. The basic of the SPSS computer program is taught as well.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 507S Teaching Practicum I 1.0-4.0 Credit

The goal of this practicum is to provide mentored teaching experiences for graduate students enrolled in the biomedical science programs of the COM. Graduate students in COM programs can meet practicum requirements in a variety of teaching venues including but not limited to tutoring, laboratory instruction, conferences, and lectures in medical school and graduate program-specific courses. Eligible teaching experiences also include instruction for high school and undergraduate students. Credits for each practicum will be awarded according to preparation time and contact hours. 1 credit hr = 16hrs of instruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 508S Teaching Practicum II 1.0-4.0 Credit

The goal of this practicum is to provide mentored teaching experiences for graduate students enrolled in the biomedical science programs of the COM. Graduate students in COM programs can meet practicum requirements in a variety of teaching venues including but not limited to tutoring, laboratory instruction, conferences, and lectures in medical school and graduate program-specific courses. Eligible teaching experiences also include instruction for high school and undergraduate students. Credits for each practicum will be awarded according to preparation time and contact hours. 1 credit hr = 16hrs of instruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 509S Teaching Practicum III 1.0-4.0 Credit

The goal of this practicum is to provide mentored teaching experiences for graduate students enrolled in the biomedical science programs of the COM. Graduate students in COM programs can meet practicum requirements in a variety of teaching venues including but not limited to tutoring, laboratory instruction, conferences, and lectures in medical school and graduate program-specific courses. Eligible teaching experiences also include instruction for high school and undergraduate students. Credits for each practicum will be awarded according to preparation time and contact hours. 1 credit hr = 16hrs of instruction.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 521S Molecular Structure and Metabolism 5.0 Credits

Introduction to the fundamental concepts of biochemistry and molecular biology. Topics covered include the structure and function of biomolecules such as proteins, nucleic acids, carbohydrates, and lipids; enzymes; membrane transport phenomena; second messenger signaling; prokaryotic and eukaryotic DNA replication; transcription and translation; protein processing and trafficking; and intermediary metabolism.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 524S Molecular Genetics 0.0 Credits

The goal of the molecular genetics core course is to familiarize students with the underlying mechanisms regulating the inheritance of genetic material. In addition, students will be introduced to genetic methodologies used to manipulate, interpret and define gene function.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 525S Immunology 0.0 Credits

Topics will include cells of the immune system and their development and function, antigen/antibody interactions and the generation of antibody diversity, the major histocompatibility complex, humoral immunity, cell-mediated immunity, transplantation immunology, and immune dysfunction and disease immune mechanisms.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 526S Cells to Systems 5.0 Credits

Cells to Systems provides a foundation in cell biology, with topics in cytoskeleton, cell adhesion, membrane biology, endocytosis, intracellular signaling, cell cycle, cell growth (cancer), cell senescence, cell death (apoptosis), and genetic methodologies. A final section covers integrative topics on complex biological systems operating in intact organisms.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 528S Cell Biology II 0.0 Credits

This module covers basic membrane transport processes, the ionic basis of membrane excitability, various types of ion channels, the process and role of endocytosis in cell function, step in folding of nascent proteins and protein degradation, protein import into various organelles including the nucleus, ER and mitochondria, and protein processing and trafficking the Golgi.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 531S Integ of Bio Func in Organ Sys 0.0 Credits

This module will provide an introduction to aspects of endocrinology, cardiovascular physiology, and central nervous system function as a means of illustrating the integration of molecular and cellular biological functions in the intact organism.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 532S SUMMER MAKE-UP MED BIOCHEM 7.0 Credits

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 536S Molecular Genetics 1.5 Credit

The goal of the molecular genetics core course is to familiarize students with the underlying mechanisms regulating the inheritance of genetic material. In addition, students will be introduced to genetic methodologies used to manipulate, interpret and define gene function.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 537S Immunology 1.5 Credit

Topics will include cells of the immune system and their development and function, antigen/antibody interactions and the generation of antibody diversity, the major histocompatibility complex, humoral immunity, cell-mediated immunity, transplantation immunology, and immune dysfunction and disease immune mechanisms.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 542S Integ of Bio Func in Org Sys 2.0 Credits

This module will provide an introduction to aspects of endocrinology, cardiovascular physiology, and central nervous system function as a means of illustrating the integration of molecular and cellular biological functions in the intact organism.

College/Department: Biomedical Graduate Studies_COM

Repeat Status: Not repeatable for credit

IDPT 550S Biochemistry and Biophysics 5.0 Credits

This course includes the fundamentals of metabolism, enzymology, protein synthesis and structure, and molecular biology taught from neuroscience perspective. In addition, there are lectures on biophysics of ion channels, and neuronal circuits.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 600S Thesis Defense 9.0 Credits

Students who have complete all course work and research requirements, but have not defended their thesis, may carry a status of "Registered for Thesis Defense Only". This registration carries no credit, has no fee and students receive no grade. Students may only be registered for thesis defense for no more than two semesters. Students may not be registered for this category if they are registered for any other graduate courses.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 9 times for 999 credits

IDPT 601S Optional Rotation 4.0 Credits

Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during fall, spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 7001S Professionalism in Medicine 1 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 7002S Professionalism in Medicine 2 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 7003S Professionalism in Medicine 3 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 7004S Professionalism in Medicine 4 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 703S HUMAN SEXUALITY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 9 times for 999 credits

IDPT 706S PHYSICIAN AND PATIENT 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 710S PIL FALL SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 720S PIL WINTER SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 730S PIL SPRING SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 740S PIL SUMMER SESSION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 750S PIL FALL SESSION II 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 751S INTR TO GERIATRICS/GERONTOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 752S INTRODUCTION TO AMBULATORY MEDICINE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 760S PIL WINTER SESSION II 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 770S PIL SPRING SESSION II 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 800S Register for Degree Only 9.0 Credits

This is a course designated to allow students who recently defended the opportunity to finish up any loose ends while maintaining the graduate student status. Students can only register for this course after they have defended their thesis.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

IDPT 801S CLINICAL PRACTICE EXAM (S/U) 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 802S FOURTH YEAR RESEARCH COURSE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 821S INTERDEPT. ELECT.-NUTRITION 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 822S ACADEMIC ELECTIVE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 823S MD/MPH RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

IDPT 824S MD/Ph.D RESEARCH 0.0 Credits**College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**IDPT 850S Literature Review Non-Thesis MS 4.0 Credits**

Literature Review of a specific topic directed at fulfillment of the degree requirement for a scholarly paper by non-thesis master's students.

Progress is monitored by student's advisor and advisory committee.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Can be repeated 2 times for 8 credits**IDPT 901S CLINICAL EXAM PREP 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**IDPT 990S INDEPENDENT STUDY 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**IDPT 991S INDEPENDENT STUDY 2 0.0 Credits****College/Department:** College of Medicine**IDPT 992S INDEPENDENT STUDY 3 0.0 Credits****College/Department:** College of Medicine**IDPT 997S SUMMER ENRICHMENT PROGRAM 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**IDPT 998S TERM ACTIVATOR 0.0 Credits****College/Department:** College of Medicine**Repeat Status:** Not repeatable for credit**IDPT 999S Special Topics in Biomedical Sciences 1.0-4.0 Credit**

Special Topics in Biomedical Sciences.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Can be repeated 3 times for 16 credits

Pharmacology Courses

PHRM 502S Current Topics i Pharm & Phys 1.0 Credit

Current topics in experimental pharmacology are presented via a journal club alternating with research presentations. In addition to active student participation, all members of the department of pharmacology and physiology (research assistants, postdoctoral fellows and faculty) participate.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Can be repeated multiple times for credit**PHRM 503S Pharm & Phys 1st Lab Rotation 4.0 Credits**

First rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Not repeatable for credit**PHRM 504S Pharm & Phys 2nd Lab Rotation 4.0 Credits**

Second rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Not repeatable for credit**PHRM 505S Pharm & Phys 3rd Lab Rotation 4.0 Credits**

Third rotation. Guided research is conducted on a part-time basis for two or three 8-10 week periods. Rotations are generally conducted during spring or summer of the first year. A written research report is required at the end of each rotation.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Not repeatable for credit**PHRM 507S Prin of Neuropharmacology 3.0 Credits**

This course covers basic concepts in Neuropharmacology, all of the major neurotransmitter systems, behavioral pharmacology and addition, approaches to molecular and cellular physiology including photoactivated biomolecules, electrophysiology, phosphorylation.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Not repeatable for credit**PHRM 512S Graduate Pharmacology 3.0 Credits**

This team taught course provides a basic knowledge of the pharmacologic mechanisms of action, effects on organ systems, routes of administration, pharmacokinetics, therapeutic uses, adverse reactions, contraindications, and drug interactions of drugs.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Not repeatable for credit**PHRM 516S Advanced Topics in Physiology 1.0 Credit**

PHRM516S is presented in several formats throughout the semester to discuss cellular physiology, neurophysiology, muscle physiology, cardiovascular physiology, pulmonary physiology, gastrointestinal physiology, endocrinology, and renal physiology. These formats include review of past scientific findings that led to the current understanding of a physiological principle, journal club style format, self-directed problem sheets, development of a working model based on past and present scientific knowledge, and point/counter-point discussions where students debate pros and cons of a controversy in physiology.

College/Department: COM School of Biomedical Sciences Professional Studies**Repeat Status:** Not repeatable for credit**Corequisite:** PHGY 503S

PHRM 517S Advanced Topics in Pharmacology 1.0 Credit

This course will expand upon the Graduate Pharmacology course for graduate students enrolled in Graduate Pharmacology 512S. The intent is to provide more in-depth coverage of selected topics that will be beneficial to students pursuing a career where pharmacology is a principle component of training, education and/or employment.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Corequisite: PHRM 512S

PHRM 518S New Frontiers in Therapy 1.0 Credit

This course will provide a glimpse of what could revolutionize diagnosis and treatment with emphasis on personalized medicine. Scientific impact, technical challenges, and sociopolitical repercussions will be discussed. Students will be required to write a research proposal in NIH format and are expected to participate in peer review.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 519S Methods in Biomedical Research 1.0 Credit

A primary goal for this course is to introduce Pharmacology & Physiology graduate students to the breadth of techniques used within the Department. Students will gain insight into not only some of the technical aspects of a variety of methods, but also how to critically examine techniques in both their own research and the literature for strengths, weaknesses and limits. At the end of the course, students should have a greater appreciation for the modalities used outside of their own labs, and an understanding of how those technologies are moving biomedical research forward.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 520S Internship in Drug Discovery and Development 4.0 Credits

The Internship in Drug Discovery and Development provides the student with a unique opportunity to apply the principles and skills learned in the classroom and acquire valuable professional experience and critical insight in a specific field. The internship is integrated into the curriculum such that it complements classroom activities and permits the student to explore an area of interest that they may ultimately pursue as a career path. Students are paired with experienced professionals who supervise their work and act as mentors and advisors. Internships can be arranged with an extensive network of pharmaceutical corporations, biotechnology companies, foundations and universities in the region as well as Drexel University itself.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: PHRM 512S [Min Grade: C] and PHGY 503S [Min Grade: C] and PHRM 525S [Min Grade: C]

PHRM 521S Intensive Internship in Drug Discovery and Development 9.0 Credits

The Intensive Internship in Drug Discovery and Development provides the student with a unique opportunity to apply the principles and skills learned in the classroom and acquire valuable professional experience and critical insight in a specific field. The internship is integrated into the curriculum such that it complements classroom activities and permits the student to explore an area of interest that they may ultimately pursue as a career path. Students are paired with experienced professionals who supervise their work and act as mentors and advisors. Internships can be arranged with an extensive network of pharmaceutical corporations, biotechnology companies, foundations and universities in the region as well as Drexel University itself.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: PHRM 512S [Min Grade: C] and PHGY 503S [Min Grade: C] and PHRM 525S [Min Grade: C]

PHRM 525S Drug Discovery and Development I 3.0 Credits

This course, the first of two, will provide in-depth exposure to the concepts and processes involved in drug discovery and development as practiced in the biopharmaceutical industry cover all facets from target identification through to the submission of the investigational New Drug Application (IND). Current unmet medical needs and case histories from difference therapeutic areas will be reviewed.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 526S Drug Discovery and Development II 3.0 Credits

This course will provide in-depth exposure to the concepts and processes involved in drug discovery and development as practiced in the biopharmaceutical industry. It will follow the first course (Drug Discovery and Development I) and will cover all aspects from roval process to the submission of the NDA to regulatory approval and post-marketing surveillance.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

Prerequisites: PHRM 525S [Min Grade: B]

PHRM 600S Pharmacology Thesis Research 9.0 Credits

Research toward the fulfillment of the dissertation is conducted beginning after successful completion of the qualifying examination. Progress is monitored by the student's advisor and department, Advisory Committee or Thesis Committee.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated multiple times for credit

PHRM 602S RESEARCH METHODS IN PHARMACOLOGY 2.0 Credits

A research course in which the student participates in several research projects under the direction of different staff members in order to become familiar with the specific areas of expertise of the faculty. This course emphasizes not only experimental methods but also the conceptual bases for investigating current problems in pharmacology.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 605S Research in Drug Discovery and Development 4.0**Credits**

This course is designed to provide opportunities for the student to pursue research in the area of drug discovery and development. This can be done either in an academic or pharmaceutical laboratory under the supervision of a mentor. An alternative or an additional aspect can be the conduct of research for this thesis that is not laboratory research but library research based on an approved topic for the thesis requirement. Both alternatives, laboratory or library research must be approved by the course directors.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Not repeatable for credit

PHRM 751S MEDICAL PHARMACOLGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 823S CARDIOVASCULAR PHARMACOLOGY 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 895S PHARMACOLOGY RESEARCH 0.0 Credits

Repeat Status: Not repeatable for credit

PHRM 9092S PHARMACOLOGY - ELECTIVE - 2WKS 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 9094S PHARMACOLOGY -ELECTIVE 0.0 Credits

College/Department: College of Medicine

Repeat Status: Can be repeated 0 times for 0 credits

PHRM 9750S RESEARCH-PHARMACOLOGY-16 wks 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 9754S PHARMACOLOGY RESEARCH 0.0 Credits

College/Department: College of Medicine

Repeat Status: Not repeatable for credit

PHRM 999S Special Topics in Pharmacology & Physiology 1.0-4.0**Credit**

This is a special topics course that will focus on graduate level topics in the area of Pharmacology & Physiology. The exact content, readings, and grading will be determined by the professor on a course by course basis.

College/Department: COM School of Biomedical Sciences Professional Studies

Repeat Status: Can be repeated 3 times for 16 credits