DREXEL UNIVERSITY

College of

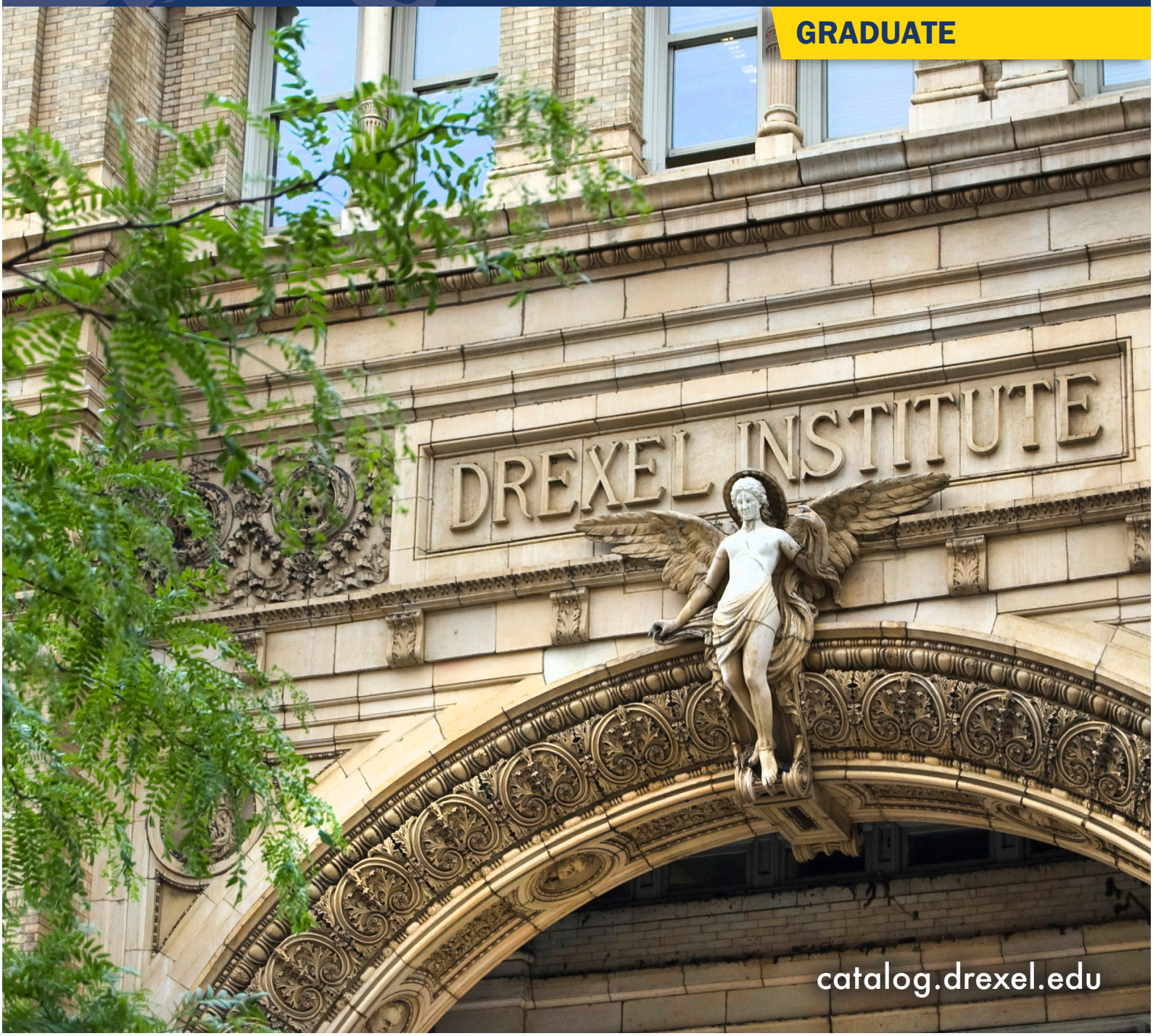
Medicine

Graduate School of Biomedical Sciences and Professional Studies

CATALOG

2021-2022

GRADUATE



catalog.drexel.edu

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College of Medicine: Graduate School of Biomedical Sciences and Professional Studies

Overview

Renowned for its innovative, student-centered educational programs, the Graduate School of Biomedical Sciences and Professional Studies in the College of Medicine at Drexel University provides regionally unique PhD and Master's level academic offerings that attract the brightest, most ambitious and entrepreneurial applicants. With a strong emphasis on job placement in different scientific and health related career fields as well as academic rigor to prepare students for medical and health-related professional schools, Drexel students are at the forefront of their selected disciplines and emerge as graduates as the next generation of leaders.

Today, there are approximately 900 students pursuing doctoral or master's degrees and certificates within the Graduate School in the College of Medicine.

The collaborative nature of the Graduate School in the College of Medicine with other Drexel schools, for example Engineering and the College of Arts and Sciences, provides students with a multidisciplinary advantage. Coupled with the solid foundation afforded by a Drexel education, the innovation-driven programs offer students a unique experience that prepares them well to launch their careers in their chosen field of study.

The Graduate School of Biomedical Sciences and Professional Studies is committed to supporting and promoting an academic success-network that propels the transition from training in different disciplines to becoming leaders in solving global problems.

More information is available on the Graduate School of Biomedical Sciences and Professional Studies (http://www.drexel.edu/medicine/Academics/Graduate-School/) website.

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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 (http://www.drexel.edu/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 (http://www.drexel.edu/medicine/About/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.

Academic Medicine

Major: Academic Medicine
Degree Awarded: Master of Science
Calendar Type: Semester
Total Credit Hours: 36.0 + research-based publication; Additional 25.0 credits for concentration in otolaryngology
Classification of Instructional Programs (CIP) code: 51.1199
Standard Occupational Classification (SOC) code: 25-1071

Note: This program is currently not accepting students.

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.

Additional Information

Visit the Office of Biomedical Graduate Studies Admissions website for more detailed information about applying to the program, including important application dates.

Degree Requirements

A minimum of 36.0 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.

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**

Writing-Intensive Course Requirements

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

A "WI" next to a course in this catalog may indicate that this course can fulfill a writing-intensive requirement. For the most up-to-date list of writing-intensive courses being offered, students should check the Writing Intensive Course List (http://drexel.edu/coas/academics/departments-centers/english-philosophy/university-writing-program/writing-intensive-courses/) at the University Writing Program (http://drexel.edu/coas/academics/departments-centers/english-philosophy/university-writing-program/). (http://drexel.edu/coas/academics/departments-centers/english-philosophy/university-writing-program/drexel-writing-center/) Students scheduling their courses can also conduct a search for courses with the attribute "WI" to bring up a list of all writing-intensive courses available that term.

Biochemistry of Health & Disease

Major: Biochemistry of Health and Disease
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0 (non-thesis); 54.0 (thesis)
Classification of Instructional Programs (CIP) code: 26.0210
Standard Occupational Classification (SOC) code: 19-1021

About the Program

The graduate program in Biochemistry of Health & Disease offers a challenging and broad-based curriculum of research and coursework leading to the MS or PhD degree (p. 10). The aim of the graduate program is to train the next generation of biomedical scientists in the theory and practice of biochemistry, biophysics and molecular biology, in an environment of experiential learning that fosters new discoveries in biomedical research. Graduate students will be challenged to become independent and critical thinkers, and prepared for the demands of scientific careers in industry, academia, and government. The themes of molecular structure, molecular mechanism, and molecular regulation are recurrent throughout the diverse research areas represented by the program faculty.

Admission Requirements

A minimum of two years of full-time study is required for an MS degree. This program is designed to prepare students for competitive industry jobs and for acceptance into PhD programs.

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.

Applicants may only apply to one program. All documents submitted by you or on your behalf in support of this application for admission to Drexel University become the property of the University, and will under no circumstances be released to you or any other party. Please note, an application fee of $75 U.S. is required.

Transcripts

Provide official transcripts from all colleges and universities attended.

International students: If you have already graduated from your previous institution at the time of your application, please email your graduation certificate(s) attached as PDF or Microsoft Word documents to enroll@drexel.edu.

- International Transcript Evaluation (international applicants only)

Transcripts must be evaluated by the following agency for admittance into this program:

World Education Services, Inc. (WES)
Bowling Green Station, PO Box 5087
New York, NY 10274-5087
212.966.6311

Applicants are responsible for supplying all necessary documentation and paying all necessary fees to have your transcripts evaluated by by WES. Please have the course-by-course evaluation sent to the mailing address listed below.

Standardized Test Scores

Submit official Graduate Record Examination (GRE) test scores. Medical College Admission Test (MCAT) scores may be submitted in lieu of GRE scores. Electronic submission is preferred through our school code, 2194.

TOEFL scores are required for international applicants or applicants who earned a degree outside the U.S. IELTS scores may be submitted in lieu of TOEFL scores. Scores will be reviewed based on section scores and total scores.

Essay

Please write approximately 500 words explaining your reasons for pursuing a degree from Drexel; your short-term and long-term career plans; and how your background, experience, interest, and/or values, when combined with a Drexel degree, will enable you to pursue these goals successfully.

Submit your essay with your application or through the Discover Drexel portal after you submit your application.

Resume

Upload your résumé as part of your admission application or through the Discover Drexel Portal after you submit your application.

Letters of Recommendation

Three letters of recommendation are required. To electronically request recommendations, you must list your recommenders and their contact information on your application. We advise that you follow up with your recommenders to ensure they received your recommendation request — they may need to check their junk mail folder. Additionally, it is your responsibility to confirm that your recommenders will submit letters by your application deadline and follow up with recommenders who have not completed their recommendations.

Request recommendations with your application or through the Discover Drexel portal after you submit your application.

Math Science GPA Form

Complete your Math Science GPA form through the Discover Drexel portal after you submit your application.

Degree Requirements (Thesis)

Required Courses		
BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club *	4.0
BIOC 507S	Biochemistry Seminar Series *	4.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 521S	Introduction to Biochemical Data	2.0
BIOC 600S	Biochemistry Thesis Research **	18.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
One Advanced Elective		**3.0**
Select at least one of the following Advanced Electives for a minimum of three credits		
BIOC 511S	Communication for Researchers	
BIOC 520S	Macromolecular Structure & Function	
BIOC 522S	Biochemistry of Drug Discovery & Design	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 510S	Cancer Biology	
CBIO 512S	Advanced Cancer Biology	
MCBG 506S	Advanced Cell Biology	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 625S	Advanced Molecular Virology	
MIIM 630S	Advanced Molecular Biology	
NEUR 609S	Graduate Neuroscience II	
PHGY 503S	Graduate Physiology	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
Total Credits		**54.0**

* This 1.0 credit course is taken 4 times.

** This 9.0 credit course is taken 3 times.

Approved Electives

Students may opt to take additional approved electives from the list below in consultation with their advisor.

BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 504S	Biochemistry 3rd Lab Rotation	4.0
IDPT 507S	Teaching Practicum I	1.0-4.0
IDPT 508S	Teaching Practicum II	1.0-4.0
IDPT 509S	Teaching Practicum III	1.0-4.0
IDPT 600S	Thesis Defense	9.0

Degree Requirements (Non-Thesis)

Required Courses		
BIOC 506S	Biochemistry Journal Club *	4.0
BIOC 507S	Biochemistry Seminar Series *	4.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 521S	Introduction to Biochemical Data	2.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
Advanced Electives		**3.0**
Select at least one of the following Advanced Electives for a minimum of three credits		
BIOC 511S	Communication for Researchers	
BIOC 520S	Macromolecular Structure & Function	
BIOC 522S	Biochemistry of Drug Discovery & Design	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 510S	Cancer Biology	
CBIO 512S	Advanced Cancer Biology	
MCBG 506S	Advanced Cell Biology	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 625S	Advanced Molecular Virology	
MIIM 630S	Advanced Molecular Biology	
NEUR 609S	Graduate Neuroscience II	
PHGY 503S	Graduate Physiology	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
Total Credits		**36.0**

* This 1.0 credit course is taken 4 times (once per semester).

Approved Electives

Students may opt to take additional approved electives from the list below in consultation with their advisor.

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 600S	Biochemistry Thesis Research	9.0
IDPT 507S	Teaching Practicum I	1.0-4.0
IDPT 508S	Teaching Practicum II	1.0-4.0
IDPT 509S	Teaching Practicum III	1.0-4.0

Sample Plan of Study (Thesis)

First Year

Fall	Credits	Spring	Credits
BIOC 502S	4.0	BIOC 506S	1.0
BIOC 506S	1.0	BIOC 507S	1.0
BIOC 507S	1.0	IDPT 504S	1.0
IDPT 502S	1.0	IDPT 526S	5.0
IDPT 521S	5.0	Advanced Elective	3.0
	12		**11**

Second Year

Fall	Credits	Spring	Credits
BIOC 506S	1.0	BIOC 506S	1.0
BIOC 507S	1.0	BIOC 507S	1.0
BIOC 508S	3.0	BIOC 521S	2.0
BIOC 600S	9.0	BIOC 600S	9.0
IDPT 500S	2.0		
IDPT 501S	2.0		
	18		**13**

Total Credits 54

Sample Plan of Study (Non-Thesis)

First Year

Fall	Credits	Spring	Credits
BIOC 506S	1.0	BIOC 506S	1.0
BIOC 507S	1.0	BIOC 507S	1.0
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
Elective	1.0	Elective	1.0
	9		**9**

Second Year

Fall	Credits	Spring	Credits
BIOC 506S	1.0	BIOC 506S	1.0
BIOC 507S	1.0	BIOC 507S	1.0
BIOC 521S	2.0	BIOC 508S	3.0
IDPT 500S	2.0	IDPT 850S	4.0
IDPT 501S	2.0		
Elective	1.0		
	9		**9**

Total Credits 36

Biochemistry of Health & Disease

Major: Biochemistry of Health and Disease
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 131.0
Classification of Instructional Programs (CIP) code: 26.0210
Standard Occupational Classification (SOC) code: 19-1021

About the Program

The graduate program in Biochemistry of Health & Disease offers a challenging and broad-based curriculum of research and coursework leading to the MS (p. 7) or PhD degree. The aim of the graduate program is to train the next generation of biomedical scientists in the theory and practice of biochemistry, biophysics and molecular biology, in an environment of experiential learning that fosters new discoveries in biomedical research. Graduate students will be challenged to become independent and critical thinkers, and prepared for the demands of scientific careers in industry, academia, and government. The themes of molecular structure, molecular mechanism, and molecular regulation are recurrent throughout the diverse research areas represented by the program faculty.

This program is research intensive, with the ultimate goal of training students to become leaders of scientific research in academics and industry. 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 future careers in college teaching, research administration, science policy, or patent law.

Admission Requirements

All documents submitted by you or on your behalf in support of this application for admission to Drexel University become the property of the University, and will under no circumstances be released to you or any other party. Please note, an application fee of $75 U.S. is required.

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Degree Requirements

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BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 504S	Biochemistry 3rd Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club *	9.0
BIOC 507S	Biochemistry Seminar Series *	9.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 511S	Communication for Researchers	2.0
BIOC 521S	Introduction to Biochemical Data	2.0
BIOC 600S	Biochemistry Thesis Research **	63.0
IDPT 500S	Responsible Conduct of Research	2.0

IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
Advanced Electives		**6.0**
Select at least two Advanced Electives for a minimum of six credits.		
BIOC 520S	Macromolecular Structure & Function	
BIOC 522S	Biochemistry of Drug Discovery & Design	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 510S	Cancer Biology	
CBIO 512S	Advanced Cancer Biology	
MCBG 506S	Advanced Cell Biology	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 604S	Special Topics in Virology	
MIIM 630S	Advanced Molecular Biology	
NEUR 609S	Graduate Neuroscience II	
PHGY 503S	Graduate Physiology	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
Total Credits		**131.0**

* Taken each semester with the exception of the last, when only Thesis Defense is taken.

** Taken each semester starting in Year 2, with the exception of the last semester when only Thesis Defense is taken.

Sample Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 502S	4.0	BIOC 503S	4.0
BIOC 506S	1.0	BIOC 504S	4.0
BIOC 507S	1.0	BIOC 506S	1.0
IDPT 502S	1.0	BIOC 507S	1.0
IDPT 521S	5.0	BIOC 521S	2.0
		IDPT 501S	2.0
		IDPT 504S	1.0
		IDPT 526S	5.0
	12		**20**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
IDPT 500S	2.0	BIOC 506S	1.0
BIOC 506S	1.0	BIOC 507S	1.0
BIOC 507S	1.0	BIOC 511S	2.0
BIOC 508S	3.0	BIOC 600S	9.0
BIOC 600S	9.0	Advanced Elective	3.0
Advanced Elective	3.0		
	19		**16**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 506S	1.0	BIOC 506S	1.0
BIOC 507S	1.0	BIOC 507S	1.0
BIOC 600S	9.0	BIOC 600S	9.0
	11		**11**
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 506S	1.0	BIOC 506S	1.0
BIOC 507S	1.0	BIOC 507S	1.0

BIOC 600S	9.0	BIOC 600S	9.0
	11		**11**
Fifth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 506S	1.0	IDPT 600S	9.0
BIOC 507S	1.0		
BIOC 600S	9.0		
	11		**9**

Total Credits 131

Biomedical Studies

Major: Biomedical Studies
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 51.0 graduate, 28.0 undergraduate
Classification of Instructional Programs (CIP) code: 26.0102
Standard Occupational Classification (SOC) code: 19-1042

About the Program

This two-year special master's degree program is designed for students who have completed all health professional school prerequisites and need to strengthen their science background and MCAT score before applying to medical or other health professional schools.

In the first year, students take advanced undergraduate courses in physics and chemistry, graduate courses in biochemistry, physiology, anatomy, psychology/sociology, laboratory techniques, a community outreach course, and a year-long dedicated MCAT preparation course. Students transition into the second year of the program after passing all courses with a minimum cumulative graduate GPA of 3.0, sitting for the MCAT, and completing a summer research project. Students typically submit their medical school applications during the summer between year one and year two. During the second year, students take rigorous coursework in biochemistry, physiology, microanatomy, and neuroanatomy, utilizing the medical-school-equivalent lectures and laboratory materials of the IMS curriculum (p. 61), complemented by an ethics and a professionalism course.

The Master of Science degree will be awarded contingent upon satisfactory completion of all program requirements, including a minimum cumulative graduate GPA of 3.0.

Additional Information

Drexel University College of Medicine
Division of Pre-Medical and Pre-Health Programs
Graduate School of Biomedical Sciences and Professional Studies
New College Building, Room 4104
245 North 15th Street, Mail Stop 344
Philadelphia, PA 19102

Phone: 215-762-4692
Email: CoM_MedicalSciences@drexel.edu

For more information about this program, visit the College of Medicine's Master of Science in Biomedical Studies (http://drexel.edu/medicine/academics/graduate-school/biomedical-studies/) webpage.

Admission Requirements

Applicants to the MBS program must have fulfilled all undergraduate pre-medical requirements and demonstrated mastery of the material at a minimum grade of C. These requirements include a year of biology, chemistry, physics, and organic chemistry, including respective laboratory sections. Applicants are required to submit official MCAT scores if the exam was taken or official GRE scores in lieu of the MCAT. The following credentials are competitive for application to the MBS program:

- A minimum undergraduate math/science (BCPM) and cumulative GPA of 2.9
- All premedical prerequisite courses at a grade of C or better
- Minimum MCAT scores of 35th percentile or minimum GRE scores of 50th percentile

Applicants with lower scores may be considered if they can demonstrate a marked improvement in their academic history. Healthcare-related experiences, community service, research, leadership, and extracurricular activities are also taken into consideration.

Degree Requirements

Required Undergraduate Courses		
MSPP 400S	Advanced Topics in Chemistry I	4.0
MSPP 401S	Advanced Topics in Chemistry II	4.0
MSPP 402S	Advanced Topics in Physics I	4.0
MSPP 403S	Advanced Topics in Physics II	4.0
MSPP 404S	Concepts in Science and Verbal Reasoning I	6.0
MSPP 405S	Concepts in Science and Verbal Reasoning II	6.0
Required MS Courses		
IMSP 502S	Medicine and Society	3.0
IMSP 506S	Medical Professionalism and Leadership	3.0
IMSP 513S	Medical Biochemistry	6.0
IMSP 522S	Medical Physiology I	3.0
IMSP 523S	Medical Physiology II	3.0
IMSP 542S	Medical Microanatomy I	4.0
IMSP 543S	Medical Microanatomy II	2.0
IMSP 562S	Medical Neuroanatomy	6.0
MSPP 505S	Laboratory Techniques in Biochemistry & Molecular Biology	2.0
MSPP 511S	Concepts in Biochemistry and Cell Biology	4.0
MSPP 512S	Psychosocial and Behavioral Factors in Health and Medicine	3.0
MSPP 513S	Advanced Human Anatomy	4.0
MSPP 515S	Advanced Human Physiology	4.0
MSPP 525S	Community Dimensions of Medicine	2.0
Summer Research Project		
MSPP 550S	Research Project	2.0
Additional Non-required Courses		
IMSP 544S	Medical Immunology I	
IMSP 545S	Medical Immunology II	
IMSP 552S	Medical Nutrition	
Total Credits		**79.0**

Sample Plan of Study

First Year

Fall	**Credits**	**Spring**	**Credits**
Required Undergraduate Courses		Required Undergraduate Courses	
MSPP 400S	4.0	MSPP 401S	4.0
MSPP 402S	4.0	MSPP 403S	4.0
MSPP 404S	6.0	MSPP 405S	6.0
Required Graduate Courses		Required MS Courses	
MSPP 505S	2.0	MSPP 513S	4.0
MSPP 511S	4.0	MSPP 515S	4.0
MSPP 512S	3.0		
MSPP 525S*	2.0		
	25		**22**

Second Year

Fall	**Credits**	**Spring**	**Credits**
IMSP 513S	6.0	IMSP 506S	3.0
IMSP 522S	3.0	IMSP 523S	3.0
IMSP 542S	4.0	IMSP 543S	2.0
IMSP 502S	3.0	IMSP 562S	6.0
MSPP 550S	2.0	Optional	
Optional		IMSP 545S	
IMSP 544S		IMSP 552S	
	18		**14**

Total Credits 79

* This course will be offered over two semesters

Biomedicine and Business

Major: Biomedicine and Business
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 11-1021

About the Program

Mission Statement

The online MS in Biomedicine and Business degree program provides comprehensive training in fundamental aspects of scientific discovery, technology commercialization, and business. The program prepares graduates for management positions in scientifically oriented organizations in the public or private sector (e.g., biotechnology and pharmaceutical industry, academics, government, and non-profit organizations). Students develop broad core knowledge in biological sciences and biomedical technology development and commercialization plus finance, economics, and organizational leadership.

Curriculum

This is an interdisciplinary program offered by the College of Medicine. The science courses are taught by faculty from Drexel University College of Medicine. Faculty from Drexel University's LeBow College of Business teach the business courses.

- Non-thesis program (36.0 semester credits are needed to graduate)
- Required and elective courses in each discipline
- Flexible internship elective (experiential learning)
- Customizable plan of study

Format

- Online (select courses in both disciplines are offered face to face on campus)
- New students admitted each fall and spring semesters
- Classes taught throughout the year (fall, spring, and summer)
- Accelerated: 1-year MS (full-time) or 1.5 years (part-time)

Full-Time and Part-Time Options

Students may meet the degree requirements on either a full-time (at least 9.0 credits per semester) or part-time basis. Full-time students generally complete the program in one year. Part-time students must complete the program within four years. Students must enroll in at least 4.5 semester credits of College of Medicine courses to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (https://drexel.edu/drexelcentral/).

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

For questions about how to apply to the program, please contact an enrollment counselor at duonline@drexel.edu or visit the Drexel University Online MS in Biomedicine and Business webpage (https://online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-business/).

For information regarding financial aid, please visit Drexel Central (https://drexel.edu/drexelcentral/).

Admission Requirements

New students are admitted every fall and spring semester.

Post-college applicants must have completed a four-year degree program. An undergraduate degree in science is preferred but not required. A minimum cumulative grade point average (GPA) of 3.0 is strongly preferred.

Applicants must also fulfill the following requirements for consideration:

- Official transcripts from all colleges and universities attended
- Essay/personal statement

- Resume
- References from at least three instructors or professionals

Official test scores from graduate and professional admission exams, such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Law School Admission Test (LSAT), or Medical College Admission Test (MCAT), are optional but highly desirable.

Three letters of recommendation are required. If you received your degree within the last five years, it is strongly recommended that at least one letter of recommendation be provided by someone familiar with your academic qualifications and potential (e.g., your undergraduate advisor, a course instructor, or your research mentor). If you are requesting a letter from someone at your place of employment, the recommendation should be provided by a supervisor (or another more senior manager) with direct knowledge of your work and should address your scientific aptitude as well as your work ethic.

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). IELTS scores may be submitted in lieu of TOEFL scores.

- TOEFL score needs to be at least 90 with at least a 27 in both the reading and writing sections
- IELTS score needs to be above 7

An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

Certain visa types do not permit individuals to enroll in online or hybrid programs. Foreign applicants should check with their visa sponsors for eligibility. Drexel University cannot sponsor F-1 or J1 visas for individuals interested in online, hybrid, or part-time programs.

Online applications (https://online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-business/#apply) are accepted all year round for consideration for either fall or spring admission. Students may defer admission by one year. All admission decisions are made at the College of Medicine.

Additional Information

For more information, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Degree Requirements

Science courses are offered by Drexel University College of Medicine and are taught in **semester terms** (fall, spring and summer). Business courses are offered by LeBow College of Business and are taught face to face in **quarter terms** (fall and winter quarters only).

Three (3.0) credit quarter courses confer the equivalent of 2.0 semester credits. The program requires the completion of 36.0 semester credits for graduation. Semesters and quarters overlap sufficiently to allow full-time students to meet the degree requirements for this program in two years.

There are several ways to customize the internship or experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal needs and career aspirations. The duration of the internship may vary. Shorter rotations may require that the student enrolls in elective courses to meet the semester credit requirements for the degree.

Required Courses		
Science		
MIIM 503S	Biomedical Ethics	2.0
or IDPT 500S	Responsible Conduct of Research	
MIIM 518S	Foundations of Applied Biomedicine *	3.0
MIIM 519S	Commercialization of Biomedical Technology **	3.0
MIIM 631S	Biomedical Innovation Development and Management	5.0
Business ***		
BUSN 501	Measuring and Maximizing Financial Performance	3.0
BUSN 502	Essentials of Economics	3.0
Elective Courses		
Choose at least 1 program-specific science elective and at least 2 business electives		
Science, Program-Specific (Choose at least 1, but more than 1 is recommended)		
MIIM 517S	Applied Statistics for Biomedical Sciences	
or IDPT 501S	Biostatistics I	
MIIM 550S	Biomedicine Seminar	
MIIM 605S	Experiential Learning	
MIIM 645S	Biomedical Career Explorations	
MIIM T680S	Special Topics in Microbiology & Immunology	
Science, Clinical Research		
CR 501S	Emerging Trends in Medical Device Regulation	
CR 511S	The History of Misconduct in Biomedical Research	

CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D
CR 514S	World Wide Regulatory Submissions
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 555S	Compliance & Monitoring Issues
CR 600S	Designing the Clinical Trial
Science, Basic Science & Research	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods
MIIM 522S	Biotechniques II: Immunological Methods
MIIM 527S	Immunology, Immunopathology and Infectious Diseases
MIIM 530S	Fundamentals of Molecular Medicine I
or MIIM 515S	Concepts in Biomedicine I
MIIM 531S	Fundamentals of Molecular Medicine II
or MIIM 516S	Concepts in Biomedicine II
MIIM 533S	Molecular Medicine Journal Club II
MIIM 534S	Molecular Medicine Journal Club I
MIIM 540S	Viruses and Viral Infections
MIIM 541S	Bacteria and Bacterial Infections
MIIM 542S	Mycology and Fungal Infections
MIIM 543S	Parasitology and Parasitic Diseases
MIIM 545S	Introduction to Infectious Diseases
MIIM 606S	Microbiology and Immunology Seminar
MIIM 613S	Emerging Infectious Diseases
MIIM 653S	Clinical Correlations in Infectious Disease
Business (Choose at least 2, but more are recommended) ***	
ACCT 601	Managerial Accounting
BLAW 646	Legal Issues in New Ventures
BUSN T680	Special Topics in BUSN
ECON 601	Managerial Economics
ECON 650	Business & Economic Strategy: Game Theory & Applications
FIN 601	Corporate Financial Management
INTB 620	International Business Management
MIS 632	Database Analysis and Design for Business
MGMT 510	Business Problem Solving
MGMT 601	Managing the Total Enterprise
MGMT 652	New Venture Planning
MGMT 715	Business Consulting
MKTG 601	Marketing Strategy & Planning
MKTG 638	New Product Planning, Strategy, and Development
MKTG 654	Corporate Brand & Reputation Management
ORGB 511	Leading in Dynamic Environments: A Personal, Relational, and Strategic Approach
ORGB 625	Leadership and Professional Development
ORGB 640	Negotiations for Leaders
POM 601	Operations Management
STAT 601	Business Statistics
STAT 632	Datamining for Managers
Entrepreneurship ***	
ENTP 515	Pitch It!
ENTP 601	Social and Sustainable Innovation
ENTP 611	Learning from Failure
ENTP 621	Innovation & Ideation
ENTP 641	Innovation in Established Companies
ENTP 671	Life After Launch
ENTP 681	The Startup Way: How to Drive Innovation in Entrepreneurial Companies

* Substitutions: MIIM 515S AND MIIM 516S OR MIIM 530S OR MIIM 531S

** Substitutions: MIIM 525S and MIIM 536S

*** Science courses are offered on a semester basis; business and entrepreneurship courses are offered on a quarter basis. Semesters and quarters overlap. Credits shown for business and entrepreneurship courses are quarter credits (3 quarter credits = 2 semester credits). This program requires a minimum of 36.0 semester credits to meet the degree requirements. This requirement can be met through a combination of science, business and entrepreneurship courses.

Additional Information

For more information, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Sample Plans of Study

These are samples of customizable plans of study. Variations may occur depending on course availability and each student's interest.

Full-Time, Fall Start*

First Year

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Elective Course(s)	
MIIM 518S	3.0	MIIM 503S	2.0	MIIM 605S	6.0
BUSN 501	3.0	MIIM 519S	3.0	MIIM 645S	2.0
Elective Course(s)		BUSN 502	3.0	Elective Course(s)	
CR 525S	3.0	Elective Course(s)		MGMT 510	3.0
		ORGB 625	3.0		
	9		**11**		**11**

Second Year

Fall	Credits
Required Course(s)	
MIIM 631S	5.0
Elective Course(s)	
MIIM 550S	3.0
Business Elective	3.0
	11

Total Credits 42

* **This is a full-time plan with # 9.0 semester credits/semester.** Business and entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 4 terms (1 year), completing 3-4 courses per term, all terms are eligible for financial aid. The first term can be part-time (8 credits) and still meet the 36 semester credit requirement for graduation.

Full-Time, Spring Start**

First Year

	Spring	Credits	Summer	Credits
	Required Course(s)		Required Course(s)	
	MIIM 503S	2.0	MIIM 518S	3.0
	MIIM 519S	3.0	Elective Course(s)	
	BUSN 502	3.0	MIIM 645S	2.0
	Elective Course(s)		CR 515S	3.0
	ORGB 625	3.0	ECON 601	3.0
		11		**11**

Second Year

Fall	Credits	Spring	Credits
Required Course(s)		Required Course(s)	
BUSN 501	3.0	MIIM 631S	5.0
Elective Course(s)		Elective Course(s)	
MIIM 550S	3.0	MGMT 510	3.0
MIIM 605S	4.0		
	10		**8**

Total Credits 40

** **This is a full-time plan with # 9.0 semester credits/semester.** Business and entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 4 terms (1 year), completing 3-4 courses per term, all terms are eligible for financial aid.

Part-Time, Fall Start***

First Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Elective Courses	
MIIM 518S	3.0	MIIM 503S	2.0	MIIM 605S	4.0
BUSN 501	3.0	MIIM 519S	3.0	MGMT 510	3.0
Elective Course(s)		BUSN 502	3.0		
MIIM 550S	3.0				
	9		**8**		**7**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
Elective Course(s)		Required Course(s)	
MIIM 645S	2.0	MIIM 631S	5.0
CR 515S	3.0	Elective Course(s)	
ORGB 631	3.0	ORGB 625	3.0
	8		**8**

Total Credits 40

*** **This is a part-time plan with <9.0 semester credits/semester.** Business and entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 5 terms (1.5 years), completing 3-4 courses per term, all terms are eligible for financial aid.

Part-Time, Spring Start****

First Year (Part-Time)

	Spring	Credits	Summer	Credits
	Required Course(s)		Required Course(s)	
	MIIM 503S	2.0	MIIM 518S	3.0
	MIIM 519S	3.0	Elective Course(s)	
	BUSN 502	3.0	MIIM 645S	2.0
			ECON 601	3.0
		8		**8**

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Elective Course(s)		Required Course(s)	
BUSN 501	3.0	MIIM 605S	2.0-6.0	MIIM 631S	5.0
Elective Course(s)		CR 545S	3.0	Elective Course(s)	
MIIM 550S	3.0			ACCT 601	3.0
CR 525S	3.0				
	9		**5-9**		**8**

Total Credits 38-42

**** **This is a part-time plan with <9.0 semester credits/semester.**Business and entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed. **To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 5 terms (1.5 years), completing 3-4 courses per term, all terms are eligible for financial aid.

Additional Information

To learn more about part-time options, please contact Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Program Goals

Upon completion of the degree requirements of this program, students would have achieved the following program-level goals:

- Develop core knowledge in biological sciences, technology development, and commercialization
- Gain understanding of finance, economics, management, and organization leadership
- Apply business expertise to evaluate the process of delivering biomedical products to market
- Develop skills to identify and evaluate professional ethical dilemmas and appropriate solutions
- Strengthen communication, leadership, and soft skills (e.g., teamwork, problem-solving, knowledge of career opportunities, and networking)

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of Drexel's Student Learning Priorities (DSLPs) (http://drexel.edu/provost/assessment/outcomes/dslp/) to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning
- Information literacy
- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship, and creative expression
- Responsible citizenship

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Biomedicine and Digital Media

Major: Biomedicine and Digital Media
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 27-1014

About the Program

The MS in Biomedicine and Digital Media is an online program that intersects science, technology, entrepreneurship, and interactive digital art design and animation. This skills-based program is for individuals interested in media design and production careers with an emphasis in health and science.

Graduates of this program will be prepared to progress into more advanced graduate studies in science or digital media and/or careers in scientifically oriented media/communication jobs in the public or private sector (e.g., academic, scientific publishing and media companies), or lead their new ventures in digital imaging.

Curriculum

This is an interdisciplinary online program offered by the College of Medicine. The science courses are taught by faculty from Drexel University's College of Medicine. Faculty from Drexel University's College of Media Arts and Design teach the digital media courses. Students must complete a minimum of 36.0 semester credits to graduate.

- Non-thesis program (36.0 semester credits are needed to graduate)
- Required and elective courses in each discipline
- Flexible internship elective (experiential learning)
- Customizable plan of study

Format

- Online
- New students admitted each fall and spring semesters
- Classes taught throughout the year (fall, spring, and summer)
- Accelerated: 1-year MS (full-time) or 1.5 years (part-time)

Full-Time and Part-Time Options

Students may meet the degree requirements in either a full-time (at least 9.0 credits per semester) or part-time basis. Full-time students generally complete the program in one year. Part-time students must complete the program within four years. Students must enroll in at least 4.5 semester credits of College of Medicine courses to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (http://www.drexel.edu/drexelcentral/).

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

For questions about how to apply to the program, please contact an enrollment counselor at duonline@drexel.edu.

Admission Requirements

New students are admitted every fall and spring semester.

Post-college applicants must have completed a four-year degree program. An undergraduate degree in science is preferred but not required. Although a minimum cumulative grade point average (GPA) of 3.0 is strongly desired, an applicant with a lower cumulative GPA will be considered if other strengths are apparent in the application.

Applicants must also fulfill the following requirements for consideration:

- Official transcripts from all colleges and universities attended
- Essay/personal statement
- Resume
- References from at least three instructors or professionals

Official test scores from graduate admission exams, such as the Graduate Record Examination (GRE), are optional but highly desirable.

Three letters of recommendation are required. If you received your degree within the last five years, it is strongly recommended that at least one letter of recommendation be provided by someone familiar with your academic qualifications and potential (e.g., your undergraduate advisor, a course instructor, or your research mentor). If you are requesting a letter from someone at your place of employment, the recommendation should be provided by a supervisor (or another more senior manager) with direct knowledge of your work and should address your scientific aptitude as well as your work ethic.

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). IELTS scores may be submitted in lieu of TOEFL scores. An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

- TOEFL score needs to be at least 90 with at least a 27 in both the reading and writing sections
- IELTS score needs to be above 7

Certain visa types do not permit individuals to enroll in online or hybrid programs. Foreign applicants should check with their visa sponsors for eligibility. Drexel University cannot sponsor F-1 or J1 visas for individuals interested in online, hybrid, or part-time programs.

Online applications (https://online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-business/#apply) are accepted all year-round for consideration for either fall or spring admission. Students may defer admission by one year. All admission decisions are made at the College of Medicine.

Additional Information

For questions about the curriculum and program goals, please contact Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

For questions about how to apply to the program, please contact an enrollment counselor at duonline@drexel.edu or visit the Drexel University Online MS in Biomedicine and Digital Media webpage (https://www.online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-digitalmedia/).

For information regarding financial aid, please visit Drexel Central (http://www.drexel.edu/drexelcentral/).

Degree Requirements

Science courses are offered by Drexel University College of Medicine and are taught in **semester terms** (fall and spring). Digital Media courses are offered by Westphal College of Media Arts & Design and are taught in **quarter terms** (fall, winter, spring, and summer).

Three (3.0) credit quarter courses confer the equivalent of 2.0 semester credits. The program required the completion of 36.0 semester credits for graduation. Semesters and quarters overlap sufficiently to allow full-time students to meet the degree requirements for this program in two years.

There are several ways to customize the internship or experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal needs and career aspirations. The duration of the internship may vary. Shorter rotations may require that the student enrolls in elective courses to meet the semester credit requirements for the degree.

Required Courses		
Science Requirements		
MIIM 503S	Biomedical Ethics	2.0
or IDPT 500S	Responsible Conduct of Research	
MIIM 518S	Foundations of Applied Biomedicine *	3.0
MIIM 519S	Commercialization of Biomedical Technology **	3.0
MIIM 631S	Biomedical Innovation Development and Management	5.0
Digital Media Requirements ***		
DIGM 505	Design and Interactivity Bootcamp	3.0
DIGM 506	Animation and Game Design Bootcamp	3.0
Electives		
Choose at least 1 program-specific science elective and 2 digital media electives		5.0
Science, Program-Specific		
MIIM 517S	Applied Statistics for Biomedical Sciences	
or IDPT 501S	Biostatistics I	
MIIM 550S	Biomedicine Seminar	
MIIM 645S	Biomedical Career Explorations	
MIIM 605S	Experiential Learning	
MIIM T680S	Special Topics in Microbiology & Immunology	
Science, Clinical Research		
CR 501S	Emerging Trends in Medical Device Regulation	
CR 511S	The History of Misconduct in Biomedical Research	
CR 514S	World Wide Regulatory Submissions	
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 555S	Compliance & Monitoring Issues	
CR 600S	Designing the Clinical Trial	
Science, Basic Science & Research		
MIIM 530S	Fundamentals of Molecular Medicine I	
or MIIM 515S	Concepts in Biomedicine I	
MIIM 531S	Fundamentals of Molecular Medicine II	
or MIIM 516S	Concepts in Biomedicine II	
MIIM 534S	Molecular Medicine Journal Club I	
MIIM 533S	Molecular Medicine Journal Club II	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
MIIM 522S	Biotechniques II: Immunological Methods	
MIIM 527S	Immunology, Immunopathology and Infectious Diseases	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology and Fungal Infections	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 545S	Introduction to Infectious Diseases	
MIIM 606S	Microbiology and Immunology Seminar	
MIIM 613S	Emerging Infectious Diseases	
MIIM 653S	Clinical Correlations in Infectious Disease	
Digital Media ***		
DIGM 501	New Media: History, Theory and Methods	
DIGM 508	Digital Cultural Heritage	
DIGM 520	Interactivity I	

DIGM 521	Interactivity II
DIGM 526	Animation II
DIGM 531	Game Design II
ANIM 588	Spatial Data Capture
GMAP 545	Game Development Foundations
GMAP 547	Serious Games
GMAP 548	Experimental Games
GMAP 560	Game Design from the Player's Perspective
DIGM T580	Special Topics in Digital Media
Entrepreneurship ***	
ENTP 611	Learning from Failure
ENTP 621	Innovation & Ideation
ENTP 641	Innovation in Established Companies

* Substitutions: MIIM 515S and MIIM 516S; or MIIM 530S or MIIM 531S

** Substitution: MIIM 535S and MIIM 536S

*** Science courses are offered on a semester basis; digital media and entrepreneurship courses are offered on a quarter basis. Semesters and quarters overlap. Credits shown for digital media and entrepreneurship courses are quarter credits (3 quarter credits = 2 semester credits). This program requires a minimum of 36.0 semester credits to meet the degree requirements. This requirement can be met through a combination of science, digital media and entrepreneurship courses.

Additional Information

For more information, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Sample Plans of Study

These are samples of customizable plans of study. Variations may occur depending on course availability and each student's interest. This program is available as an online program, starting in the fall semester.

Full-time, Fall Start

First Year

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Elective Course(s)	
MIIM 518S	3.0	MIIM 519S	3.0	MIIM 605S	2.0-6.0
DIGM 505*	3.0	MIIM 503S	2.0	CR 525S	3.0
DIGM 506*	3.0	Elective Course(s)		ENTP 641*	3.0
Elective Course(s)		DIGM 530*	3.0		
MIIM 645S	2.0	ENTP 621*	3.0		
	11		**11**		**8-12**

Second Year

Fall	Credits
Required Course(s)	
MIIM 631S	5.0
Elective Course(s)	
CR 515S	3.0
DIGM 525*	3.0
	11

Total Credits 41-45

* **This is a full-time plan with #9.0 semester credits/semester.** Digital media and entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed. **To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 4 terms (1 year), completing 3-4 courses per term, all terms are eligible for financial aid.

Part-time, Fall Start

First Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Elective Course(s)	
MIIM 518S	3.0	MIIM 519S	3.0	MIIM 605S	2.0-6.0

DIGM 505*	3.0	MIIM 503S	2.0	CR 525S	3.0
DIGM 506*	3.0	Elective Course(s)		ENTP 641*	3.0
		DIGM 530*	3.0		
	9		**8**		**8-12**

Second Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
Elective Course(s)		Required Course(s)	
MIIM 550S	3.0	MIIM 631S	5.0
MIIM 540S	2.0	ENTP 621*	3.0
DIGM 525*	3.0		
	8		**8**

Total Credits 41-45

* **This is a part-time plan with <9.0 semester credits/semester.** Digital media and entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 5 terms (1.5 years), completing 2-3 courses per term, all terms are eligible for financial aid

Additional Information

To learn more about part-time options, please contact Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Program Goals

Upon completion of the degree requirements of this program students would have developed:

- A broad core knowledge in interactive digital media development for application in biomedical science and innovative technologies
- More in-depth analytical, research, and critical thinking skills applicable to the process of biomedical technology development
- Skills to identify professional ethical dilemmas and evaluate appropriate solutions
- Graduate-level communication and leadership skills
- Additional professional soft skills (e.g., teamwork, problem-solving, knowledge of career opportunities, networking)

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of Drexel's Student Learning Priorities (DSLPs) (https://drexel.edu/provost/assessment/outcomes/dslp/) to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning
- Information literacy
- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship, and creative expression
- Responsible citizenship

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Biomedicine and Entrepreneurship

Major: Biomedicine and Entrepreneurship
Degree Awarded: Master of Science (MS)
Calendar Type: Semester

Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 19-1020

About the Program

Mission Statement

The online MS in Biomedicine and Entrepreneurship program integrates training in technical and practical aspects of science, research, and entrepreneurship for individuals interested in pursuing innovation-driven careers in the life sciences. The program helps develop individual initiative and entrepreneurial thinking around scientific discoveries and innovation. The program is designed to facilitate not only new venture creation but also individual initiative and entrepreneurial thinking.

Graduates of the program will be prepared to progress into more advanced graduate studies in science or entrepreneurship and/or careers in scientifically oriented management jobs in the public or private sector. These graduates will especially be equipped to lead or have top management roles in new biomedical or life sciences ventures.

Curriculum

This is an interdisciplinary online program offered by the College of Medicine. The science courses, which are offered online, are taught by faculty from Drexel University College of Medicine. Drexel University's Charles D. Close School of Entrepreneurship (http://drexel.edu/close/) teach the entrepreneurship courses.

- Non-thesis program (36.0 semester credits needed to graduate)
- Required and elective courses in each discipline
- Flexible optional internship (experiential learning)
- Customizable plan of study

Format

- Online (select courses in both disciplines are offered face to face on-campus)
- New students admitted each fall and spring semesters
- Classes taught throughout the year (fall, spring, and summer)
- Accelerated: 1-year MS (full-time) or 1.5 years (part-time)

Full-Time and Part-time Options

Students may meet the degree requirements on either a full-time (at least 9.0 credits per semester) or part-time basis. Full-time students generally complete the program in one year. Part-time students must complete the program within four years. Students must enroll in at least 4.5 semester credits of College of Medicine courses to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (https://drexel.edu/drexelcentral/).

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

For questions about how to apply to the program, please contact an enrollment counselor at duonline@drexel.edu or visit the Drexel University Online MS in Biomedicine and Entrepreneurship webpage (https://www.online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-entrepreneurship/).

Admission Requirements

New students are admitted every fall and spring semester.

Post-college applicants must have completed a four-year degree program. An undergraduate degree in science is preferred but not required; although a minimum cumulative grade point average (GPA) of 3.0 is strongly preferred.

Applicants must also fulfill the following requirements for consideration:

- Official transcripts from all colleges and universities attended
- Official test scores from graduate and professional admission exams are highly desirable, such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Law School Admission Test (LSAT), or Medical College Admission Test (MCAT)
- References from at least three instructors or professionals

Official test scores from graduate and professional admission exams, such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), Law School Admission Test (LSAT), or Medical College Admission Test (MCAT), are optional but highly desirable.

Three letters of recommendation are required. If you received your degree within the last five years, it is strongly recommended that at least one letter of recommendation be provided by someone familiar with your academic qualifications and potential (e.g., your undergraduate advisor, a course instructor, or your research mentor). If you are requesting a letter from someone at your place of employment, the recommendation should be provided by a supervisor (or another more senior manager) with direct knowledge of your work and should address your scientific aptitude as well as your work ethic.

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). IELTS scores may be submitted in lieu of TOEFL scores. An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

- TOEFL score needs to be at least 90 with at least a 27 in both the reading and writing sections.
- IELTS score needs to be above 7

Certain visa types do not permit individuals to enroll in online or hybrid programs. Foreign applicants should check with their visa sponsors for eligibility. Drexel University cannot sponsor F-1 or J1 visas for individuals interested in online, hybrid, or part-time programs.

Online applications (https://www.online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-entrepreneurship/#apply) are accepted all year-round for consideration for either fall or spring admission. Students may defer admission by one year. All admission decisions are made at the College of Medicine.

Additional Information

For questions about the curriculum and program goals, please contact Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

For questions about how to apply to the program, please contact an enrollment counselor at duonline@drexel.edu.

For information regarding financial aid, please visit Drexel Central (http://www.drexel.edu/drexelcentral/).

Degree Requirements

Science courses are offered by Drexel University College of Medicine and are taught in **semester terms** (fall, spring and summer). Entrepreneurship courses are taught in **quarter terms** (fall and winter only).

Three (3.0) credit quarter courses confer the equivalent of 2.0 semester credits. The program required the completion of 36.0 semester credits for graduation. Semesters and quarters overlap sufficiently to allow full-time students to meet the degree requirements for this program in two years.

There are several ways to customize the internship or experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal needs and career aspirations. The duration of the internship may vary. Shorter rotations may require that the student enrolls in elective courses to meet the semester credit requirements for the degree.

Required Courses		
Science		
MIIM 503S	Biomedical Ethics	2.0
or IDPT 500S	Responsible Conduct of Research	
MIIM 518S	Foundations of Applied Biomedicine *	3.0
MIIM 519S	Commercialization of Biomedical Technology	3.0
MIIM 631S	Biomedical Innovation Development and Management	5.0
Entrepreneurship		
ENTP 501	Entrepreneurship Practice & Mindset **	3.0
ENTP 540	Approaches to Entrepreneurship **	3.0
Electives		
Choose at least 1 program-specific science elective and 2 entrepreneurship electives		6.0
Science, Program-Specific (Pick at least 1, but more than 1 is recommended)		
MIIM 517S	Applied Statistics for Biomedical Sciences	
or IDPT 501S	Biostatistics I	
MIIM 550S	Biomedicine Seminar	
MIIM 605S	Experiential Learning	
MIIM 645S	Biomedical Career Explorations	
MIIM T680S	Special Topics in Microbiology & Immunology	
Science, Clinical Research		
CR 501S	Emerging Trends in Medical Device Regulation	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	

CR 514S	World Wide Regulatory Submissions
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 555S	Compliance & Monitoring Issues
CR 600S	Designing the Clinical Trial
Science, Basic Science & Research	
MIIM 530S	Fundamentals of Molecular Medicine I
or MIIM 515S	Concepts in Biomedicine I
MIIM 531S	Fundamentals of Molecular Medicine II
or MIIM 516S	Concepts in Biomedicine II
MIIM 534S	Molecular Medicine Journal Club I
MIIM 533S	Molecular Medicine Journal Club II
MIIM 521S	Biotechniques I: Molecular and Genomic Methods
MIIM 522S	Biotechniques II: Immunological Methods
MIIM 527S	Immunology, Immunopathology and Infectious Diseases
MIIM 540S	Viruses and Viral Infections
MIIM 541S	Bacteria and Bacterial Infections
MIIM 542S	Mycology and Fungal Infections
MIIM 543S	Parasitology and Parasitic Diseases
MIIM 545S	Introduction to Infectious Diseases
MIIM 606S	Microbiology and Immunology Seminar
MIIM 613S	Emerging Infectious Diseases
MIIM 653S	Clinical Correlations in Infectious Disease
Entrepreneurship **	
ENTP 515	Pitch It!
ENTP 535	Social Entrepreneurship
ENTP 555	Dynamics of the Family Firm
ENTP 565	Franchising
ENTP 601	Social and Sustainable Innovation
ENTP 611	Learning from Failure
ENTP 621	Innovation & Ideation
ENTP 631	Building Internal & External Relationships
ENTP 641	Innovation in Established Companies
ENTP 651	Leading New Ventures
ENTP 660	Early Stage Venture Funding
ENTP 670	Clean Venture Lab
ENTP 671	Life After Launch
ENTP 681	The Startup Way: How to Drive Innovation in Entrepreneurial Companies
ENTP 690	The Lean Launch
ENTP T580	Special Topics in Entrepreneurship

* Substitutions: MIIM 515S and MIIM 516S OR MIIM 530S OR MIIM 531S

** Science courses are offered on a semester basis; entrepreneurship courses are offered on a quarter basis. Semesters and quarters overlap. Credits shown for ENTP courses are quarter credits (3 quarter credits = 2 semester credits). This program requires a minimum of 36.0 semester credits to meet the degree requirements. This requirement can be met through a combination of science and entrepreneurship courses.

Additional Information

For more information, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Sample Plans of Study

These are samples of customizable plans of study. Variations may occur depending on course availability and each student's interest.

Full-Time, Fall Start

First Year

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Elective Course(s)	
MIIM 518S	3.0	MIIM 519S	3.0	MIIM 605S	2.0-6.0
Elective Course(s)		MIIM 503S or IDPT 500S	2.0	MIIM 645S	2.0

MIIM 550S	3.0	ENTP 540*	3.0 ENTP 651*	3.0
CR 525S	3.0	Elective Course(s)		
		ENTP 631*	3.0	
	9		**11**	**7-11**

Second Year

Fall	**Credits**
Required Course(s)	
MIIM 631S	5.0
ENTP 501*	3.0
Elective Course(s)	
ENTP 631*	3.0
	11

Total Credits 38-42

* **This is a full-time plan with # 9.0 semester credits/semester.** Entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 4 terms (1 year), completing 3-4 courses per term, all terms are eligible for financial aid.

Full-Time, Spring Start

First Year

	Spring	**Credits**	**Summer**	**Credits**
	Required Course(s)		Required Course(s)	
	MIIM 519S	3.0	MIIM 518S	3.0
	MIIM 503S	2.0	Elective Course(s)	
	ENTP 540*	3.0	MIIM 645S	2.0
	Elective Course(s)		ENTP 641*	3.0
	ENTP 660*	3.0	ENTP 651*	3.0
		11		**11**

Second Year

Fall	**Credits**	**Spring**	**Credits**
Required Course(s)		Required Course(s)	
ENTP 501*	3.0	MIIM 631S	5.0
Elective Course(s)		Elective Course(s)	
MIIM 550S	3.0	CR 501S	3.0
MIIM 605S	2.0-6.0	ENTP 690*	3.0
	8-12		**11**

Total Credits 41-45

* **This is a full-time plan with # 9.0 semester credits/semester.** Entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 4 terms (1 year), completing 3-4 courses per term, all terms are eligible for financial aid.

Part-Time, Fall Start

First Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
Required Course(s)		Required Course(s)		Elective Course(s)	
MIIM 518S	3.0	MIIM 519S	3.0	MIIM 605S	2.0-6.0
ENTP 501*	3.0	MIIM 503S	2.0	ENTP 651*	3.0
Elective Course(s)		ENTP 540*	3.0		
CR 525S	3.0				
	9		**8**		**5-9**

Second Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
Elective Course(s)		Required Course(s)	
MIIM 550S	3.0	MIIM 631S	5.0
CR 515S	3.0	Elective Course(s)	

ENTP 611*	3.0	ENTP 621*	3.0
	9		**8**

Total Credits 39-43

* **This is a part-time plan with <9.0 semester credits/semester.** Entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 5 terms (1.5 years), completing 3-4 courses per term, all terms are eligible for financial aid.

Part-Time, Spring Start

First Year (Part-Time)

	Spring	Credits	Summer	Credits
	Required Course(s)		Required Course(s)	
	MIIM 519S	3.0	MIIM 518S	3.0
	MIIM 503S	2.0	Elective Course(s)	
			CR 515S	3.0
			ENTP 641*	3.0
		5		**9**

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Required Course(s)	
ENTP 540*	3.0	ENTP 540*	3.0	MIIM 631S	5.0
Elective Course(s)		Elective Course(s)		Elective Course(s)	
MIIM 550S	3.0	MIIM 605S	2.0-6.0	ENTP 651*	3.0
CR 535S	3.0				
	9		**5-9**		**8**

Total Credits 36-40

* **This is a part-time plan with <9.0 semester credits/semester.** Entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 5 terms (1.5 years), completing 3-4 courses per term, all terms are eligible for financial aid.

Additional Information

To learn more about part-time options, please contact Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Program Goals

Upon completion of the degree requirements for this MS program, students would have achieved the following program-level goals:

- Develop essential knowledge and skills for managing commercialization of biomedical innovation within the context of new ventures and established enterprises
- Develop analytical, research, and critical thinking skills around science and biomedical innovation and new product development
- Develop an advanced understanding of professional ethics
- Develop advanced communication and leadership skills
- Develop practical knowledge and skills used in real-life scenarios
- Develop other "work readiness" soft skills such as teamwork, problem-solving, knowledge of career opportunities, and networking

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of Drexel's Student Learning Priorities (DSLPs (http://drexel.edu/provost/assessment/outcomes/dslp/)) (http://www.drexel.edu/provost/irae/assessment/outcomes/dslp/)to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning

- Information literacy
- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship, and creative expression
- Responsible citizenship

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Biomedicine and Law

Major: Biomedicine and Law

Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 19-1020; 23-2000

About the Program

The online Master of Science in Biomedicine and Law degree program comprehensive training in technical and practical aspects of science and innovation as well as in the legal aspects related to new biomedical product development, entrepreneurship, and regulatory compliance. This program is geared to individuals interested in careers focused on technology development.

Graduates of this program will be prepared to progress into more advanced graduate studies in science and/or careers in scientifically oriented management jobs in the public or private sector (e.g., technology commercialization offices, patent agencies). These individuals will also be competitive law school applicants if they so chose to continue their professional studies even though credits for their legal coursework in this program will not be transferable for law school credits.

Curriculum

This is an interdisciplinary online program offered by the College of Medicine. The science courses, which are offered online, are taught by faculty from Drexel University College of Medicine. Faculty from Drexel University's Kline School of Law teach the entrepreneurship courses.

- Non-thesis program (36.0 semester credits needed to graduate)
- No thesis requirement
- Required and elective courses in each discipline
- Flexible internship elective (experiential learning)
- Customizable plan of study

Format

- Online (select courses in both disciplines are offered face to face on-campus)
- New students admitted each fall and spring semesters
- Classes taught throughout the year (fall, spring, and summer)
- Accelerated: 1-year MS (full-time) or 1.5 years (part-time)

Full-Time and Part-Time Options

Students may meet the degree requirements in either a full-time (at least 9.0 credits per semester) or part-time basis. Full-time students generally complete the program in one year. Part-time students must complete the program within four years. Students must enroll in at least 4.5 semester credits of College of Medicine courses to qualify for financial aid. For information regarding financial aid, please visit Drexel Central (https://drexel.edu/drexelcentral/).

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

For questions about how to apply to the program, please contact an enrollment counselor at duonline@drexel.edu.

Admission Requirements

New students are admitted every fall and spring semester.

Post-college applicants must have completed a four-year degree program. An undergraduate degree in science is preferred but not required; although a minimum cumulative grade point average (GPA) of 3.0 is strongly preferred.

Applicants must also fulfill the following requirements for consideration:

- Official transcripts from all colleges and universities attended
- Essay/personal statement
- Resume
- References from at least three instructors or professionals.

Official test scores from graduate admission exams, such as the Graduate Record Examination (GRE), are optional but highly desirable.

Three letters of recommendation are required. If you received your degree within the last five years, it is strongly recommended that at least one letter of recommendation be provided by someone familiar with your academic qualifications and potential (e.g., your undergraduate advisor, a course instructor, or your research mentor). If you are requesting a letter from someone at your place of employment, the recommendation should be provided by a supervisor (or another more senior manager) with direct knowledge of your work and should address your scientific aptitude as well as your work ethic.

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). IELTS scores may be submitted in lieu of TOEFL scores. An evaluation by World Education Services (WES) is required for transcripts from institutions outside the United States.

- TOEFL score needs to be at least 90 with at least a 27 in both the reading and writing sections
- IELTS score needs to be above 7

Online applications (https://www.online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-law/) are accepted all year-round for consideration for either fall or spring admission. Students may defer admission by one year. All admission decisions are made at the College of Medicine.

Additional Information

For questions about the curriculum and program goals, please contact Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

For information regarding financial aid, please visit Drexel Central (http://www.drexel.edu/drexelcentral/).

For questions about how to apply to the program, please contact an enrollment counselor at duonline@drexel.edu.

Degree Requirements

There are several ways to customize the experiential learning component (2.0 - 6.0 semester credits) so that it satisfies both the degree requirements and, especially, the student's own personal situation. The duration of the internship may vary. Shorter rotations may require that the student enroll in elective courses to meet the semester credit requirements for degree.

Required Courses		
Science Requirements		
MIIM 503S	Biomedical Ethics	2.0
or IDPT 500S	Responsible Conduct of Research	
or LAW 783S	Bioethics	
MIIM 518S	Foundations of Applied Biomedicine *	3.0
MIIM 519S	Commercialization of Biomedical Technology **	3.0
MIIM 631S	Biomedical Innovation Development and Management	5.0
Law Requirements		
LSTU 500S	Introduction to the Legal System	3.0
LSTU 506S	Patients and Privacy: HIPAA and Related Regulations	3.0
Electives		
Choose at least 1 program-specific science elective and 2 law electives		
Science, Program-Specific (Required to pick at least 1 course, but more than 1 is recommended)		
MIIM 517S	Applied Statistics for Biomedical Sciences	
or IDPT 501S	Biostatistics I	

MIIM 550S	Biomedicine Seminar
MIIM 605S	Experiential Learning
MIIM 645S	Biomedical Career Explorations
MIIM T680S	Special Topics in Microbiology & Immunology
Science, Clinical Research	
CR 501S	Emerging Trends in Medical Device Regulation
CR 511S	The History of Misconduct in Biomedical Research
CR 514S	World Wide Regulatory Submissions
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 555S	Compliance & Monitoring Issues
CR 600S	Designing the Clinical Trial
Science, Basic Science & Research	
MIIM 530S	Fundamentals of Molecular Medicine I
or MIIM 515S	Concepts in Biomedicine I
MIIM 531S	Fundamentals of Molecular Medicine II
or MIIM 516S	Concepts in Biomedicine II
MIIM 533S	Molecular Medicine Journal Club II
MIIM 534S	Molecular Medicine Journal Club I
MIIM 521S	Biotechniques I: Molecular and Genomic Methods
MIIM 522S	Biotechniques II: Immunological Methods
MIIM 527S	Immunology, Immunopathology and Infectious Diseases
MIIM 540S	Viruses and Viral Infections
MIIM 541S	Bacteria and Bacterial Infections
MIIM 542S	Mycology and Fungal Infections
MIIM 543S	Parasitology and Parasitic Diseases
MIIM 545S	Introduction to Infectious Diseases
MIIM 606S	Microbiology and Immunology Seminar
MIIM 613S	Emerging Infectious Diseases
MIIM 653S	Clinical Correlations in Infectious Disease
Law (Required to pick at least 2 courses) ***	
LAW 610S	Reproductive Rights & Justice
LAW 674S	Health Care Fraud and Abuse
LAW 703S	Law and Entrepreneurship
LAW 780S	Health Care Quality Regulation
LAW 781S	Health Care Business Regulation
LAW 782S	Health Policy Colloquium
LAW 784S	Health Care Finance
LAW 785S	Legal Regulation of Pharmaceutical and Medical Device Research and Development
LAW 787S	Legal Regulation of Pharmaceutical and Medical Device Sales and Marketing Practices
LAW 788S	Law of Medical Malpractice
LAW 792S	Food and Drug Law
LAW 872S	Health Law Legal Research
LSTU 501S	Compliance Skills: Auditing, Investigation & Reporting
LSTU 503S	Legal Research and Analysis
LSTU 504S	Health Care Rules and Regulations
LSTU 505S	Health Care Quality, Patient Safety and Risk Management
LSTU 507S	Risk Assessment and Management
Entrepreneurship ***	
ENTP 611	Learning from Failure
ENTP 621	Innovation & Ideation
ENTP 641	Innovation in Established Companies

* Substitutions: MIIM 515S and MIIM 516S OR MIIM 530S OR MIIM 531S

** Substitutions: MIIM 535S and MIIM 536S

*** Science and law courses are offered on a semester basis, and entrepreneurship courses are offered on a quarter basis. Semesters and quarters overlap. Credits shown for entrepreneurship courses are quarter credits (3 quarter credits = 2 semester credits). This program requires a minimum of 36.0 semester credits to meet the degree requirements. This requirement can be met through a combination of science, digital media and entrepreneurship courses.

Additional Information

For more information, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Sample Plans of Study

These are samples of customizable plans of study. Variations may occur depending on course availability and each student's interest.

Full-time, Fall Start

First Year

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Elective Course(s)	
MIIM 518S	3.0	MIIM 519S	3.0	MIIM 605S	2.0-6.0
LSTU 500S*	3.0	LSTU 506S*	3.0	LSTU 503S*	2.0-3.0
Elective Course(s)		Elective Course(s)			
MIIM 550S	3.0	CR 545S	3.0		
	9		**9**		**4-9**

Second Year

Fall	Credits
Required Course(s)	
MIIM 503S	2.0
MIIM 631S (Capstone Course)	5.0
Elective Course(s)	
LSTU 501S*	3.0
	10

Total Credits 32-37

* **This is a full-time plan with # 9.0 semester credits/semester.** Both science and Law courses are listed in semester credits. **To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 4 terms (1 year), completing 3-4 courses per term, all terms are eligible for financial aid.

Full-time, Spring Start

First Year

Fall	Credits	Spring	Credits	Summer	Credits
Elective Course(s)		Required Course(s)		Required Course(s)	
MIIM 605S	2.0-6.0	MIIM 519S	3.0	MIIM 518S	3.0
MIIM 550S	3.0	LSTU 500S*	3.0	LSTU 506S*	2.0-3.0
LSTU 503S*	2.0-3.0	Elective Course(s)		Elective Course(s)	
		CR 545S	3.0	CR 515S	3.0
	7-12		**9**		**8-9**

Second Year

Spring	Credits
Required Course(s)	
MIIM 631S	5.0
MIIM 503S	2.0
Elective Course(s)	
ENTP 621*	3.0
	10

Total Credits 34-40

* **This is a full-time plan with # 9.0 semester credits/semester.** Both science and Law courses are listed in semester credits, and are offered in overlapping semester terms. Entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 4 terms (1 year), completing 3-4 courses per term, all terms are eligible for financial aid.

Part-time, Fall Start

First Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Required Course(s)	
MIIM 518S	3.0	MIIM 519S	3.0	LSTU 506S*	2.0-3.0
Elective Course(s)		MIIM 503S	2.0	Elective Course(s)	
MIIM 550S	3.0	LSTU 500S*	3.0	MIIM 605S	2.0-6.0
	6		**8**		**4-9**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
Elective Course(s)		Required Course(s)	
CR 545S	3.0	MIIM 631S (Capstone Course)	5.0
MIIM 645S	2.0	Elective Course(s)	
LSTU 503S*	2.0-3.0	LSTU 501S*	2.0-3.0
	7-8		**7-8**

Total Credits 32-39

* **This is a part-time plan with <9.0 semester credits/semester.** Both science and law courses are listed in semester credits, and are offered in overlapping semesters. **To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 5 terms (1.5 years), completing 3-4 courses per term, all terms are eligible for financial aid.

Part-time, Spring Start

First Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
Required Course(s)		Required Course(s)		Required Course(s)	
MIIM 503S	2.0	MIIM 519S	3.0	MIIM 518S	3.0
Elective Course(s)		LSTU 500S*	3.0	LSTU 506S*	2.0-3.0
MIIM 550S	3.0			Elective Course(s)	
LSTU 503S*	2.0-3.0			MIIM 645S	2.0
	7-8		**6**		**7-8**

Second Year (Part-Time)

		Spring	Credits	Summer	Credits
		Elective Course(s)		Required Course(s)	
		MIIM 605S	2.0-6.0	MIIM 631S	5.0
		LSTU 504S*	3.0	Elective Course(s)	
				ENTP 621*	3.0
			5-9		**8**

Total Credits 33-39

* **This is a part-time plan with #9.0 semester credits/semester.** Both science and law courses are listed in semester credits, and are offered in overlapping semester terms. Entrepreneurship courses are listed in quarter credits, since they are offered in quarter terms (overlap with semester terms). However, 2.0 semester credits will be awarded for 3.0 quarter credits completed.**To qualify for financial aid, each semester students must enroll in #4.5 credits in science courses offered by the College of Medicine.** Students must enroll in at least 1 College of Medicine course in order to enroll in any course offered by another Drexel College or School. Students graduate after 5 terms (1.5 years), completing 3-4 courses per term, all terms are eligible for financial aid.

Additional Information

To learn more about part-time options, please contact Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Program Goals

Upon completion of the degree requirements for this MS program, students will have developed:

- A broad core knowledge in biological sciences and legal aspects of biomedical innovation
- More in-depth analytical, research, and critical thinking skills
- An advanced understanding of professional ethics
- Graduate-level communication and leadership skills
- Other "work readiness" soft skills such as teamwork, problem-solving, knowledge of career opportunities, and networking

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students would have also made progress in all of Drexel's Student Learning Priorities (DSLPs) (https://drexel.edu/provost/assessment/outcomes/dslp/) to help them build their future:

Core Intellectual and Practical Skills:

- Communication
- Creative and critical thinking
- Ethical reasoning
- Information literacy
- Self-directed learning

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship, and creative expression
- Responsible citizenship

Additional Information

For questions about the curriculum and program goals, please email Program Director Dr. Sujata Bhatia at skb322@drexel.edu.

Biotechnology

Major: Biotechnology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 41.0
Classification of Instructional Programs (CIP) code: 41.0101
Standard Occupational Classification (SOC) code: 11-9121; 19-1029; 25-2031

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.

This program includes both academic coursework and hands-on practica.

For more information, please visit Drexel College of Medicine's Biotechnology program (http://drexel.edu/medicine/academics/graduate-school/biotechnology/) webpage.

Additional Information

Jane Azizkhan-Clifford, PhD
Interim Program Director
Department of Biochemistry and Molecular Biology
Drexel University College of Medicine
biotechnology@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. While there are no minimum requirements, applicants should be competitive with regard to grades, entrance exam scores and letters of recommendation. Students must fulfill all requirements for consideration as defined by the Executive Committee of the Division of Biomedical Science Programs:

- official transcripts from all colleges and universities attended
- official transcript evaluation such as WES, for transcripts from international institutions that are not in English, or that do not use a 4 point GPA scale;
- official entrance exam scores such as the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT);

- references from at least three instructors or industry professionals;
- an application fee of $75;
- international 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, with the exception of those who have received their undergraduate degree in an accredited US institution;

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.

Additional Information

To learn more about applying to Drexel College of Medicine programs, visit the College of Medicine's Graduate School of Biomedical Sciences and Professional Studies (http://www.drexel.edu/medicine/Academics/Graduate-School/) website.

Degree Requirements

This program offers a set of required didactic courses designed to provide students with the theoretical underpinnings of modern Biochemistry and Biotechnology, and will form a foundation for the four hands-on practica. These practica will provide detailed exposure and experience in four different aspects of biochemistry/biotechnology: protein expression and purification; crystallography; gene expression and manipulation; protein-protein and protein-ligand interaction with SPR; and imaging/microscopy. 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. The third 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.

Required Courses		
BIOC 507S	Biochemistry Seminar Series *	4.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
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	4.0
BIOC 515S	Biotechnology Practicum III	8.0
BIOC 516S	Biotechnology Practicum IV	4.0
Advanced Electives		
BIOC 521S	Introduction to Biochemical Data	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
BIOT 502S	Group Dynamics in STEM	
BIOT 503S	Professional Portfolio Development	
Total Credits		**41.0**

* Taken each semester for one credit.

Sample Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 507S	1.0	BIOC 507S	1.0
BIOC 513S	4.0	BIOC 514S	4.0
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
	11		**11**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 507S	1.0	BIOC 507S	1.0
BIOC 515S	8.0	BIOC 508S	3.0
		BIOC 516S	4.0

	IDPT 500S	2.0
	9	**10**

Total Credits 41

Cancer Biology

Major: Cancer Biology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 46.0 (non-thesis); 55.0 (thesis)
Classification of Instructional Programs (CIP) code: 26.0911
Standard Occupational Classification (SOC) code: 19-1042

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

For more information about the program, and how to apply, please visit the College of Medicine's Cancer Biology program (http://drexel.edu/medicine/academics/graduate-school/cancer-biology/) webpage.

Mauricio Reginato, PhD
Program Director
Department of Biochemistry and Molecular Biology
Drexel University College of Medicine
mjr53@drexel.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 Executive Committee of the Division of Biomedical Science Programs:

- Official transcripts from all colleges and universities attended;
- Official transcript evaluation such as WES, for transcripts from international institutions that are not in English, or that do not use a 4 point GPA scale;
- Official entrance exam scores such as the Graduate Record Examination (GRE) or Medical College Admission Test (MCAT);
- References from at least three instructors or industry professionals;
- An application fee of $75;
- International 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, with the exception of those who have received their undergraduate degree in an accredited U.S. institution.

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.

Additional Information

To learn more about applying to Drexel College of Medicine programs, visit the College of Medicine's Graduate School of Biomedical Sciences and Professional Studies (http://www.drexel.edu/medicine/Academics/Graduate-School/) website.

Degree Requirements

Thesis Option

55.0 semester credits

Required Courses		
CBIO 503S	Cancer Biology Journal Club *	4.0
CBIO 504S	Cancer Biology 1st Lab Rotation	4.0
CBIO 505S	Cancer Biology 2nd Lab Rotation	4.0
CBIO 506S	Cancer Biology Thesis Research **	18.0
CBIO 510S	Cancer Biology	3.0
CBIO 512S	Advanced Cancer Biology	2.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
MCBG 513S	Molec & Cell Biology Seminar *	4.0
Approved Electives		
BIOC 508S	Experimental Approaches to Biochemical Problems	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 501S	Infection, Inflammation and Cancer	
CBIO 508S	Cancer Biomarkers and Therapeutics	
EPI 551	Epidemiology of Cancer	
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
IDPT 600S	Thesis Defense	
MCBG 506S	Advanced Cell Biology	
MCBG 514S	Cell Cycle and Apoptosis	
PHRM 525S	Drug Discovery and Development I	
Total Credits		**55.0**

* Taken each semester

** Taken a minimum of two times in the second year.

Non-Thesis Option

46.0 semester credits

Required Courses		
CBIO 503S	Cancer Biology Journal Club *	4.0
CBIO 504S	Cancer Biology 1st Lab Rotation	4.0
CBIO 505S	Cancer Biology 2nd Lab Rotation	4.0
CBIO 510S	Cancer Biology	3.0
CBIO 512S	Advanced Cancer Biology	2.0
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
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 513S	Molec & Cell Biology Seminar *	4.0
Advanced Electives		**5.0**
Select a minimum of five credits of Advanced Electives		

BIOC 508S	Experimental Approaches to Biochemical Problems
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology
CBIO 501S	Infection, Inflammation and Cancer
CBIO 508S	Cancer Biomarkers and Therapeutics
EPI 551	Epidemiology of Cancer **
MCBG 506S	Advanced Cell Biology
MCBG 514S	Cell Cycle and Apoptosis
PHRM 525S	Drug Discovery and Development I
General Electives	
CBIO 506S	Cancer Biology Thesis Research
IDPT 507S	Teaching Practicum I
IDPT 508S	Teaching Practicum II
IDPT 509S	Teaching Practicum III
Total Credits	**46.0**

* Taken every semester

** Note that this is a three credit quarter course which converts to two semester credits

Sample Plan of Study

Plan of Study: Thesis Option

First Year

Fall	Credits	Spring	Credits
CBIO 503S	1.0	CBIO 503S	1.0
CBIO 504S	4.0	CBIO 505S	4.0
IDPT 500S	2.0	IDPT 501S	2.0
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
MCBG 513S	1.0	MCBG 513S	1.0
	14		**14**

Second Year

Fall	Credits	Spring	Credits
CBIO 503S	1.0	CBIO 503S	1.0
CBIO 510S	3.0	CBIO 506S	9.0
CBIO 506S	9.0	CBIO 512S	2.0
MCBG 513S	1.0	MCBG 513S	1.0
	14		**13**

Total Credits 55

Plan of Study: Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
CBIO 503S	1.0	CBIO 503S	1.0
CBIO 504S	4.0	CBIO 505S	4.0
IDPT 500S	2.0	IDPT 501S	2.0
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
MCBG 513S	1.0	MCBG 513S	1.0
	14		**14**

Second Year

Fall	Credits	Spring	Credits
CBIO 503S	1.0	CBIO 503S	1.0
CBIO 510S	3.0	CBIO 512S	2.0
MCBG 513S	1.0	IDPT 850S	4.0
Elective(s)	4.0	MCBG 513S	1.0
		Elective	1.0
	9		**9**

Total Credits 46

Clinical Research for Health Professionals

Major: Clinical Research for Health Professionals
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 51.0000
Standard Occupational Classification (SOC) code: 11-9199

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 investigator-initiated research. The degree often acts as an advanced preparation for independent investigators and other practicing researchers familiar with clinical research while developing their clinical careers.

The program is also available to other clinical health professionals such as nurses (with a minimum of a bachelor's degree required), medical technologists, etc., to help these individuals advance their professional opportunities.

Online coursework coupled with supervised independent research activities will allow healthcare 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 an independent research project and reporting on that research project up to and including experiencing a facsimile of the peer review and re-submission process. The research project will provide students with the opportunity to develop, test, and report on research hypotheses.

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 medical devices. Research mentors must be established researchers with a doctoral degree. A key requirement of this mentored research is the support of a doctoral level mentor/advisor located at the institution where the student's research will be conducted. 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 ad hoc committee whose members come from the Graduate School 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.

Additional Information

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Director, Graduate Programs in Clinical Research
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215-762-3812

For more information about the program and to apply, visit the Drexel University Online (http://online.drexel.edu/online-degrees/biomedical-degrees/ms-crhp/) website.

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.

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 the Graduate School 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.

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 545S	Pharmaceutical Law	
CR 612S	Fundamentals of Compliance	
Select two of the following:		6.0
New Product Research and Development		
CR 515S	Intro to Clinical Trials	
CR 525S	Scientific Writing and Medical Literature	
CR 600S	Designing the Clinical Trial	
CR 609S	Innovative Product Development	
CR 614S	Introduction to Clinical Pharmacology	
CR 620S	Regulatory, Scientific and Social Issues Affecting Biotech Research	
Compliance and Safety Surveillance		
CR 555S	Compliance & Monitoring Issues	
CR 570S	Principles and Practice of Pharmacovigilance	
CR 612S	Fundamentals of Compliance	
CR 633S	Quality Assurance Audits	
Ethics and Law		
CR 505S	Ethical Issues in Research	
CR 511S	The History of Misconduct in Biomedical Research	
CR 545S	Pharmaceutical Law	
CR 565S	Contemporary Issues in Human Research Protection	
Regulatory		
CR 501S	Emerging Trends in Medical Device Regulation	
CR 508S	Medical Device Combination Product Regulation	
CR 514S	World Wide Regulatory Submissions	
CR 523S	Current Issues in Review Boards	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 551S	International Regulatory Affairs	
Biostatistics and Data Management		
CR 500S	Epidemiology	
CR 520S	Applications of Clinical Research Biostatistics	
CR 527S	Clinical Data Management	
CR 631S	Applications of Clinical Research Biostatistics II	
Clinical Research Management		
CR 510S	Sponsored Projects Finance	
CR 512S	Fundamentals of Academic Research Administration	
CR 536S	Clinical Project Management	
CR 541S	Patient Recruitment and Informed consent	
CR 550S	Leadership Skills	
New Therapeutic Product Business and Strategic Planning		
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	
CR 518S	Clinical Trial Budgeting	
CR 546S	Clinical Outsourcing	
CR 617S	Informatics in Pharm Res & Development	
CR 625S	Health Policy and Economics	
CR 635S	Strategic Planning	
Research/Journal-type paper requirement (min 21.0 credits)		
Each student conducts a minimum of 9 hours research/week for 3 credits per semester *		21.0
CRHP 501S	Research Health Professions I	
CRHP 502S	Research Health Professions II	
CRHP 503S	Research Health Professions III	
CRHP 504S	Research Health Professions IV	
CRHP 505S	Research Health Professions V	
CRHP 506S	Research Health Professions VI	
CRHP 507S	Research Health Professions VII	
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.

Sample Plan of Study

First Year				
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
CRHP 501S	3.0	CR 500S	3.0	CRHP 503S	3.0
CR 515S	3.0	CRHP 502S	3.0	CR 520S	3.0
	6		**6**		**6**
Second Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
CRHP 504S	3.0	CRHP 505S	3.0	CRHP 506S	3.0
Elective	3.0	Elective	3.0		
	6		**6**		**3**
Third Year					
Fall	**Credits**				
CRHP 507S	3.0				
	3				

Total Credits 36

Note: Some terms are less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students these terms.

Clinical Research Organization and Management

Major: Clinical Research Organization and Management
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 51.0000
Standard Occupational Classification (SOC) code: 11-9199

About the Program

The Master of Science in Clinical Research Organization and Management is an online program designed for individuals already trained in the area of clinical sciences, as well as for others who desire a focused education 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 programs
- Describe 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 Drexel University Online for details.

Additional Information

Kamran Mohiuddin, M.D., M.B.A.,FAPCR
Director, Graduate Programs in Clinical Research
km3668@drexel.edu
215-762-3812

For more information about the program, visit the Drexel University Online Master of Science in Clinical Research Organization and Management (https://www.online.drexel.edu/online-degrees/biomedical-degrees/ms-crom/) webpage.

For information about applying to the program, visit the Drexel University Online Admissions Criteria (https://www.online.drexel.edu/online-degrees/biomedical-degrees/ms-crom/#admissionscriteria) webpage.

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 and Management program (subject code "CR") 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**.

Program Requirements		**36.0**
New Product Research and Development		
CR 515S	Intro to Clinical Trials	
CR 525S	Scientific Writing and Medical Literature	
CR 600S	Designing the Clinical Trial	
CR 609S	Innovative Product Development	
CR 614S	Introduction to Clinical Pharmacology	
CR 620S	Regulatory, Scientific and Social Issues Affecting Biotech Research	
Compliance and Safety Surveillance		
CR 555S	Compliance & Monitoring Issues	
CR 570S	Principles and Practice of Pharmacovigilance	
CR 612S	Fundamentals of Compliance	
CR 633S	Quality Assurance Audits	
Ethics and Law		
CR 505S	Ethical Issues in Research	
CR 511S	The History of Misconduct in Biomedical Research	
CR 545S	Pharmaceutical Law	
CR 565S	Contemporary Issues in Human Research Protection	
Regulatory		
CR 501S	Emerging Trends in Medical Device Regulation	
CR 508S	Medical Device Combination Product Regulation	
CR 514S	World Wide Regulatory Submissions	
CR 523S	Current Issues in Review Boards	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 551S	International Regulatory Affairs	
Biostatistics and Data Management		
CR 500S	Epidemiology	
CR 520S	Applications of Clinical Research Biostatistics	
CR 527S	Clinical Data Management	
CR 631S	Applications of Clinical Research Biostatistics II	
Clinical Research Management		
CR 510S	Sponsored Projects Finance	
CR 512S	Fundamentals of Academic Research Administration	
CR 536S	Clinical Project Management	
CR 541S	Patient Recruitment and Informed consent	
CR 550S	Leadership Skills	
New Therapeutic Product Business and Strategic Planning		
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	
CR 518S	Clinical Trial Budgeting	
CR 546S	Clinical Outsourcing	
CR 617S	Informatics in Pharm Res & Development	
CR 625S	Health Policy and Economics	
CR 635S	Strategic Planning	
Total Credits		**36.0**

Drexel Pathway to Medical School

Major: Drexel Pathway to Medical School
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 44.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 19-1029

About the Program

This intensive, one-year master's degree program provides candidates a conditional acceptance for matriculation into the Drexel University College of Medicine's MD program following successful completion of the DPMS program. The intensive introductory summer enrichment curriculum provides small group instruction. Throughout the program, students are supported with individualized learning strategy enhancement, peer mentors, and tutors.

Additional Information

Drexel University College of Medicine
Division of Pre-medical and Pre-health Programs
Graduate School of Biomedical Sciences and Professional Studies
New College Building, Room 4104
245 North 15th Street, Mail Stop 344
Philadelphia, PA 19102

Phone: 215-762-4692
Email: CoM_MedicalSciences@drexel.edu

Visit the Drexel University College of Medicine's website for more information on the Drexel Pathway to Medical School program (https://drexel.edu/medicine/academics/graduate-school/drexel-pathway-to-medical-school/).

Admission Requirements

The program is open to all premedical students who have successfully completed the prerequisite coursework for medical school with a grade of C or better. All applications to the DPMS program are considered by the College of Medicine which utilizes a holistic review process. While there are no specific minimum or maximum GPA or score requirements, a typical competitive applicant has a GPA above 2.9 and an MCAT above the 25th percentile. If an applicant is chosen for an interview, they will be notified by the College of Medicine.

Degree Requirements

Required Courses		
DPMS 500S	Medical Science Preparation	1.0
DPMS 501S	Critical Thinking and Scientific Communication Seminar	2.0
DPMS 502S	Accelerated Introductory Medical Biostatistics	3.0
IMSP 513S	Medical Biochemistry	6.0
MSPA 520S	Medical Terminology	3.0
IMSP 506S	Medical Professionalism and Leadership	3.0
IMSP 522S	Medical Physiology I	3.0
IMSP 523S	Medical Physiology II	3.0
IMSP 542S	Medical Microanatomy I	4.0
MSPP 513S	Advanced Human Anatomy	4.0
Electives		**12.0**
DPMS 503S	Neurobiology of Mental Illness	
DPMS 504S	Functional Neuroanatomy	
IMSP 544S	Medical Immunology I	
IMSP 545S	Medical Immunology II	
MSPP 404S	Concepts in Science and Verbal Reasoning I	
MSPP 405S	Concepts in Science and Verbal Reasoning II	
Total Credits		**44.0**

Sample Plan of Study

First Year

	Credits	Fall	Credits	Spring	Credits
Pre-Fall*		IMSP 513S	6.0	IMSP 506S	3.0
DPMS 500S	1.0	IMSP 522S	3.0	IMSP 523S	3.0
DPMS 501S	2.0	IMSP 542S	4.0	MSPP 513S	4.0
DPMS 502S	3.0	Electives - Select from the list below:	6.0	Electives - Select from the list below:	6.0
MSPA 520S	3.0	DPMS 503S		DPMS 504S	
		IMSP 544S		IMSP 545S	
		MSPP 404S		MSPP 405S	
	9		**19**		**16**

Total Credits 44

* Pre-Fall Term begins six weeks before the start of the first term.

Drug Discovery and Development

Major: Drug Discovery and Development
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 38.0
Classification of Instructional Programs (CIP) code: 26.1001
Standard Occupational Classification (SOC) code: 19-1029

About the Program

The MS in Drug Discovery and Development program provides in-depth exposure to the multiple elements involved in the discovery and development of marketed drugs. This unique program provides the rigorous scientific and technical training necessary to succeed and advance in the complex and multidisciplinary field of drug discovery. It has been designed to prepare students for a smooth transition into an enduring and productive career within the pharmaceutical and biotechnology industry. It covers all aspects of drug discovery and development beginning with the identification of a drug target and proceeding through to clinical trials, regulatory approval and commercialization. Students will also be introduced 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 the biomedical sciences, life sciences, health sciences or related fields who wish to pursue an industry-focused master's-level degree or enhance their qualifications for a doctoral program in the biomedical sciences or medicine. This includes individuals who plan 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 pharmaceutical and biotechnical industries require a diversity of experience and expertise.

Additional Information

For more information about this program, visit the College of Medicine's Biomedical Graduate Studies (https://drexel.edu/medicine/admissions/overview/) page.

Admission Requirements

For acceptance to the program, the applicant must have completed a four-year life science, physical science, pharmacy, or related bachelor's degree program, with a 3.0 GPA preferred. Students must fulfill all requirements for consideration as defined by the Executive Committee of the Interdisciplinary and Career-Oriented Division of the Graduate School of Biomedical Science and Professional Studies.

- Official transcripts from all colleges and universities attended
- Official copies of entrance test scores and official test scores from the Graduate Record Examination (GRE) for applicants to the full-time program
- References from at least three instructors or professionals
- An application fee is required for the full-time program.
- 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 basic chemistry, cell biology, biochemistry, and mathematics and are encouraged to have training in 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 Graduate School of Biomedical Science and Professional Studies in the College of Medicine, as well as important application dates.

Additional Information

For more information on how to apply, visit Drexel's Admissions page for Biomedical Graduate Studies (https://drexel.edu/grad/programs/ducom/drug-discovery-and-development/).

Degree Requirements

The curriculum is designed to provide students with a with a comprehensive understanding of the entire process of drug discovery and development and its scientific foundation, while simultaneously offering multiple options to pursue specialized areas of interest.

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0-3.0
or CR 612S	Fundamentals of Compliance	
NEUR 500S	Statistics for Neuro/Pharm Research	2.0-3.0
or IDPT 501S	Biostatistics I	
or CR 520S	Applications of Clinical Research Biostatistics	
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 527S	Current Topics in Drug Discovery and Development	1.0
PHRM 605S	Research in Drug Discovery and Development	4.0
or PHRM 610S	Practicum in Drug Discovery and Development	
Electives *		**20.0-21.0**
Elective Options		
CBIO 510S	Cancer Biology	
CR 500S	Epidemiology	
CR 501S	Emerging Trends in Medical Device Regulation	
CR 505S	Ethical Issues in Research	
CR 508S	Medical Device Combination Product Regulation	
CR 510S	Sponsored Projects Finance	
CR 511S	The History of Misconduct in Biomedical Research	
CR 512S	Fundamentals of Academic Research Administration	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	
CR 514S	World Wide Regulatory Submissions	
CR 515S	Intro to Clinical Trials	
CR 518S	Clinical Trial Budgeting	
CR 520S	Applications of Clinical Research Biostatistics	
CR 523S	Current Issues in Review Boards	
CR 525S	Scientific Writing and Medical Literature	
CR 527S	Clinical Data Management	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 536S	Clinical Project Management	
CR 541S	Patient Recruitment and Informed consent	
CR 545S	Pharmaceutical Law	
CR 546S	Clinical Outsourcing	
CR 550S	Leadership Skills	
CR 551S	International Regulatory Affairs	
CR 555S	Compliance & Monitoring Issues	
CR 565S	Contemporary Issues in Human Research Protection	
CR 570S	Principles and Practice of Pharmacovigilance	
CR T580S	Special Topics in Clinical Research	
CR 600S	Designing the Clinical Trial	
CR 609S	Innovative Product Development	
CR 612S	Fundamentals of Compliance	
CR 614S	Introduction to Clinical Pharmacology	
CR 617S	Informatics in Pharm Res & Development	

CR 620S	Regulatory, Scientific and Social Issues Affecting Biotech Research
CR 625S	Health Policy and Economics
CR 631S	Applications of Clinical Research Biostatistics II
CR 633S	Quality Assurance Audits
CR 635S	Strategic Planning
MIIM 521S	Biotechniques I: Molecular and Genomic Methods
MIIM 522S	Biotechniques II: Immunological Methods
MIIM 524S	Vaccines and Vaccine Development
MIIM 527S	Immunology, Immunopathology and Infectious Diseases
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
PATH 601S	Cell and Molecular Pathobiology of Cancer
PHGY 503S	Graduate Physiology
PHRM 502S	Current Topics in Pharmacology & Physiology
PHRM 503S	Pharm & Phys 1st Lab Rotation
PHRM 507S	Prin of Neuropharmacology
PHRM 516S	Advanced Topics in Physiology
PHRM 517S	Advanced Topics in Pharmacology
PHRM 518S	New Frontiers in Therapy
PHRM 519S	Methods in Biomedical Research
PHRM 520S	Internship in Drug Discovery and Development
PHRM 521S	Intensive Internship in Drug Discovery and Development
Quarter Elective Course Options (must be approved by advisor)	
PHRM T580S	Special Topics in Pharmacology
BMES 604	Pharmacogenomics
MGMT 910	Readings in Strategic Management
MGMT 940	Seminar in Organizational Behavior
ORGB 511	Leading in Dynamic Environments: A Personal, Relational, and Strategic Approach
PROJ 501	Introduction to Project Management
PROJ 535	International Project Management
Total Credits	**38.0-41.0**

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

Sample Plan of Study

Full Time Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
IDPT 500S	2.0	NEUR 500S	2.0
PHGY 503S	4.0	PHRM 502S	1.0
PHRM 516S	1.0	PHRM 526S	3.0
PHRM 525S	3.0	PHRM 605S	4.0
	10		**10**

Second Year

Fall	Credits	Spring	Credits
PHRM 512S	3.0	Electives or Thesis	9.0
Electives	6.0		
	9		**9**

Total Credits 38

Part Time Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
CR 612S	3.0	PHRM 526S	3.0
PHRM 525S	3.0	Elective	3.0
	6		**6**

Second Year			
Fall	**Credits**	**Spring**	**Credits**
CR 520S	3.0	PHRM 512S	3.0
Elective	3.0	PHRM 527S	1.0
		Electives	6.0
	6		**10**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
PHRM 610S	4.0	Electives	6.0
Elective	3.0		
	7		**6**

Total Credits 41

Forensic Science

Major: Forensic Science
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 42.0
Classification of Instructional Programs (CIP) code: 43.0406
Standard Occupational Classification (SOC) code: 19-4092

About the Program

The Master of Science in Forensic Science (MSFS) program is a two-year graduate program leading to the Master of Science degree. Students in this program will gain theoretical and practical expertise in various aspects of forensic investigation. Graduates from the MSFS program will be prepared to work as analysts in forensic laboratories or in the biotech and pharmaceutical industry and gain a foundation for additional degrees in science and healthcare.

The core curriculum, taken by all students, provides foundational skills in forensic chemistry, biology, criminalistics, statistics, and law. For enhanced study, students can further specialize through concentrations in Molecular Biology or Forensic Medicine, leveraging the areas of expertise within the College of Medicine. Students will also complete a thesis-quality mentored research project in an area of their interest within the different disciplines represented at the College.

Experiential Learning

Hands-on learning plays a significant role in the Forensic Science program curriculum. Many of the courses involve face-to-face learning or hybrid solutions. The practicum experience allows the student to gain "real world experience" within a controlled learning environment. Students are free to choose the type of institution and also the location of where they want to complete their experience. Students wishing to find full-time employment opportunities find that the practicum enables them to build their professional network prior to earning their degree.

Practicum Description

The practicum experience allows students to translate their academic training into "real-world" applications. Because of this exposure, students are better prepared to enter the current job market or transition to medical and law schools.

Program Level Outcomes

Graduates of the Master of Forensic Science program will achieve six program level outcomes that describe the skills, competencies, and knowledge gained through completion of the program curriculum:

- Demonstrate the ability to evaluate physical evidence from a multidisciplinary and multi-science point of view. Applying accepted processing protocols to ensure the continuity of the physical evidence.
- Establish a familiarity with all of the divisions of a crime laboratory including biology, chemistry, comparative sciences, crime scene unit, evidence control, and quality control/quality assurance
- Understand the legal aspects of forensic science in the judicial system
- Demonstrate competence with instrumentation and equipment relative to their field of scientific analysis
- Effectively communicate scientific ideas and information in both oral and written formats using technical language

Additional Information

For more information about this program, visit the College of Medicine's Master of Science in Forensic Science (https://drexel.edu/medicine/academics/graduate-school/forensic-science/) webpage.

Admission Requirements

Applicants to the MS in Forensic Science Program must have completed a four-year BA or BS degree program with a focus in biology, chemistry, or related disciplines with undergraduate coursework in biology, general and organic chemistry, physics, mathematics, or related subjects. Although a minimum cumulative grade point average (GPA) of 3.0 on a 4.0 system is strongly desired, applicants with a lower cumulative GPA will be considered based on overall experience, such as research and/or professional, and other strengths that are demonstrated in the application.

The following must be submitted for consideration:

- Application with $75.00 fee
- Official transcripts from each college and/or university attended
- Three letters of recommendation (two must be academic)
- Official GRE or other standardized test scores (e.g. MCAT test scores)
- A personal statement describing the interest in this field, personal goals, and career aspirations
- 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.

Additional Information

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

Ms. Safia Dias
215.762.4283
shd42@drexel.edu

Division of Interdisciplinary and Career-Oriented Programs
Graduate School of Biomedical Sciences and Professional Studies
Drexel University College of Medicine
245 North 15th Street, Mail Stop 344
New College Building
Philadelphia, PA 19102-1192

Degree Requirements

Requirements

Required Core Courses:		
IHS 510S	Introductory Biostatistics	2.0
or IDPT 501S	Biostatistics I	
IHS 514S	Molecular Biology & Biochemistry of the Cell	3.0
MFSP 541S	Fundamentals of Forensic Chemistry	3.0
MFSP 542S	Foundations of Physical Evidence	3.0
MFSP 550S	Biological Aspects of the Forensic Sciences	2.0
MFSP 572S	Forensic Research Project I	1.0
MFSP 573S	Forensic Research Project II	3.0
MFSP 575S	Introduction to Criminal Law and Trial Process	3.0
MFSP 589S	Forensic DNA Analysis	4.0
MFSP 592S	Forensic Graduate Seminar	2.0
MFSP 598S	Forensic Research Project III	4.0
MFSP 602S	Professional Courtroom Testimony & Moot Court	3.0
Select 9 credits from the following: For a concentration in Molecular Biology or Forensic Medicine, complete the coursework required for each concentration. For general study, complete 9 credits of coursework from either concentration or additional electives with Program Director approval.		**9.0**
Total Credits		**42.0**

Forensic Medicine Concentration		
Required Coursework		
MFSP 551S	Human Function	3.0
MFSP 552S	Structure of the Human Body	3.0
MFSP 554S	Principles of Forensic Pathology	3.0
Total Credits		**9.0**

Molecular Biology Concentration		
Required Coursework		

MFSP 577S	Genetics for the Forensic Scientist	2.0
MFSP 579S	Forensic Microbiology	2.0
MFSP 580S	Principles of Immunology	2.0
MFSP 597S	Forensic Serology	3.0
Total Credits		**9.0**

Additional Electives		
CHEM 755	Mass Spectrometry *	3.0
IHS 513S	Scientific Writing for Healthcare Professionals	2.0
MFSP 553S	Human Structure Lab	1.0
MFSP 555S	Forensic Science Practicum	3.0
MFSP 556S	Forensic Anthropology and Topics in Human Identification	3.0
MFSP 557S	Drug Chemistry	2.0
MFSP 558S	Instrumental Analysis	2.0
MFSP 563S	Latent Fingerprint Analysis	3.0
MFSP 567S	Basic Techniques for the Analysis of Biomolecules	0.0-3.0
MFSP 570S	Nuclear/Biological/Chemical Terrorism	3.0
MFSP 571S	Bloodstain Pattern Analysis	3.0
MFSP 578S	Forensic Photography	3.0
MFSP 581S	Human Osteology and Calcified Tissue Biology I	3.0
MFSP 582S	Human Osteology and Calcified Tissue Biology II	2.0
MFSP 583S	The Autopsy in Clinical Forensic Medicine	2.0
MFSP 584S	Introduction to Forensic Radiology	2.0
MFSP 585S	Clinical Forensic Emergency Medicine and Traumatology	2.0
MFSP 588S	Advanced Topics in Cell Biology	2.0
MFSP 590S	Homicide Investigation	3.0
MFSP T580S	Special Topics in Forensic Science	1.0-4.0
MFSP 603S	Medical Toxicology	2.0

* Quarter course credits have been converted to semester credits.

Sample Plan of Study

General Plan of Study

First Year

Fall	Credits	Spring	Credits
MFSP 541S	3.0	IHS 514S	3.0
MFSP 542S	3.0	MFSP 589S	4.0
MFSP 550S	2.0	MFSP 572S	1.0
MFSP 575S	3.0	IDPT 501S or IHS 510S	2.0
	11		**10**

Second Year

Fall	Credits	Spring	Credits
MFSP 573S	3.0	MFSP 598S	4.0
MFSP 602S	3.0	MFSP 592S	2.0
Select courses from concentration or additional electives	5.0-6.0	Select courses from concentration or additional electives	4.0
	11-12		**10**

Total Credits 42-43

Specific Plans of Study for Concentrations

Molecular Biology Concentration

First Year

Fall	Credits	Spring	Credits
MFSP 541S	3.0	IDPT 501S or IHS 510S	2.0
MFSP 542S	3.0	IHS 514S	3.0
MFSP 550S	2.0	MFSP 572S	1.0
MFSP 575S	3.0	MFSP 589S	4.0
	11		**10**

Second Year

Fall	Credits	Spring	Credits
MFSP 573S	3.0	MFSP 577S	2.0
MFSP 579S	2.0	MFSP 580S	2.0
MFSP 597S	3.0	MFSP 592S	2.0
MFSP 602S	3.0	MFSP 598S	4.0
	11		**10**

Total Credits 42

Forensic Medicine Concentration

First Year

Fall	Credits	Spring	Credits
MFSP 541S	3.0	IDPT 501S or IHS 510S	2.0
MFSP 542S	3.0	IHS 514S	3.0
MFSP 550S	2.0	MFSP 572S	1.0
MFSP 575S	3.0	MFSP 589S	4.0
	11		**10**

Second Year

Fall	Credits	Spring	Credits
MFSP 551S	3.0	MFSP 554S	3.0
MFSP 552S	3.0	MFSP 592S	2.0
MFSP 573S	3.0	MFSP 598S	4.0
MFSP 602S	3.0		
	12		**9**

Total Credits 42

Histotechnology

Major: Histotechnology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 46.0
Classification of Instructional Programs (CIP) code: 51.1007
Standard Occupational Classification (SOC) code: 29-2011; 29-2012

About the Program

The Graduate 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 Histotechnologytraining 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 (https://www.ascp.org/content/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 (https://www.nsh.org/home/) 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.

Additional Information

For more information about this program, visit the College of Medicine's Master of Science in Histotechnology 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.

Additional Information

For further information, contact:

Tina Rader, MHS, PA(ASCP)[CM]
Co-Director Pathologists' Assistant and Histotechnology Programs
Drexel University College of Medicine
New College Building, NCB4313
245 N. 15th Street, Mail Stop 344
Philadelphia, PA 19102-1192
215-762-4113
tina.rader@drexelmed.edu

Degree Requirements

Required Courses		
IHS 514S	Molecular Biology & Biochemistry of the Cell	3.0
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
Total Credits		**46.0**

Sample Plan of Study

First Year

Fall	Credits Spring	Credits Summer	Credits
MLAS 545S	3.0 MFSP 551S	3.0 MHPP 503S	9.0
MSPA 520S	3.0 MHPP 500S	4.0 MSPA 510S	2.0
MSPA 540S	3.0 MHPP 502S	3.0 MSPA 560S	2.0
MFSP 552S	3.0 MSPA 580S	4.0	
MFSP 553S	1.0 IHS 514S	3.0	
MSPA 590S	3.0		
	16	**17**	**13**

Total Credits 46

Immunology

Major: Immunology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.0508
Standard Occupational Classification (SOC) code: 11-9121

About the Program

Mission Statement

The Master of Science in Immunology**,** offered by the Department of Microbiology and Immunology and the Institute for Molecular Medicine and Infectious Disease (IMMID)**,** is a **non-thesis degree program.** The program provides education and training in areas of research in basic and clinical immunology and immunologically based diseases. Students in this program acquire theoretical and practical knowledge about the normal functions of the immune system and disease pathogenesis associated with immunological dysfunction. Students also learn how this knowledge is applied to develop tools for diagnosis, treatment, prognosis, and prevention of immunologically based diseases. Graduates from this program will be ready to enter the biotechnology workforce and are attractive candidates for doctoral programs in science and medicine.

The Master of Science in Immunology program is designed to provide academic and practical biotechnical knowledge in translational research, particularly in the areas of immunotherapeutics and vaccine development.

Curriculum

The two year non-thesis program encompasses fundamental requirements to establish a sound grounding in immunology, biochemistry, genetics, and cellular and molecular biology. The program is typically completed in two full-time years (four semesters of at least nine credits) of required and elective graduate courses, and one or more experiential research components in the first or second year. The flexibility of the curriculum enables students to complete the degree requirement within 18 months on an accelerated 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. A minimum of 36.0 credits is required to graduate with at least 6.0 of those earned as research credits.

The experiential research component of the curriculum can be fulfilled by two alternative approaches. Most students choose to engage in an intensive 6.0 credit hands-on research internship in which a 12-16 week research program will be undertaken in a laboratory at Drexel University, another academic institution, or at a biotechnology or biopharmaceutical company. Alternatively, students may choose to engage in a less intensive experience spanning two semesters, or conduct an independent research project with the approval and supervision of program directors.

Traditional (Face-to-Face), Hybrid, or Online Learning Options

Classes can be attended at any of Drexel College of Medicine locations: Center City and Queen Lane campuses in Philadelphia. State-of-the-art video conferencing provides real-time interactive learning at these locations. Most classes are held in the late afternoon/early evening to facilitate participation of working professionals. The program may also be completed fully online—offered through Drexel University Online (https://online.drexel.edu/online-degrees/biomedical-degrees/ms-immunology/). All required courses and most electives have online sections and online students experience the same curriculum as face-to-face or hybrid students. Online sections are designed to maximize interactions among students and faculty and may include live web sessions. Individual students also may choose a mix of traditional and online (hybrid) courses. The goal is to provide maximum scheduling flexibility.

Additional Information

For more detailed information about the curriculum and program goals, please contact either:

Stephen Jennings, PhD
Email: srj32@drexel.edu

Pooja Jain, PhD
Email: pj27@drexel.edu

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.

Online applications are considered year-round. Potential students are encouraged to apply no later than July 1 for fall admission or December 1 for spring admission.

Additional Information

For more information about the program and to access the online application, view the Master of Science in Immunology (http://drexel.edu/medicine/academics/Graduate-School/immunology/) page on the College of Medicine's website.

Degree Requirements

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 Immunology. In order to maintain full-time student status, a minimum of 9.0 credits must be taken in any given academic semester. In most cases, there are both traditional (face-to-face) and online sections for each course). Students should work with their program advisors to plan their course of study.

Research Requirements

The research component of the curriculum can be fulfilled by two alternative approaches. Most student choose to engage in a hands-on research internship in which a 12-week research program will be undertaken in a laboratory at Drexel, another academic institution, or at a biotechnology or biopharmaceutical company. Alternatively, students may choose to engage in an independent research project with the approval and supervision of program directors.

For an individualized plan of study listing the sequence of courses to be completed, students should work with their program advisor.

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
or MIIM 503S	Biomedical Ethics	
IDPT 501S	Biostatistics I	2.0
or MIIM 517S	Applied Statistics for Biomedical Sciences	
MIIM 527S	Immunology, Immunopathology and Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	3.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fundamentals of Molecular Medicine III	2.0
MIIM 533S	Molecular Medicine Journal Club II	1.0

MIIM 534S	Molecular Medicine Journal Club I	1.0
MIIM 606S	Microbiology and Immunology Seminar	1.0
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.		16.0
Possible Electives		
MIIM 502S	Microbiology and Immunology Journal Club	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
MIIM 522S	Biotechniques II: Immunological Methods	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology and Fungal Infections	
MIIM 543S	Parasitology and Parasitic Diseases	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 621S	Biomedical Research I	
MIIM 622S	Biomedical Research II	
MIIM 625S	Advanced Molecular Virology	
MIIM 630S	Advanced Molecular Biology	
MIIM 651S	Research Internship in Immunology	
MIIM 660S	Current Concepts in Molecular Medicine I	
MLAS 529S	Molecular Genetics	
Total Credits		**36.0**

Sample Plan of Study

Full Time

First Year

Fall	Credits	Spring	Credits
Required Course(s):		Required Course(s):	
MIIM 527S	3.0	IDPT 501S or MIIM 517S	2.0
MIIM 530S	3.0	MIIM 531S	2.0
MIIM 534S	1.0	MIIM 533S	1.0
Elective(s):		MIIM 606S	1.0
MIIM 540S	2.0	Elective(s):	
		MIIM 524S	3.0
	9		**9**

Second Year

Fall	Credits	Spring	Credits
Required Course(s):		Required Course(s):	
MIIM 532S	2.0	IDPT 500S or MIIM 503S	2.0
MIIM 606S	1.0	MIIM 654S	3.0
Elective(s):		Elective(s):	
MIIM 651S	6.0	MIIM 522S	2.0
		MIIM 543S	2.0
	9		**9**

Total Credits 36

Part Time

First Year (Part-Time)

Fall	Credits	Spring	Credits
Required Course(s):		Required Course(s):	
IDPT 500S or MIIM 503S	2.0	IDPT 501S or MIIM 517S	2.0
MIIM 530S	3.0	MIIM 531S	2.0
MIIM 534S	1.0	MIIM 533S	1.0
		MIIM 606S	1.0
	6		**6**

Second Year (Part-Time)			
Fall	**Credits**	**Spring**	**Credits**
Required Course(s):		Required Course(s):	
MIIM 527S	3.0	MIIM 654S	3.0
MIIM 532S	2.0	Elective(s):	
MIIM 606S	1.0	MIIM 524S	3.0
	6		**6**

Third Year (Part-Time)			
Fall	**Credits**	**Spring**	**Credits**
Elective(s):		Elective(s):	
MIIM 651S	6.0	MIIM 522S	2.0
		MIIM 541S	2.0
		MIIM 543S	2.0
	6		**6**

Total Credits 36

Program Goals

Over the course of completing the program, students will develop

- Core knowledge of molecular and cellular disciplines that constitute biomedical sciences
- Working knowledge of normal functions of the immune system at the cellular and molecular level and how immunological dysfunction contributes to immunologically based disease
- Practical knowledge and skills that help identify gaps in the biomedical field for the development of molecular diagnostic and therapeutic tools.
- Skills in basic, translational, or clinical research
- Professional ethics necessary for the responsible conduct of research
- Communication and leadership skills
- Other soft skills (e.g., collaboration, problem solving, career planning, networking) that facilitate career advancement and promotion

In the course of meeting these program-level goals, students will have also made progress in all of the Drexel Student Learning Priorities (DSLPs) (https://drexel.edu/provost/assessment/outcomes/dslp/) to help them build their futures.

Core Intellectual and Practical Skills:

- Communication
- Critical and creative thinking
- Ethical reasoning
- Information literacy
- Self-directed learning
- Technology use

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship, and creative expression
- Responsible citizenship

Infectious Disease

Major: Infectious Disease
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.0508
Standard Occupational Classification (SOC) code: 19-1022; 19-1029

About the Program

Mission Statement

The Master of Science in Infectious Disease (http://www.drexel.edu/medicine/Academics/Graduate-School/Infectious-Disease/) program, offered by the Department of Microbiology and Immunology (http://www.drexel.edu/medicine/About/Departments/Microbiology-Immunology/) and by the Institute for Molecular Medicine and Infectious Disease (http://www.drexel.edu/medicine/About/Departments/Institute-for-Molecular-Medicine-Infectious-Disease/) (IMMID), provides graduate-level training in the area of infectious disease. Classroom activities, online learning, and research experiences cover fundamentals of molecular biology, cell biology, and immunology, as well as basic, translational, and clinical aspects of diseases caused by important infectious pathogens, including SARS-CoV-2, HIV, methicillin-resistant Staphylococcus aureus (MRSA), malarial parasites, and influenza virus. Elective courses offer highly focused studies of topics relevant to infectious disease, including: vaccines and vaccine development; viral, bacterial, parasitic, and fungal pathogens; emerging pathogens; principles of biocontainment; and emerging biomedical interventions for infectious diseases.

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

Curriculum

This non-thesis degree program comprises numerous required and elective graduate courses, as well as an elective research internship that can be completed during the course of the training program. Although most learners will complete the program in two years (four semesters) as full-time students, some may opt to enroll on a part-time basis, taking up to seven years to complete the degree program. Elective courses available to students in the program provide additional knowledge and expertise in areas relevant to infectious disease research, such as emerging infectious diseases, vaccines effective against infectious pathogens, biotechniques and laboratory research, and principles of biocontainment. The successful completion of the degree will be determined by grades obtained in the graduate courses, participation in seminars and journal clubs, and (if applicable) performance in the experiential learning component. The degree is conferred upon successful completion of a minimum of 36.0 credits of course work.

Learning Options

The Master of Science in Infectious Disease Program is available in two learning formats. Students can enroll in the face-to-face/hybrid program and attend classes on the Center City and Queen Lane campuses of the Drexel University College of Medicine in Philadelphia. Most classes are held in the late afternoon/early evening to facilitate participation of working professionals. Required and elective courses are offered both live (face-to-face) and online, providing the student the flexibility to formulate a hybrid plan of study that includes a mix of traditional, face-to-face courses and online courses.

The online degree program, which is offered through Drexel University Online, features the same curriculum as the face-to-face/hybrid program, including the experiential research internship. Online courses are designed with activities that maximize interactions among students and faculty, including live web sessions with faculty and guest speakers.

These different program formats provide students with maximum flexibility to meet their schedule demands and accommodate their learning preferences.

Experiential Learning

A signature element of the Program is the Research Internship in Infectious Disease. The internship encompasses one of 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 focused on infectious diseases in humans.

Most students choose to engage in a hands-on research internship consisting of a 16-week research project in a laboratory at Drexel University, another academic institution, or at a biotechnology or biopharmaceutical company. Students in the online program can make arrangements with academic institutions or biotechnology companies at their own locations rather than in the Greater Philadelphia region. Alternatively, traditional and online students may choose to engage in independent research projects with the approval and supervision of the Program Director.

Because the Research Internship in Infectious Disease is an elective course, students can instead choose to earn all 12 elective credits by completing other elective courses offered as part of the curriculum.

Additional Information

For more detailed information about the curriculum and program goals, please contact:

Fred Krebs, Ph.D. (Director)
Email: fck23@drexel.edu

Visit the websites for the face-to-face/hybrid and online Master of Science in Infectious Disease programs 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-disease/) site.

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 personal statement that describes your career goals and reasons for pursuing an MS in Infectious Disease
- A current *curriculum vitae* (cv) or resume
- Letters of recommendation 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 (if provided), recommendation letters, and relevant research or professional experiences.

Additional Information

Visit the websites for the face-to-face/hybrid and online Masters of Science in Infectious Disease programs 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-disease/) site.

Degree Requirements

Courses with an MIIM or IDPT designation are offered by the Drexel University College of Medicine and are taught on a semester schedule (fall and spring). Courses are available in traditional (face-to-face), hybrid, and/or online formats. Some of these traditional courses and hybrid courses are offered as evening classes at locations on either the Center City Campus or the Queen Lane Campus. While many activities in online courses can be completed asynchronously (i.e., at times that you choose), some courses include synchronous activities that require students to join the class at specified days and times (as indicated in the course syllabus).

At least 36.0 credits are required to complete the program and earn a Master of Science in Infectious Disease.

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
or MIIM 503S	Biomedical Ethics	
IDPT 501S	Biostatistics I	2.0
or MIIM 517S	Applied Statistics for Biomedical Sciences	
MIIM 527S	Immunology, Immunopathology and Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	3.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fundamentals of Molecular Medicine III	2.0
MIIM 533S	Molecular Medicine Journal Club II	1.0
MIIM 534S	Molecular Medicine Journal Club I	1.0
MIIM 545S	Introduction to Infectious Diseases	4.0
MIIM 606S	Microbiology and Immunology Seminar	1.0
MIIM 653S	Clinical Correlations in Infectious Disease	3.0
Electives		**12.0-15.0**
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
MIIM 522S	Biotechniques II: Immunological Methods	
MIIM 523S	Molecular Virology	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	

MIIM 540S	Viruses and Viral Infections
MIIM 541S	Bacteria and Bacterial Infections
MIIM 542S	Mycology and Fungal Infections
MIIM 543S	Parasitology and Parasitic Diseases
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis
MIIM 613S	Emerging Infectious Diseases
MIIM 615S	Experimental Therapeutics
MIIM 621S	Biomedical Research I
MIIM 622S	Biomedical Research II
MIIM 625S	Advanced Molecular Virology
MIIM 652S	Research Internship in Infectious Disease
MIIM 660S	Current Concepts in Molecular Medicine I
MLAS 529S	Molecular Genetics
Total Credits	**36.0-39.0**

Sample Plans of Study

The following plans of study illustrate two possible paths to degree completion and graduation. Plans can also be composed for students starting the program in the spring semester and for students who want to complete the degree over more than three years. Individualized plans of study are constructed cooperatively between accepted students and the academic advisor prior to the start of the first semester. Plans of study can also be modified during a student's progress through the program to accommodate changes in a student's preferences or extracurricular circumstances.

First Year

Fall	**Credits**	**Spring**	**Credits**
Required Course(s):		Required Course(s):	
IDPT 500S or MIIM 503S	2.0	IDPT 501S or MIIM 517S	2.0
MIIM 527S	3.0	MIIM 531S	2.0
MIIM 530S	3.0	MIIM 533S	1.0
MIIM 534S	1.0	MIIM 545S	4.0
	9		**9**

Second Year

Fall	**Credits**	**Spring**	**Credits**
Required Course(s):		Elective(s):	
MIIM 532S	2.0	MIIM 524S	3.0
MIIM 606S	1.0	MIIM 652S	6.0
MIIM 653S	3.0		
Elective(s):			
MIIM 525S	1.0		
MIIM 540S	2.0		
	9		**9**

Total Credits 36

First Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
Required Course(s):		Required Course(s):	
IDPT 500S or MIIM 503S	2.0	MIIM 531S	2.0
MIIM 530S	3.0	MIIM 533S	1.0
MIIM 534S	1.0	MIIM 545S	4.0
	6		**7**

Second Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
Required Course(s):		Required Course(s):	
MIIM 527S	3.0	IDPT 501S or MIIM 517S	2.0
MIIM 532S	2.0	Elective(s):	
MIIM 606S	1.0	MIIM 524S	3.0
		MIIM 540S	2.0
	6		**7**

Third Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
Required Course(s):		Elective(s):	
MIIM 653S	3.0	MIIM 652S	6.0
Elective(s):			

MIIM 525S	1.0	
	4	**6**

Total Credits 36

Note: Third Year Fall (Part-Time) is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Program Goals

Upon completion of the Master of Science in Infectious Disease Program, students will have achieved the following program-level goals:

1. **Develop broad core knowledge in the biological sciences.**
   - Demonstrate proficiency in fundamental concepts in molecular biology, biochemistry, and cell biology.
   - Demonstrate proficiency in these areas as they are described and applied in the primary scientific literature.
2. **Develop a working knowledge of infectious disease pathogens and the diseases that they cause.**
   - Demonstrate basic science knowledge of pathogens that cause human disease in the fields of virology, parasitology, bacteriology, mycology, and others.
   - Identify diseases caused by these pathogens and the mechanisms of pathogenesis.
   - Be able to critically analyze and evaluate publications in the primary literature that describe basic, translational, and clinical infectious disease research.
3. **Develop skills in analytical and critical thinking.**
   - Develop proficiency in critical analyses of ideas and concepts related to infectious disease research documented in the primary literature.
   - Use critical thinking skills in collegial presentations and discussions of research focused on infectious diseases and the pathogens that cause them.
4. **Develop skills in basic, translational, and/or clinical research.**
   - Develop new laboratory skills or enhance pre-existing skills.
   - Be proficient in collecting information and data from electronic source material and databases.
   - Apply analytical skills and critical thinking to data analyses.
5. **Develop professional ethics necessary for the responsible conduct of research.**
   - Be able to identify and evaluate professional ethical dilemmas, and discuss appropriate resolutions.
   - Apply professional ethical standards such as appropriate attribution of ideas, good recordkeeping, and truthful presentation of data/facts and conclusions.
6. **Develop communication and leadership skills.**
   - Be proficient at developing oral and/or written comprehensive reports, presenting facts, conducting analyses, and reaching conclusions.
   - Be proficient at using appropriate technologies for communication.
   - Be able to interact and work effectively with others in work settings involving cultural and demographic diversity.
7. **Develop other soft skills (e.g. collaboration, problem solving, career planning, networking) that facilitate career advancement and promotion.**
   - Develop a working knowledge of career opportunities in the desired field.
   - Effectively present a professional profile of oneself.
   - Be proficient at time and task management.
   - Be able to work effectively in collaborative and team-driven settings.
   - Begin the development of problem-solving skills to be used in the workplace.
   - Begin to establish a professional network.

Drexel Student Learning Priorities (DSLPs)

In the course of meeting these program-level goals, students will have also made progress in all of the Drexel Student Learning Priorities (DSLPs) (http://drexel.edu/provost/assessment/outcomes/dslp/) to help them build their futures:

Core Intellectual and Practical Skills

- Communication
- Critical and creative thinking
- Ethical reasoning
- Information literacy
- Self-directed learning
- Technology use

Experiential and Applied Learning

- Global competence
- Leadership
- Professional practice
- Research, scholarship, and creative expression
- Responsible citizenship

Intensive Medical Sciences

Major: Intensive Medical Sciences
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 35.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 11-9121

About the Program

This is a one-year intensive, non-thesis special master's program for students who have completed their pre#medical school coursework and wish to enhance their credentials for medical school application by taking courses equivalent in rigor to first-year medical school coursework.

Taking highly rigorous courses comparable to the first year of medical school permits medical school admissions committees to directly evaluate a student's competence. In addition, it provides students an opportunity to test their preparation and motivation for medical school. It is intended for students who believe that their undergraduate performance did not fully reflect their academic abilities and are now prepared to compete in medical school courses and demonstrate that they can excel.

Additional Information

Drexel University College of Medicine
Division of Pre-Medical and Pre-Health Programs
Graduate School of Biomedical Sciences and Professional Studies
New College Building, Room 4104
245 North 15th Street, Mail Stop 344
Philadelphia, PA 19102

Phone: 215-762-4692
Email: CoM_MedicalSciences@drexel.edu

For more information about this program, visit the College of Medicine's Intensive Medical Sciences (https://drexel.edu/medicine/academics/graduate-school/intensive-medical-sciences/) webpage.

Admission Requirements

Students with an undergraduate GPA of 3.2 or higher can be considered for this program. In addition, applicants must have a minimum MCAT total score of 507 (with no section less than 126) or 511 (with no section less than 124) to be considered for the guaranteed interview option at the Drexel MD program. Due to the rigor of the program, full-time commitment to the curriculum is essential.

Degree Requirements

IMSP 502S	Medicine and Society	3.0
IMSP 506S	Medical Professionalism and Leadership	3.0
IMSP 513S	Medical Biochemistry	6.0
IMSP 522S	Medical Physiology I	3.0
IMSP 523S	Medical Physiology II	3.0
IMSP 542S	Medical Microanatomy I	4.0
IMSP 543S	Medical Microanatomy II	2.0
IMSP 544S	Medical Immunology I	2.5
IMSP 545S	Medical Immunology II	1.5
IMSP 552S	Medical Nutrition	1.0

IMSP 562S	Medical Neuroanatomy	6.0
Total Credits		**35.0**

Sample Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
IMSP 502S	3.0	IMSP 506S	3.0
IMSP 513S	6.0	IMSP 523S	3.0
IMSP 522S	3.0	IMSP 543S	2.0
IMSP 542S	4.0	IMSP 545S	1.5
IMSP 544S	2.5	IMSP 552S	1.0
		IMSP 562S	6.0
	18.5		**16.5**

Total Credits 35

Interdisciplinary Health Sciences

Major: Interdisciplinary Health Sciences
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 48.0
Classification of Instructional Programs (CIP) code: 51.1099
Standard Occupational Classification (SOC) code: 29-2011; 29-2012

About the Program

The Graduate School of Biomedical Sciences and Professional Studies, Division of Pre-Medical and Pre-Health (PMPH) Programs, offers the Master of Science degree in Interdisciplinary Health Sciences (IHS). This program allows students to become stronger applicants to medical or other health professional schools by enhancing their academic credentials through a customizable biomedical curriculum. The IHS program also helps students to find and engage in meaningful community service experiences and provides an opportunity to supplement biomedical coursework with laboratory or clinical research.

IHS students complete multiple required courses throughout their first and second years. These courses provide general knowledge and training essential for a career in healthcare. Students also receive personalized guidance from a program advisor as they select courses to best meet their needs and interests from a broad range of electives. Students entering their second year in IHS select a concentration track and complete a specified number of courses within that concentration prior to graduation. In this way, the IHS curriculum is both flexible and structured in its goal of reinforcing the healthcare career interests of each student.

During the second year of IHS, students complete a rigorous one-year research project which teaches students to communicate complex scientific information and hone their critical thinking and analysis skills. Students with a dedicated interest in biomedical research may choose to complete a mentored research project in a laboratory or clinic. Alternatively, students may choose to complete an independent literature analysis project on the biomedical topic of their choice.

Upon completion of IHS, students will have a strong, integrated view of the biomedical sciences, which provides numerous advantages to graduates whether using their degree as a springboard for further professional education or for direct entry into the healthcare workforce.

Students must complete a minimum of 48.0 credits to graduate and must complete all required courses. The awarding of the Master of Science degree will be contingent upon satisfactory completion of all program requirements, including an earned GPA of no less than 3.0.

Additional Information

For more information about the program, visit the College of Medicine's MS in Interdisciplinary Health Sciences (https://drexel.edu/medicine/academics/graduate-school/interdisciplinary-health-sciences/) webpage.

Admission Requirements

Applicants to the IHS program must meet the following criteria:

- Earned a minimum undergraduate math/science GPA of 2.5
- Successfully completed all pre-medical prerequisite courses
- Received MCAT scores in the 20th-50th percentile range or minimum GRE – 50th percentile

Qualifying students participating in other PMPH Master of Science programs may have the option to transition into IHS if healthcare career goals deem the transfer appropriate.

Applicants with lower scores may be considered if they can demonstrate recent upward academic trends, or exemplary healthcare experience or community service activities.

Additional Information

For more information about applying to the program, visit the College of Medicine's MS in Interdisciplinary Health Sciences Admissions (https://drexel.edu/medicine/academics/graduate-school/interdisciplinary-health-sciences/how-to-apply/) webpage.

Degree Requirements

Required Courses		
IHS 500S	Career Development in the Health Sciences Seminar I	1.0
IHS 501S	Career Development in the Health Sciences Seminar II	1.0
IHS 507S	Initiating Biomedical Research	2.0
IHS 508S	MIHS Research Project	1.5
IHS 509S	MIHS Research Paper	1.5
IHS 510S	Introductory Biostatistics	3.0
IHS 513S	Scientific Writing for Healthcare Professionals	2.0
MSPP 525S	Community Dimensions of Medicine	2.0
Concentration Courses and Electives *		**34.0**
Total Credits		**48.0**

* Number of elective credits may vary depending on concentration selected.

Concentrations:

Biochemical and Pharmacologic Principles		
Select six of the following:		
CR 614S	Introduction to Clinical Pharmacology	3.0
IHS 502S	Neuropharmacology	3.0
IHS 514S	Molecular Biology & Biochemistry of the Cell	3.0
IHS 520S	Molecular & Cellular Bases of Medicine	2.0
IHS 525S	Human Nutrition	3.0
IHS T580S	Special Topics in Interdisciplinary Health Science *	3.0
MFSP 551S	Human Function	3.0
MFSP 557S	Drug Chemistry	2.0
MFSP 580S	Principles of Immunology	2.0
MLAS 529S	Molecular Genetics	3.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 581S	Medical Microbiology II	3.0
MSPP 511S	Concepts in Biochemistry and Cell Biology	4.0
MSPP 515S	Advanced Human Physiology	4.0
PHRM 512S	Graduate Pharmacology	3.0

Concepts in Anatomy and Pathology		
Select six of the following:		
CR 500S	Epidemiology	3.0
IHS 514S	Molecular Biology & Biochemistry of the Cell	3.0
IHS 521S	Neurophysiology of the Senses	4.0
IHS 525S	Human Nutrition	3.0
IHS T580S	Special Topics in Interdisciplinary Health Science *	3.0
MFSP 551S	Human Function	3.0
MFSP 554S	Principles of Forensic Pathology	3.0
MFSP 556S	Forensic Anthropology and Topics in Human Identification	3.0
MFSP 580S	Principles of Immunology	2.0
MFSP 584S	Introduction to Forensic Radiology	2.0
MLAS 531S	Embryology	3.0
MLAS 536S	Animal Models for Biomedical Research	1.0
MLAS 545S	Fundamentals of Histology	3.0
MSPP 511S	Concepts in Biochemistry and Cell Biology	4.0

MSPP 513S	Advanced Human Anatomy	4.0
MSPP 515S	Advanced Human Physiology	4.0
Laboratory Techniques		
Required courses for this concentration		
IHS 522S	Enhanced Laboratory Investigation I	2.0
IHS 523S	Enhanced Laboratory Investigation II	2.0
Select four of the following:		
BIOT 502S	Group Dynamics in STEM	3.0
BIOT 503S	Professional Portfolio Development	2.0
CR 505S	Ethical Issues in Research	3.0
CR 511S	The History of Misconduct in Biomedical Research	3.0
CR 515S	Intro to Clinical Trials	3.0
CR 565S	Contemporary Issues in Human Research Protection	3.0
CR 600S	Designing the Clinical Trial	3.0
CR 612S	Fundamentals of Compliance	3.0
MFSP 556S	Forensic Anthropology and Topics in Human Identification	3.0
MFSP 577S	Genetics for the Forensic Scientist	2.0
MFSP 578S	Forensic Photography	3.0
MFSP 579S	Forensic Microbiology	2.0
MFSP 589S	Forensic DNA Analysis	4.0
MFSP T580S	Special Topics in Forensic Science *	3.0
MLAS 523S	Organizational Management	3.0
MLAS 525S	Animal Anatomy	2.0
MLAS 535S	Biology & Care Of Lab Animals	4.0
MLAS 536S	Animal Models for Biomedical Research	1.0
MLAS 545S	Fundamentals of Histology	3.0
MLAS 610S	Diseases of Laboratory Animals	3.0
MSPA 520S	Medical Terminology	3.0
MSPA 580S	Medical Microbiology I	4.0
MSPA 581S	Medical Microbiology II	3.0
MSPP 505S	Laboratory Techniques in Biochemistry & Molecular Biology	2.0
Medical Science		
Required Courses for this Concentration		
IMSP 502S	Medicine and Society	3.0
IMSP 506S	Medical Professionalism and Leadership	3.0
IMSP 513S	Medical Biochemistry	6.0
IMSP 522S	Medical Physiology I	3.0
IMSP 523S	Medical Physiology II	3.0
IMSP 542S	Medical Microanatomy I	4.0
IMSP 543S	Medical Microanatomy II	2.0
IMSP 562S	Medical Neuroanatomy	6.0
Optional		
IMSP 544S	Medical Immunology I	2.5
IMSP 545S	Medical Immunology II	1.5
IMSP 552S	Medical Nutrition	1.0
Additional Electives		
CR 609S	Innovative Product Development	3.0
IHS 515S	Exploring Diversity in Healthcare	2.0
IHS 516S	Strategic Communication and Professional Development	2.0
MFSP 558S	Instrumental Analysis	3.0
MFSP 567S	Basic Techniques for the Analysis of Biomolecules	3.0
MFSP 581S	Human Osteology and Calcified Tissue Biology I	3.0
MFSP 582S	Human Osteology and Calcified Tissue Biology II	2.0
MFSP 585S	Clinical Forensic Emergency Medicine and Traumatology	2.0
MFSP 586S	Introduction to Forensic Pediatrics	3.0
MFSP 587S	Introduction to Forensic Psychology	2.0
MFSP 588S	Advanced Topics in Cell Biology	2.0

* Please see your advisor for the course numbers and topics that are acceptable.

Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
IHS 500S	1.0	IHS 501S	1.0
IHS 510S	3.0	MSPP 525S	2.0
IHS 513S	2.0	IHS 507S***	2.0
Minimum of 6.0 additional credits selected from list of electives in conjunction with program director	6.0	Minimum of 6.0 additional credits selected from list of electives in conjunction with program director	6.0
	12		**11**

Second Year

Fall	Credits	Spring	Credits
IHS 508S	1.5	IHS 509S	1.5
Additional credits selected from list of electives in conjunction with program director, with at least 5.0 credits coming from concentration track†	10.0	Additional credits selected from list of electives in conjunction with program director, with at least 5.0 credits coming from concentration track†	12.0
	11.5		**13.5**

Total Credits 48

* Students taking the Medical Sciences track are also required to take all IMS fall courses except for IMSP 544S, IMSP 545S, IMSP 552S.

** Please see your advisor for acceptable course numbers.

*** Students may also take this course in the Fall of Year two with approval of the Program Director.

† Number of credits is only a suggestion and may be split differently between Semesters.

Laboratory Animal Science

Major: Laboratory Animal Science
Degree Awarded: Master of Laboratory Animal Science (MLAS)
Calendar Type: Semester
Total Credit Hours: 49.0
Classification of Instructional Programs (CIP) code: 01.8102
Standard Occupational Classification (SOC) code: 19-1011

About the Program

The Graduate 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.

Available Online

For individuals who are currently working in the laboratory animal science field, the MLAS program is available 100% online. Students can work full-time while completing the program part-time (6 semesters). The majority of courses are completely asynchronous, thus allowing maximum flexibility for the working professional. Please review our website (http://www.drexel.edu/medicine/Academics/Graduate-School/Master-of-Laboratory-Animal-Science/Online-MLAScience/) 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.

Pre-Veterinary Graduate Minor

Students desiring to attend veterinary medical school have the option to elect to complete a pre-vet minor (p. 97) within the Master of Laboratory Animal Science (MLAS) program. The addition of these courses to the MLAS program will help to further enhance the student's application to veterinary medical school by providing additional rigorous and relevant graduate level coursework.

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.drexel.edu/medicine/Academics/Graduate-School/Master-of-Laboratory-Animal-Science/) for a comprehensive list of veterinary medical schools that have been attended by MLAS alumni.

Additional Information

Erin Vogelsong
Program Director, MLAS
Assistant Professor
Graduate School of Biomedical Sciences and Professional Studies
College of Medicine
Drexel University
245 N. 15th St., Room 15305
Philadelphia, PA 19102
Tel. 215.762.7968 | Fax: 215-762-7961
Erin.Vogelsong@Drexel.edu | drexel.edu/medicine (http://drexel.edu/medicine/)

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 3.0 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.

Additional Information

For more information, please contact:

Erin Vogelsong
Program Director, MLAS
Assistant Professor
Graduate School of Biomedical Sciences and Professional Studies
College of Medicine
Drexel University
245 N. 15th St., Room 15305

Philadelphia, PA 19102
Tel. 215.762.7968 | Fax: 215-762-7961
Erin.Vogelsong@Drexel.edu | drexel.edu/medicine (http://drexel.edu/medicine/)

Degree Requirements

The MLAS degree can be completed full-time in two years and one summer practicum, or part-time in three 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.

Required Courses		
MLAS 501S	Laboratory Animal Seminar	2.0
MLAS 503S	The Institutional Animal Care and Use Committee's (IACUC) Role in Animal Research	3.0
MLAS 510S	Clinical Orientation In Laboratory Animal Facilities	1.0
MLAS 520S	Financial Mgmt In Lab Anim Sci	3.0
MLAS 521S	Arch Eng & Plan For Anim Fac	4.0
MLAS 523S	Organizational Management	3.0
MLAS 525S	Animal Anatomy	2.0
MLAS 535S	Biology & Care Of Lab Animals	4.0
MLAS 536S	Animal Models for Biomedical Research	1.0
MLAS 606S	Clinical Laboratory Techniques and Concepts	1.0
MLAS 610S	Diseases of Laboratory Animals	3.0
MLAS 801S	Laboratory Animal Practicum	12.0
MSPA 580S	Medical Microbiology I	4.0
Electives		
Students must select a minimum of 6.0 credits from the following:		6.0
IHS 514S	Molecular Biology & Biochemistry of the Cell	
MLAS 500S	Animal Nutrition	
MLAS 502S	Occupational Safety and Health in Laboratory Animal Care and Use Programs	
MLAS 504S	Public Outreach for Animal Research	
MLAS 513S	Biochemical Basis of Disease (Upenn)	
MLAS 514S	Hematopoiesis (Upenn)	
MLAS 529S	Molecular Genetics	
MLAS 530S	Biostats In Vet Science	
MLAS 531S	Embryology	
MLAS 545S	Fundamentals of Histology	
MSPP 511S	Concepts in Biochemistry and Cell Biology	
PHGY 503S	Graduate Physiology	
PHRM 512S	Graduate Pharmacology	
Total Credits		**49.0**

Sample Plan of Study

Online MLAS Plan of Study

First Year (Part-Time)

Fall	Credits	Spring	Credits
MLAS 510S	1.0	MLAS 520S	3.0
MLAS 801S*	12.0	MLAS 523S	3.0
MSPA 580S	4.0		
	17		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
MLAS 525S	2.0	MLAS 503S	3.0
MLAS Elective	3.0	MLAS 535S	4.0
	5		**7**

Third Year (Part-Time)

Fall	Credits	Spring	Credits
MLAS 606S	1.0	MLAS 501S	2.0
MLAS 610S	3.0	MLAS 521S	4.0

MLAS Elective	3.0	MLAS 536S	1.0
	7		**7**

Total Credits 49

* Students will be able to satisfy this requirement with relevant laboratory animal science experience.

On Campus (Face-to-Face) MLAS Plan of Study

First Year

Fall	Credits	Spring	Credits
MLAS 510S	1.0	MLAS 520S	3.0
MLAS 523S	3.0	MLAS 535S	4.0
MLAS 536S	1.0	MLAS Elective*	3.0
MSPA 580S	4.0		
	9		**10**

Second Year

Fall	Credits	Spring	Credits
MLAS 525S	2.0	MLAS 501S	2.0
MLAS 606S	1.0	MLAS 521S	4.0
MLAS 610S	3.0	MLAS 503S	3.0
MLAS Elective*	3.0	MLAS 801S**	12.0
	9		**21**

Total Credits 49

* Students must choose a minimum of 2 elective courses to reach the 49.0 total credits.

** Students will begin their practicum in the spring, but it may continue into the summer depending on their location.

Medical Science

Major: Medical Science
Degree Awarded: Master of Science (MS) or Medical Doctor/Master of Science (MD/MS)
Calendar Type: Semester
Total Credit Hours: 59.0 (MS); 30.0 (MD/MS)
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 11-9121

About the MS Program

The Master of Science in Medical Science (MMS) program is a rigorous, direct-entry, two-year degree program that couples a challenging and rich curriculum with engaged and personalized student advisement. The program is designed to provide talented students with both medical knowledge and research competencies.

The first and second years of study focus on honing different skillsets. This sequence allows students to develop strong, well-rounded academic portfolios and become competitive candidates for seats in medical school or as they continue their graduate medical education.

About the MD/MS Program

The MD/MS in Medical Science (MD-MS) dual-degree program is designed to prepare physician scientists for careers as lifetime learners. The program is built on the foundation that clinical medicine and biomedical research enjoy a unique synergy. Physician scientists are uniquely poised to recognize, understand, apply, and expand clinical applications of basic research or identify novel or emerging areas of scientific inquiry that are needed to support clinical efforts.

The MD/MS degree in Medical Science would accept Drexel medical students who are in good academic standing following completion of the required medical school coursework as outlined in the plan of study and transfer them into the Graduate School of Biomedical Sciences and Professional Studies where they would be enrolled in the second year of the MMS program. At the end of this year, if they successfully complete MMSP 501S, MMSP 502S, MMSP 503S, and MMSP 504S, these students are eligible for the Master of Science in Medical Science.

At the conclusion of this one-year course of study, students will transfer back to the medical school to complete their requirements for the MD degree.

Additional Information

Drexel University College of Medicine
Division of Pre-Medical and Pre-Health Programs
245 North 15th Street, Mail Stop 344, Room 4104 NCB

Philadelphia, PA 19102
215.762.4692
Email: CoM_MedicalSciences@drexel.edu

Degree Requirements (MS)

Students must satisfactorily complete all coursework and conduct a full year of either bench-top or clinical research with a primary investigator. Successful completion of the program requires a minimum GPA of 3.0.

IMSP 502S	Medicine and Society	3.0
IMSP 506S	Medical Professionalism and Leadership	3.0
IMSP 513S	Medical Biochemistry	6.0
IMSP 522S	Medical Physiology I	3.0
IMSP 523S	Medical Physiology II	3.0
IMSP 542S	Medical Microanatomy I	4.0
IMSP 543S	Medical Microanatomy II	2.0
IMSP 562S	Medical Neuroanatomy	6.0
MMSP 501S	Research in Medical Science I	6.0
MMSP 502S	Research in Medical Science II	6.0
MMSP 503S	Research Seminar I	3.0
MMSP 504S	Research Seminar II	3.0
MMSP 505S	Introduction to Biomedical Research	2.0
Select one statistics course from the following:		**3.0**
CR 520S	Applications of Clinical Research Biostatistics	
MLAS 530S	Biostats In Vet Science	
IHS 510S	Introductory Biostatistics	
Optional		
IMSP 544S	Medical Immunology I	
IMSP 545S	Medical Immunology II	
IMSP 552S	Medical Nutrition	
Electives		**6.0**
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 565S	Contemporary Issues in Human Research Protection	
CR 600S	Designing the Clinical Trial	
IHS 505S	Healthcare in Spanish I	
IHS 506S	Healthcare in Spanish II	
IHS 511S	Biology of Cancer	
MLAS 529S	Molecular Genetics	
MLAS 531S	Embryology	
MSPP 513S	Advanced Human Anatomy	
PHRM 512S	Graduate Pharmacology	
MMSP 520S	Medical Pathology I	
MMSP 521S	Medical Pathology II	
Total Credits		**59.0**

Degree Requirements (MD/MS)

MMSP 501S	Research in Medical Science I	6.0
MMSP 502S	Research in Medical Science II	6.0
MMSP 503S	Research Seminar I	3.0
MMSP 504S	Research Seminar II	3.0
IDPT 500S	Responsible Conduct of Research	2.0
Transfer credits from MD program		10.0
Total Credits		**30.0**

Sample Plan of Study (MS)

First Year

Fall	Credits	Spring	Credits
IMSP 513S	6.0	IMSP 506S	3.0
IMSP 522S	3.0	IMSP 523S	3.0
IMSP 542S	4.0	IMSP 543S	2.0
IMSP 502S	3.0	IMSP 562S	6.0
Optional		MMSP 505S	2.0
IMSP 544S		Optional	
		IMSP 552S	
		IMSP 545S	
	16		**16**

Second Year

Fall	Credits	Spring	Credits
MMSP 503S	3.0	MMSP 502S	6.0
MMSP 501S	6.0	MMSP 504S	3.0
		A statistics course*	3.0
		Minimum of 6 additional graduate level science credits from list of electives*	6.0
	9		**18**

Total Credits 59

* Can be taken in either the fall or spring semester of second year

Sample Plan of Study (MD/MS)

Second Year

Fall	Credits	Spring	Credits
MMSP 501S	6.0	MMSP 502S	6.0
MMSP 503S	3.0	MMSP 504S	3.0
IDPT 500S	2.0		
Transfer credits from MD program	10.0		
	21		**9**

Total Credits 30

Microbiology and Immunology

Major: Microbiology and Immunology
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 45.0 (MS, non-thesis); 54.0 (MS, thesis); 132.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.0599
Standard Occupational Classification (SOC) code: 19-1022

About the Program

The Department of Microbiology and Immunology offers students 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 genomics; inflammation and 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. Students are provided with a curriculum of integrated courses that include the essentials for biomedical research as well as courses that emphasis host-pathogen interactions through a molecular pathogenesis series of courses on viruses, bacteria, fungi, and parasites, as well as immunology. Upon completing these programs, students pursue careers in academic, governmental, or industrial settings.

MS in Microbiology and Immunology

The MS program provides students a broad background in microbiology and immunology and the techniques used in microbiology and immunology research. There are both a thesis and non-thesis option for an MS degree. The thesis option combines course-work with a novel research project. The non-thesis degree program allows students to 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 average amount of time to completion is two years.

PhD in Microbiology and Immunology

The PhD program trains individuals to conduct independent hypothesis-driven research and to teach in the fields of microbiology and immunology. 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. The average amount of time to completion is five years.

Additional Information

For more information, including scheduling a plan of study, visit the College of Medicine's Microbiology and Immunology program (https://drexel.edu/medicine/academics/graduate-school/microbiology-immunology/) website.

Admission Requirements

Students interested in all types of pathogens (viral, bacterial, fungal, parasitic) and the host response to these interactions are encouraged to apply. There are no minimal requirements, but applicants should be competitive with regard to grades, research experience, and letters of recommendation. Applicants are encouraged to use email to contact the program director or 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.

Additional Information

To learn more about applying to the Microbiology and Immunology program please visit the Microbiology and Immunology program specific website (http://drexel.edu/medicine/academics/graduate-school/microbiology-immunology/how-to-apply/).

To learn more about applying to Drexel College of Medicine programs, please visit the College of Medicine’s Graduate School of Biomedical Sciences and Professional Studies (http://www.drexel.edu/medicine/Academics/Graduate-School/) (http://drexel.edu/medicine/academics/graduate-school/)website.

Degree Requirements (MS)

Non-Thesis Option

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
MIIM 502S	Microbiology and Immunology Journal Club *	4.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I (Viral Pathogenesis)	2.0
MIIM 513S	Molecular Pathogenesis II	3.0
MIIM 606S	Microbiology and Immunology Seminar *	4.0
Advanced Electives		**9.0**
Select a minimum of nine credits of Advanced Electives.		
MIIM 504S	Microbiology and Immunology 1st Rotation	
MIIM 514S	Grant Building	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 528S	Structural Bioinformatics	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 625S	Advanced Molecular Virology	
MIIM 630S	Advanced Molecular Biology	
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
MIIM 505S	Microbiology and Immunology 2nd Rotation	

MIIM 506S	Microbiology and Immunology 3rd Rotation	
MIIM 600S	Microbiology and Immunology Thesis Research	
Total Credits		**45.0**

* Taken each semester.

Thesis Option

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
MIIM 502S	Microbiology and Immunology Journal Club *	4.0
MIIM 504S	Microbiology and Immunology 1st Rotation	4.0
MIIM 508S	Immunology I	3.0
MIIM 512S	Molecular Pathogenesis I (Viral Pathogenesis)	2.0
MIIM 513S	Molecular Pathogenesis II	3.0
MIIM 600S	Microbiology and Immunology Thesis Research **	18.0
MIIM 606S	Microbiology and Immunology Seminar *	4.0
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
IDPT 600S	Thesis Defense	
MIIM 505S	Microbiology and Immunology 2nd Rotation	
MIIM 506S	Microbiology and Immunology 3rd Rotation	
MIIM 514S	Grant Building	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 528S	Structural Bioinformatics	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 625S	Advanced Molecular Virology	
MIIM 630S	Advanced Molecular Biology	
Total Credits		**54.0**

* Taken each semester.

** Taken each semester starting in the Second Year, until Thesis Defense

Students may opt to take additional approved advanced or general electives in consultation with their advisor, but these are not required.

Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Graduate School of Biomedical Sciences and Professional Studies programs. (http://drexel.edu/medicine/academics/graduate-school/)

Degree Requirements (PhD)

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
MIIM 502S	Microbiology and Immunology Journal Club *	9.0
MIIM 504S	Microbiology and Immunology 1st Rotation	4.0
MIIM 505S	Microbiology and Immunology 2nd Rotation	4.0
MIIM 506S	Microbiology and Immunology 3rd Rotation	4.0
MIIM 508S	Immunology I	3.0

MIIM 512S	Molecular Pathogenesis I (Viral Pathogenesis)	2.0
MIIM 513S	Molecular Pathogenesis II	3.0
MIIM 514S	Grant Building	2.0
MIIM 600S	Microbiology and Immunology Thesis Research **	63.0
MIIM 606S	Microbiology and Immunology Seminar *	9.0
Advanced Electives		
Choose at least two Advanced Electives for a minimum of four credits		4.0-6.0
MIIM 528S	Structural Bioinformatics	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 625S	Advanced Molecular Virology	
MIIM 630S	Advanced Molecular Biology	
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
Total Credits		**132.0-134.0**

* Taken each semester until Thesis Defense

** Taken each semester starting in Year two until Thesis Defense

Sample Plan of Study (MS)

Non-Thesis Option

First Year

Fall	**Credits**	**Spring**	**Credits**
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 508S	3.0	MIIM 513S	3.0
MIIM 512S	2.0	MIIM 606S	1.0
MIIM 606S	1.0		
	13		**11**

Second Year

Fall	**Credits**	**Spring**	**Credits**
IDPT 500S	2.0	IDPT 501S	2.0
MIIM 502S	1.0	IDPT 850S	4.0
MIIM 606S	1.0	MIIM 502S	1.0
Advanced Elective	6.0	MIIM 606S	1.0
		Advanced Elective	3.0
	10		**11**

Total Credits 45

Thesis Option

First Year

Fall	**Credits**	**Spring**	**Credits**
IDPT 502S	1.0	IDPT 501S	2.0
IDPT 521S	5.0	IDPT 504S	1.0
MIIM 502S	1.0	IDPT 526S	5.0
MIIM 504S	4.0	MIIM 502S	1.0
MIIM 508S	3.0	MIIM 513S	3.0
MIIM 512S	2.0	MIIM 606S	1.0
MIIM 606S	1.0		
	17		**13**

Second Year

Fall	**Credits**	**Spring**	**Credits**
IDPT 500S	2.0	MIIM 502S	1.0
MIIM 502S	1.0	MIIM 600S	9.0

MIIM 600S	9.0	MIIM 606S	1.0
MIIM 606S	1.0		
	13		**11**

Total Credits 54

Sample Plan of Study (PhD)

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 504S	4.0	MIIM 505S	4.0
MIIM 508S	3.0	MIIM 506S	4.0
MIIM 512S	2.0	MIIM 513S	3.0
MIIM 606S	1.0	MIIM 606S	1.0
	17		**19**

Second Year

Fall	Credits	Spring	Credits
IDPT 501S	2.0	IDPT 500S	2.0
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 600S	9.0	MIIM 514S	2.0
MIIM 606S	1.0	MIIM 600S	9.0
Advanced Elective(s)	2.0-3.0	MIIM 606S	1.0
		Advanced Elective(s)	2.0-3.0
	15-16		**17-18**

Third Year

Fall	Credits	Spring	Credits
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 600S	9.0	MIIM 600S	9.0
MIIM 606S	1.0	MIIM 606S	1.0
	11		**11**

Fourth Year

Fall	Credits	Spring	Credits
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 600S	9.0	MIIM 600S	9.0
MIIM 606S	1.0	MIIM 606S	1.0
	11		**11**

Fifth Year

Fall	Credits	Spring	Credits
MIIM 502S	1.0	IDPT 600S	9.0
MIIM 600S	9.0		
MIIM 606S	1.0		
	11		**9**

Total Credits 132-134

Molecular and Cell Biology and Genetics

Major: Molecular and Cell Biology and Genetics
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 37.0 (MS, non-thesis); 53.0 (MS, thesis); 127.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.0210
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The interdisciplinary, research-oriented Molecular and Cell Biology and Genetics program offers both MS and PhD degrees. The program provides a broad education-training program for graduate students interested in biomedical problems that cross disciplinary boundaries and offers the opportunity for students to choose from approximately 60 faculty members in 10 different departments/centers to pursue their research interests. Our curriculum and research activities are tailored to students' needs and interests. Consequently, students can pursue a diverse variety of projects that range from the design and development of new therapeutic treatment strategies to the characterization of the molecular mechanisms that underlie various cellular

processes and diseases. This intensive and research-oriented program provides students with opportunities to perform cutting-edge biomedical research employing multidisciplinary strategies. Upon completing these programs, students pursue careers in academic, governmental, or industrial settings.

The MS Program in Molecular & Cell Biology & Genetics

In the MS program, the focus is on strengthening the student's grasp of molecular biology and biotechnology and on providing experience and knowledge of research methods available in this fast-expanding field. This program is designed to prepare students for competitive industry jobs and for acceptance into PhD programs. Our MS students take the same courses as our PhD students, while also gaining extensive biomedical research experience. 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. 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.

The PhD Program in Molecular & Cell Biology & Genetics

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 preliminary exam and qualifying exam at the end of their first and second years, respectively.

Additional Information

For more information about the program, please visit the College of Medicine's Molecular and Cell Biology and Genetics program (https://drexel.edu/medicine/academics/graduate-school/molecular-cell-biology-genetics/) website.

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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.

Additional Information

To learn more about applying to Drexel College of Medicine programs, visit the College of Medicine’s Graduate School of Biomedical Sciences and Professional Studies (http://www.drexel.edu/medicine/Academics/Graduate-School/) 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 an 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.

Additional Information

For more information, including scheduling a plan of study, visit the College of Medicine's Molecular and Cell Biology and Genetics program (https://drexel.edu/medicine/academics/graduate-school/molecular-cell-biology-genetics/) website.

Degree Requirements (MS)

Thesis Option

53 semester credits

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
MCBG 501S	MCBG 1st Lab Rotation	4.0
MCBG 506S	Advanced Cell Biology	2.0
MCBG 512S	MCBG Journal Club *	4.0
MCBG 513S	Molec & Cell Biology Seminar *	4.0
MCBG 600S	MCBG Thesis Research **	18.0
Advanced Electives		**5.0**
Select at least two advanced electives for a minimum of five credits.		
BIOC 508S	Experimental Approaches to Biochemical Problems	
BIOC 511S	Communication for Researchers	
BIOC 520S	Macromolecular Structure & Function	
BIOC 521S	Introduction to Biochemical Data	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 510S	Cancer Biology	
CBIO 512S	Advanced Cancer Biology	
MCBG 514S	Cell Cycle and Apoptosis	
MIIM 508S	Immunology I	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 630S	Advanced Molecular Biology	
NEUR 508S	Graduate Neuroscience I	
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
PHRM 507S	Prin of Neuropharmacology	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
PHRM 602S	Research Methods in Pharmacology	
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
IDPT 600S	Thesis Defense	
MCBG 502S	MCBG 2nd Lab Rotation	
MCBG 503S	MCBG 3rd Lab Rotation	
Total Credits		**53.0**

* Taken each semester in the two year program.

** Taken each semester starting in the spring semester of year one.

Non-Thesis Option

37 semester credits

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
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 506S	Advanced Cell Biology	2.0
MCBG 512S	MCBG Journal Club *	4.0

MCBG 513S	Molec & Cell Biology Seminar *	4.0
Advanced Electives		**7.0**
Select at least three Advanced Electives for a minimum of seven credits.		
BIOC 508S	Experimental Approaches to Biochemical Problems	
BIOC 511S	Communication for Researchers	
BIOC 520S	Macromolecular Structure & Function	
BIOC 521S	Introduction to Biochemical Data	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 510S	Cancer Biology	
CBIO 512S	Advanced Cancer Biology	
MCBG 514S	Cell Cycle and Apoptosis	
MIIM 508S	Immunology I	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 630S	Advanced Molecular Biology	
NEUR 508S	Graduate Neuroscience I	
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
PHRM 507S	Prin of Neuropharmacology	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
PHRM 602S	Research Methods in Pharmacology	
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
MCBG 501S	MCBG 1st Lab Rotation	
MCBG 502S	MCBG 2nd Lab Rotation	
MCBG 503S	MCBG 3rd Lab Rotation	
MCBG 600S	MCBG Thesis Research	
Total Credits		**37.0**

* Taken each semester in the two year program.

Sample Plan of Study (MS)

Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 501S	2.0
IDPT 521S	5.0	IDPT 504S	1.0
MCBG 501S	4.0	IDPT 526S	5.0
MCBG 512S	1.0	MCBG 506S	2.0
MCBG 513S	1.0	MCBG 512S	1.0
		MCBG 513S	1.0
	12		**12**

Second Year

Fall	Credits	Spring	Credits
IDPT 500S	2.0	MCBG 600S	9.0
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
MCBG 600S	9.0	Advanced Elective	2.0
Advanced Elective	3.0		
	16		**13**

Total Credits 53

Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
MCBG 512S	1.0	MCBG 506S	2.0
MCBG 513S	1.0	MCBG 512S	1.0
Advanced Elective	1.0	MCBG 513S	1.0
	9		**10**

Second Year

Fall	Credits	Spring	Credits
IDPT 500S	2.0	IDPT 850S	4.0
IDPT 501S	2.0	MCBG 512S	1.0
MCBG 512S	1.0	MCBG 513S	1.0
MCBG 513S	1.0	Advanced Elective	3.0
Advanced Elective	3.0		
	9		**9**

Total Credits 37

Degree Requirements (PhD)

For additional graduation requirements, refer to the Graduate School of Biomedical Sciences and Professional Studies Handbook and the Molecular and Cell Biology and Genetics PhD Program Policies and Procedures (http://drexel.edu/~/media/Files/medicine/drexel-pdfs/programs/program-molecular-cell-bio-genetics/Drexel_Molecular_Cell_Biology_Genetics_Program_Policies_PhD.ashx?la=en).

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 501S	Biostatistics I	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
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 *	9.0
MCBG 513S	Molec & Cell Biology Seminar *	9.0
MCBG 600S	MCBG Thesis Research **	63.0
Advanced Electives		**7.0**
Select at least three Advanced Electives for a minimum of seven credits.		
BIOC 508S	Experimental Approaches to Biochemical Problems	
BIOC 511S	Communication for Researchers	
BIOC 521S	Introduction to Biochemical Data	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
CBIO 510S	Cancer Biology	
CBIO 512S	Advanced Cancer Biology	
MCBG 514S	Cell Cycle and Apoptosis	
MIIM 508S	Immunology I	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 607S	Immunology II	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 630S	Advanced Molecular Biology	
NEUR 508S	Graduate Neuroscience I	
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
PHRM 507S	Prin of Neuropharmacology	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	

PHRM 526S	Drug Discovery and Development II
PHRM 602S	Research Methods in Pharmacology
General Electives	
IDPT 507S	Teaching Practicum I
IDPT 508S	Teaching Practicum II
IDPT 509S	Teaching Practicum III
Total Credits	**127.0**

* Taken each semester with the exception of the last, when only Thesis Defense is taken.

** Taken each semester starting in year 2, with the exception of the last semester when only Thesis Defense is taken.

Sample Plan of Study (PhD)

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 501S	2.0
IDPT 521S	5.0	IDPT 504S	1.0
MCBG 501S	4.0	IDPT 526S	5.0
MCBG 512S	1.0	MCBG 502S	4.0
MCBG 513S	1.0	MCBG 503S	4.0
		MCBG 506S	2.0
		MCBG 512S	1.0
		MCBG 513S	1.0
	12		**20**

Second Year

Fall	Credits	Spring	Credits
IDPT 500S	2.0	MCBG 600S	9.0
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
MCBG 600S	9.0	Advanced Elective	3.0
Advanced Elective	4.0		
	17		**14**

Third Year

Fall	Credits	Spring	Credits
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
MCBG 600S	9.0	MCBG 600S	9.0
	11		**11**

Fourth Year

Fall	Credits	Spring	Credits
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
MCBG 600S	9.0	MCBG 600S	9.0
	11		**11**

Fifth Year

Fall	Credits	Spring	Credits
MCBG 512S	1.0	IDPT 600S	9.0
MCBG 513S	1.0		
MCBG 600S	9.0		
	11		**9**

Total Credits 127

Molecular Medicine

Major: Molecular Medicine
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 36.0
Classification of Instructional Programs (CIP) code: 26.0204
Standard Occupational Classification (SOC) code: 19-1029

About the Program

Mission Statement

The Master of Science in Molecular Medicine program, offered by the Department of Microbiology and Immunology and by the Institute for Molecular Medicine and Infectious Disease (IMMID), provides education and training in areas of research in human health at the molecular level. Students in this program acquire theoretical and practical knowledge about normal body functions and disease pathogenesis at the molecular level. Students also learn how this knowledge is applied to develop novel tools for diagnosis, treatment, prognosis, and prevention of disease. Graduates from this program will be ready to enter the biotechnology workforce and are attractive candidates for doctoral programs in science and medicine.

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.

Curriculum

The two year non-thesis program encompasses fundamental requirements to establish a sound grounding in microbiology, biochemistry, genetics, and molecular biology. The program is typically completed in two full-time years (four semesters of at least 9.0 credits) of required and elective graduate courses and one or more experiential research components in the first or second year. The flexibility of the curriculum enables students to complete the degree requirement within 18 months on an accelerated basis and up to four 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. A minimum of 36.0 credits is required to graduate with at least 6.0 of those earned as research credits.

The experiential research component of the curriculum can be fulfilled by two alternative approaches. Most students choose to engage in an intensive 6.0 credit hands-on research internship in which a 12-16 week research program will be undertaken in a laboratory at Drexel, another academic institution, or at a biotechnology or biopharmaceutical company. Alternatively, students may choose to engage in a a less intensive experience spanning two semesters, or conduct an independent research project, with the approval and supervision of program directors.

Traditional (Face-to-Face), Hybrid, or Online Learning Options

Classes can be attended at any of Drexel College of Medicine locations: Center City and Queen Lane campuses in Philadelphia. State-of-the-art video conferencing provides real-time interactive learning at these locations. Most classes are held in the late afternoon/early evening to facilitate participation of working professionals. The program may also be completed fully online, offered through Drexel University Online. All required courses and most electives have online sections and online students experience the same curriculum as face-to-face or hybrid students. Online sections are designed to maximize interactions among students and faculty and may include live web sessions. Individual students also may choose a mix of traditional and online courses (hybrid). The goal is to provide maximum scheduling flexibility.

Additional Information

For more detailed information about the curriculum and program goals, please contact either:

Pamela Norton, PhD
Email: pan29@drexel.edu

Stephen Jennings, PhD
Email: srj32@drexel.edu

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.

Online applications are considered year-round. Potential students are encouraged to apply no later that July 1 for fall admission or December 1 for spring admission.

Additional Information

For more information about the program and to access the online application, view the College of Medicine's MS in Molecular Medicine (https://drexel.edu/medicine/academics/graduate-school/molecular-medicine/) webpage.

Degree Requirements

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. In most cases, there are both traditional (face-to-face) and online sections for each course. Students should work with their program advisors to plan their course of study.

Research Requirements

The research component of the curriculum can be fulfilled by two alternative approaches. Most student choose to engage in a hands-on research internship in which a 12-week research program will be undertaken in a laboratory at Drexel, another academic institution, or at a biotechnology or biopharmaceutical company. Alternatively, students may choose to engage in an independent research project with the approval and supervision of program directors.

For an individualized plan of study listing the sequence of courses to be completed, students should work with their program advisor.

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
or MIIM 503S	Biomedical Ethics	
IDPT 501S	Biostatistics I	2.0
or MIIM 517S	Applied Statistics for Biomedical Sciences	
MIIM 527S	Immunology, Immunopathology and Infectious Diseases	3.0
MIIM 530S	Fundamentals of Molecular Medicine I	3.0
MIIM 531S	Fundamentals of Molecular Medicine II	2.0
MIIM 532S	Fundamentals of Molecular Medicine III	2.0
MIIM 533S	Molecular Medicine Journal Club II	1.0
MIIM 534S	Molecular Medicine Journal Club I	1.0
MIIM 540S	Viruses and Viral Infections	2.0
MIIM 541S	Bacteria and Bacterial Infections	2.0
MIIM 542S	Mycology and Fungal Infections	2.0
MIIM 543S	Parasitology and Parasitic Diseases	2.0
MIIM 606S	Microbiology and Immunology Seminar	1.0
MIIM 660S	Current Concepts in Molecular Medicine I	3.0
Electives		
To complete the 36.0 credits total, students select from a menu of additional electives, and complete their required research component.		8.0
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
MIIM 522S	Biotechniques II: Immunological Methods	
MIIM 523S	Molecular Virology	
MIIM 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
MIIM 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 613S	Emerging Infectious Diseases	
MIIM 615S	Experimental Therapeutics	
MIIM 621S	Biomedical Research I	
MIIM 622S	Biomedical Research II	
MIIM 625S	Advanced Molecular Virology	
MIIM 650S	Research Internship in Molecular Medicine	
MLAS 529S	Molecular Genetics	
Total Credits		**36.0**

Sample Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
IDPT 500S or MIIM 503S	2.0	MIIM 531S	2.0
MIIM 527S	3.0	MIIM 533S	1.0
MIIM 530S	3.0	MIIM 541S	2.0
MIIM 534S	1.0	MIIM 542S	2.0
		MIIM 543S	2.0
	9		**9**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
MIIM 532S	2.0	IDPT 501S or MIIM 517S	2.0
MIIM 606S	1.0	MIIM 540S	2.0
Electives	6.0	MIIM 660S	3.0
		Elective	2.0
	9		**9**

Total Credits 36

Program Goals

Over the course of completing the program, students will develop:

- Core knowledge of molecular and cellular disciplines that constitute biomedical sciences
- Working knowledge of normal body functions at the molecular level and how these are altered in states of disease
- Practical knowledge and skills that help identify gaps in the biomedical field for the development of molecular diagnostic and therapeutic tools
- Skills in basic, translational, and/or clinical research
- Professional ethics necessary for the responsible conduct of research
- Communication and leadership skills
- Other soft skills (e.g. collaboration, problem solving, career planning, networking) that facilitate career advancement and promotion

In the course of meeting these program-level goals, students will have also made progress in all of the Drexel Student Learning Priorities (DSLPs) (https://drexel.edu/provost/assessment/outcomes/dslp/) to help them build their futures.

Core Intellectual and Practical Skills:

- Communication
- Critical and creative thinking
- Ethical reasoning
- Information literacy
- Self-directed learning
- Technology use

Experiential and Applied Learning:

- Global competence
- Leadership
- Professional practice
- Research, scholarship and creative expression
- Responsible citizenship

Neuroscience

Major: Neuroscience
Degree Awarded: Master of Science (MS) or Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 38.5 (MS, non-thesis); 55.5 (MS, thesis); 123.5 (PhD)
Classification of Instructional Programs (CIP) code: 26.1501
Standard Occupational Classification (SOC) code: 11-9121

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 and 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 hypothesis-driven 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.

Additional Information

For more information, visit the College of Medicine's Neuroscience program (https://drexel.edu/medicine/academics/graduate-school/neuroscience/) website.

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.

Additional Information

To learn more about applying to Drexel College of Medicine programs, visit the College of Medicine’s Graduate School of Biomedical Sciences and Professional Studies (https://drexel.edu/medicine/academics/graduate-school/) 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

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0

IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 520S	Neurobiology Topics I	2.0
NEUR 521S	Neurobiology Topics II	2.0
NEUR 602S	Medical Neuroscience	6.0
NEUR 609S	Graduate Neuroscience II	4.0
Advanced Electives		
Select one of the following advanced electives:		1.0-4.0
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	Motor Systems	
Suggested Electives		
Select at least one credit of suggested electives:		1.0
MCBG 506S	Advanced Cell Biology	
NEUR 615S	ADVANCED SPEC. TOPICS IN NEURO	
PHRM 507S	Prin of Neuropharmacology	
PHRM 512S	Graduate Pharmacology	
Total Credits		**38.5-41.5**

Approved Electives

Students may opt to take additional approved electives in consultation with their advisor.

General Electives		
IDPT 507S	Teaching Practicum I	1.0-4.0
IDPT 508S	Teaching Practicum II	1.0-4.0
IDPT 509S	Teaching Practicum III	1.0-4.0
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 600S	Neuroscience Thesis Research	9.0

* Additional courses from the Biograduate Medical programs may be taken as electives. Students should check with the College of Medicine's Graduate School of Biomedical Sciences and Professional Studies (https://drexel.edu/medicine/academics/graduate-school/) programs.

MS Degree Requirements: Thesis Option

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
or IDPT 550S	Biochemistry and Biophysics	
IDPT 526S	Cells to Systems	5.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 501S	Neuroscience 1st Lab Rotation	4.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 520S	Neurobiology Topics I	2.0
NEUR 521S	Neurobiology Topics II	2.0
NEUR 600S	Neuroscience Thesis Research *	18.0
NEUR 602S	Medical Neuroscience	6.0
NEUR 609S	Graduate Neuroscience II	4.0
Advanced Electives		**1.0-4.0**
Select at least one of the following Advanced Electives		
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	

NEUR 634S	Motor Systems	
Total Credits		**55.5-58.5**

* Taken both semesters in the second year.

Approved Electives

Students may opt to take additional approved electives in consultation with their advisor.

Suggested Electives		
IDPT 600S	Thesis Defense	9.0
MCBG 506S	Advanced Cell Biology	2.0
NEUR 502S	Neuroscience 2nd Lab Rotation	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
General Electives		
IDPT 507S	Teaching Practicum I	1.0-4.0
IDPT 508S	Teaching Practicum II	1.0-4.0
IDPT 509S	Teaching Practicum III	1.0-4.0
NEUR 503S	Neuroscience 3rd Lab Rotatin	4.0

* Additional courses from the Biomedical Graduate Programs may be taken as electives. Students should check with the College of Medicine's Graduate School of Biomedical Sciences and Professional Studies (https://drexel.edu/medicine/academics/graduate-school/) programs.

PhD Degree Requirements

For additional graduation requirements, refer to the School of Biomedical Sciences and Professional Studies Handbook and the Neuroscience Program Policies and Procedures (https://drexel.edu/medicine/academics/graduate-school/neuroscience/).

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 credits.

Required Courses		
IDPT 500S	Responsible Conduct of Research	2.0
IDPT 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 501S	Neuroscience 1st Lab Rotation	4.0
NEUR 502S	Neuroscience 2nd Lab Rotation	4.0
NEUR 508S	Graduate Neuroscience I	2.5
NEUR 520S	Neurobiology Topics I [*]	8.0
NEUR 521S	Neurobiology Topics II [**]	6.0
NEUR 600S	Neuroscience Thesis Research [*]	63.0
NEUR 602S	Medical Neuroscience	6.0
NEUR 609S	Graduate Neuroscience II	4.0
Advanced Electives		**1.0-4.0**
Select at least one of the following Advanced Electives		
NEUR 511S	Advanced Cellular and Developmental Neuroscience	
NEUR 512S	Advanced Systems and Behavioral Neuroscience	
NEUR 634S	Motor Systems	
Suggested Electives		
IDPT 507S	Teaching Practicum I	
MCBG 506S	Advanced Cell Biology	
NEUR 503S	Neuroscience 3rd Lab Rotatin	
PHRM 507S	Prin of Neuropharmacology	
PHRM 512S	Graduate Pharmacology	

General Electives		
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
Total Credits		**123.5-126.5**

* Taken each Fall semester starting in the Second Year, until Thesis Defense

** Taken each Spring semester starting in the Second Year, until Thesis Defense

*** Taken each semester starting the Second Year, until Thesis Defense

* Additional courses from the Biomedical Graduate programs may be taken as electives. Students should check with the College of Medicine's School of Biomedical Sciences and Professional Studies (https://drexel.edu/medicine/academics/graduate-school/) programs.

Sample Plan of Study (MS) Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 521S	5.0	IDPT 504S	1.0
NEUR 508S	2.5	IDPT 526S	5.0
NEUR 520S	2.0	NEUR 521S	2.0
	10.5		**10**

Second Year

Fall	Credits	Spring	Credits
IDPT 850S	4.0	NEUR 500S	2.0
NEUR 609S	4.0	NEUR 602S	6.0
Suggested Elective	1.0	Advanced Elective	1.0-4.0
	9		**9-12**

Total Credits 38.5-41.5

Sample Plan of Study (MS) Thesis

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 521S	5.0	IDPT 504S	1.0
NEUR 501S	4.0	IDPT 526S	5.0
NEUR 508S	2.5	NEUR 602S	6.0
	12.5		**14**

Second Year

Fall	Credits	Spring	Credits
NEUR 520S	2.0	NEUR 500S	2.0
NEUR 600S	9.0	NEUR 521S	2.0
NEUR 609S	4.0	NEUR 600S	9.0
		Advanced Elective	1.0-4.0
	15		**14-17**

Total Credits 55.5-58.5

Sample Plan of Study (PhD)

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 521S	5.0	IDPT 526S	5.0
NEUR 501S	4.0	NEUR 502S	4.0
NEUR 508S	2.5	NEUR 602S	6.0
	12.5		**16**

Second Year

Fall	Credits	Spring	Credits
IDPT 500S	2.0	NEUR 500S	2.0
NEUR 520S	2.0	NEUR 521S	2.0
NEUR 600S	9.0	NEUR 600S	9.0

NEUR 609S	4.0	Advanced Elective	1.0-4.0
	17		**14-17**

Third Year

Fall	**Credits**	**Spring**	**Credits**
NEUR 520S	2.0	NEUR 521S	2.0
NEUR 600S	9.0	NEUR 600S	9.0
	11		**11**

Fourth Year

Fall	**Credits**	**Spring**	**Credits**
NEUR 520S	2.0	NEUR 521S	2.0
NEUR 600S	9.0	NEUR 600S	9.0
	11		**11**

Fifth Year

Fall	**Credits**	**Spring**	**Credits**
NEUR 520S	2.0	IDPT 600S	9.0
NEUR 600S	9.0		
	11		**9**

Total Credits 123.5-126.5

Pathologists’ Assistant

Major: Pathologists' Assistant
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Total Credit Hours: 91.0
Classification of Instructional Programs (CIP) code: 51.0811
Standard Occupational Classification (SOC) code: 29-2055

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 coursework and clinical experiences necessary to properly educate a pathologists' assistant. The Master of Science in 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 (https://www.ascp.org/content/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; and
- Promotes public and professional awareness of the pathologists' assistant as an integral member of the healthcare team.

Visit the AAPA (https://www.pathassist.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.

Additional Information

For more information about this program, visit the College of Medicine's Master of Science in Pathologists' Assistant (https://drexel.edu/medicine/academics/graduate-school/pathologists-assistant-patha/) program webpage.

Admission Requirements

A pathologists' 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, particularly 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 coursework 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. The 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:
  - Discuss personal goals, conditions, or career aspirations that motivate you to pursue graduate study at Drexel University.
  - What are your most important accomplishments?
  - What do you expect to achieve through this program?

Additional Information

For further information, contact:

Pathologists' Assistant (PathA) Program
Division of Interdisciplinary and Career-oriented Programs
245 North 15th Street, Mail Stop 344
New College Building, Room 4104
Philadelphia, PA 19102
215.762.4692
CoM_career-oriented@drexel.edu

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**

Sample Plan of Study

First Year

	Summer	**Credits**
	MLAS 531S	3.0
	MLAS 545S	3.0
	MSPA 500S	5.0
	MSPA 510S	2.0
	MSPA 520S	3.0
		16

Second Year

Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
MSPA 530S	4.0	MFSP 551S	3.0	MSPA 560S	2.0
MSPA 540S	3.0	MSPA 541S	3.0	MSPA 600S	6.0
MSPA 570S	6.0	MSPA 550S	4.0	MSPA 610S	6.0
MSPA 580S	4.0	MSPA 571S	4.0		
MSPA 590S	3.0	MSPA 581S	3.0		
	20		**17**		**14**

Third Year

Fall	**Credits**	**Spring**	**Credits**
MSPA 601S	6.0	MSPA 602S	6.0
MSPA 611S	6.0	MSPA 612S	6.0
	12		**12**

Total Credits 91

Pharmacology and Physiology

Major: Pharmacology and Physiology
Degree Awarded: Master of Science (MS) and Doctor of Philosophy (PhD)
Calendar Type: Semester
Total Credit Hours: 45.0 (MS, non-thesis); 62.0 (MS, thesis); 128.0 (PhD)
Classification of Instructional Programs (CIP) code: 26.1002
Standard Occupational Classification (SOC) code: 19-1042

About the Programs

The College of Medicine's Graduate School of Biomedical Sciences and Professional Studies offers graduate programs leading to the MS and the PhD degrees in Pharmacology & Physiology. 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.

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.

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.

Additional Information

For more information about the program, please visit the College of Medicine's Pharmacology & Physiology program (http://drexel.edu/medicine/academics/graduate-school/pharmacology-physiology/)website.

Amanda Mangano
Academic Administrator
Division of Biomedical Science Programs
Drexel University College of Medicine
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215.762.8217
amm523@drexel.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.

Additional Information

To learn more about applying to Drexel College of Medicine programs visit the Drexel College of Medicine's Graduate School of Biomedical Sciences and Professional Studies (http://www.drexel.edu/medicine/Academics/Graduate-School/) website.

Degree Requirements (MS)

About the Curriculum

The core curriculum is a comprehensive interdisciplinary program of study for all first-year research master's students in the Division of Biomedical Science 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, students will 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.

Additional Information

For more information about the program, please visit the College of Medicine's Pharmacology and Physiology program (https://drexel.edu/medicine/academics/graduate-school/pharmacology-physiology/) webpage.

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 502S	Learn Early As Professionals I (LEAP I)	1.0

IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 850S	Literature Review Non-Thesis MS	4.0
PHRM 502S	Current Topics in Pharmacology & Physiology *	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 516S	Advanced Topics in Physiology	1.0
PHRM 517S	Advanced Topics in Pharmacology	1.0
PHGY 503S	Graduate Physiology	4.0
Advanced Electives		**9.0**
Select at least three Advanced Electives for a minimum of nine credits.		
BIOC 520S	Macromolecular Structure & Function	
CBIO 510S	Cancer Biology	
MIIM 508S	Immunology I	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
MLAS 536S	Animal Models for Biomedical Research	
NEUR 508S	Graduate Neuroscience I	
PHRM 518S	New Frontiers in Therapy	
PHRM 519S	Methods in Biomedical Research	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
IDPT 600S	Thesis Defense	
CR 500S	Epidemiology	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	
CR 514S	World Wide Regulatory Submissions	
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 550S	Leadership Skills	
CR 555S	Compliance & Monitoring Issues	
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	Introduction to Clinical Pharmacology	
CR 617S	Informatics in Pharm Res & Development	
Total Credits		**45.0**

* Taken each semester.

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 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
PHRM 502S	Current Topics in Pharmacology & Physiology *	4.0
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 517S	Advanced Topics in Pharmacology	1.0
PHRM 600S	Pharmacology Thesis Research **	18.0
PHGY 503S	Graduate Physiology	4.0
Advanced Electives		
Select at least two Advanced Electives for a minimum of four credits.		4.0
BIOC 520S	Macromolecular Structure & Function	
CBIO 510S	Cancer Biology	
MIIM 508S	Immunology I	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
MLAS 536S	Animal Models for Biomedical Research	
NEUR 508S	Graduate Neuroscience I	
PHRM 518S	New Frontiers in Therapy	
PHRM 519S	Methods in Biomedical Research	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
General Electives		
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
IDPT 600S	Thesis Defense	
CR 500S	Epidemiology	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	
CR 514S	World Wide Regulatory Submissions	
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 550S	Leadership Skills	
CR 555S	Compliance & Monitoring Issues	
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	Introduction to Clinical Pharmacology	
CR 617S	Informatics in Pharm Res & Development	
PHRM 505S	Pharm & Phys 3rd Lab Rotation	
Total Credits		**62.0**

* Taken each semester.

** Taken each semester starting in the second year.

Degree Requirements (PhD)

About the Curriculum

The core curriculum is a comprehensive interdisciplinary program of study for all PhD students in the Division of Biomedical Science 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, students will 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.

Additional Information

For more information about the program, please visit the College of Medicine's Pharmacology and Physiology program (https://drexel.edu/medicine/academics/graduate-school/pharmacology-physiology/) webpage.

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 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 507S	Teaching Practicum I	1.0-4.0
IDPT 508S	Teaching Practicum II	1.0-4.0
IDPT 509S	Teaching Practicum III	1.0-4.0
IDPT 521S	Molecular Structure and Metabolism	5.0
IDPT 526S	Cells to Systems	5.0
IDPT 600S	Thesis Defense	9.0
PHRM 502S	Current Topics in Pharmacology & Physiology *	9.0
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 517S	Advanced Topics in Pharmacology	1.0
PHRM 600S	Pharmacology Thesis Research **	63.0
PHGY 503S	Graduate Physiology	4.0
Advanced Electives		**4.0**
Choose at least two Advanced Electives for a minimum of four credits.		
BIOC 520S	Macromolecular Structure & Function	
CBIO 510S	Cancer Biology	
MIIM 508S	Immunology I	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
PHRM 518S	New Frontiers in Therapy	
PHRM 519S	Methods in Biomedical Research	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
MLAS 536S	Animal Models for Biomedical Research	
General Electives		
CR 500S	Epidemiology	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	
CR 514S	World Wide Regulatory Submissions	
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 550S	Leadership Skills	
CR 555S	Compliance & Monitoring Issues	
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	Introduction to Clinical Pharmacology	
CR 617S	Informatics in Pharm Res & Development	
CR 620S	Regulatory, Scientific and Social Issues Affecting Biotech Research	
CR 625S	Health Policy and Economics	
CR 635S	Strategic Planning	
Total Credits		**128.0-137.0**

* Taken each semester with the exception of the last when only Thesis Defense is taken.

** Taken each semester starting in year 2, with the exception of the last semester when only Thesis Defense is taken.

Sample Plan of Study (MS)

Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S		1.0 IDPT 500S	2.0
IDPT 521S		5.0 IDPT 504S	1.0

PHGY 503S	4.0	IDPT 526S	5.0
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 503S	4.0	PHRM 504S	4.0
PHRM 516S	1.0	PHRM 512S	3.0
	16		**16**

Second Year

Fall	Credits	Spring	Credits
PHRM 502S	1.0	IDPT 501S or NEUR 500S	2.0
PHRM 507S	3.0	PHRM 502S	1.0
PHRM 517S	1.0	PHRM 600S	9.0
PHRM 600S	9.0	Advanced Elective	2.0
Advanced Elective	2.0		
	16		**14**

Total Credits 62

Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 521S	5.0	IDPT 504S	1.0
PHGY 503S	4.0	IDPT 526S	5.0
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 516S	1.0	PHRM 512S	3.0
		Advanced Elective	3.0
	12		**15**

Second Year

Fall	Credits	Spring	Credits
PHRM 502S	1.0	IDPT 501S or NEUR 500S	2.0
PHRM 507S	3.0	IDPT 850S	4.0
PHRM 517S	1.0	PHRM 502S	1.0
Advanced Elective	4.0	Advanced Elective	2.0
	9		**9**

Total Credits 45

Sample Plan of Study (PhD)

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 521S	5.0	IDPT 504S	1.0
PHGY 503S	4.0	IDPT 526S	5.0
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 503S	4.0	PHRM 504S	4.0
PHRM 516S	1.0	PHRM 505S	4.0
		PHRM 512S	3.0
	16		**20**

Second Year

Fall	Credits	Spring	Credits
PHRM 502S	1.0	IDPT 501S or NEUR 500S	2.0
PHRM 507S	3.0	IDPT 507S	1.0-4.0
PHRM 517S	1.0	PHRM 502S	1.0
PHRM 600S	9.0	PHRM 600S	9.0
	14		**13-16**

Third Year

Fall	Credits	Spring	Credits
IDPT 508S	1.0-4.0	IDPT 509S	1.0-4.0
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 600S	9.0	PHRM 600S	9.0
Advanced Electives	2.0	Advanced Electives	2.0
	13-16		**13-16**

Fourth Year

Fall	Credits	Spring	Credits
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 600S	9.0	PHRM 600S	9.0
	10		**10**

Fifth Year

Fall	Credits	Spring	Credits
PHRM 502S	1.0	IDPT 600S	9.0
PHRM 600S	9.0		
	10		**9**

Total Credits 128-137

Graduate Minor in Clinical Research Organization and Management

About the Graduate Minor

The minor in Clinical Research Organization and Management provides exposure to several important elements involved in the development of new therapeutics. This program has been designed to help students transition to a productive career within the pharmaceutical and biotechnology industry. The program provides graduate students with an overview of the conduct of clinical investigations while introducing participants to relevant business, legal, and ethical issues.

Admission Requirements

Requirements for admission are enrollment in a biomedical science, biomedical engineering, or biology graduate program and the approval of the parent program's director.

Program Requirements

Required courses		
CR 515S	Intro to Clinical Trials	3.0
CR 545S	Pharmaceutical Law	3.0
Electives		**3.0**
Select one of the following:		
CR 500S	Epidemiology	
CR 505S	Ethical Issues in Research	
CR 512S	Fundamentals of Academic Research Administration	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D	
CR 520S	Applications of Clinical Research Biostatistics	
CR 525S	Scientific Writing and Medical Literature	
CR 535S	Current Federal Regulatory Issues in Biomedical Research	
CR 550S	Leadership Skills	
CR 565S	Contemporary Issues in Human Research Protection	
CR 570S	Principles and Practice of Pharmacovigilance	
CR 600S	Designing the Clinical Trial	
CR 612S	Fundamentals of Compliance	
CR 614S	Introduction to Clinical Pharmacology	
Total Credits		**9.0**

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

Graduate Minor in Drug Discovery and Development

About the Graduate Minor

The graduate minor in Drug Discovery and Development provides exposure to the multiple elements involved in the discovery and development of prescription medications. It has been designed to familiarize students with important applications of biomedical research and to facilitate a transition to the pharmaceutical or biotechnology industry. It covers all aspects of drug discovery and development ranging from the identification and validation of molecular targets through to regulatory approval and commercialization. Students will also be exposed to critical clinical, legal and business aspects associated with the successful development of a marketed drug.

Admission Requirements

Requirements for admission are enrollment in a biomedical science, biomedical engineering, or biology graduate program and the approval of the parent program's director.

Program Requirements

Required Semester Courses		
PHRM 525S	Drug Discovery and Development I [*]	3.0
PHRM 526S	Drug Discovery and Development II [*]	3.0
Electives [**]		**3.0**
CBIO 510S	Cancer Biology	
CR 500S	Epidemiology [*]	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D [*]	
CR 514S	World Wide Regulatory Submissions [*]	
CR 515S	Intro to Clinical Trials [*]	

CR 535S	Current Federal Regulatory Issues in Biomedical Research *
CR 545S	Pharmaceutical Law *
CR 550S	Leadership Skills *
CR 555S	Compliance & Monitoring Issues *
CR T980S	Special Topics in Clinical Research *
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	Introduction to Clinical Pharmacology *
CR 617S	Informatics in Pharm Res & Development *
CR 620S	Regulatory, Scientific and Social Issues Affecting Biotech Research *
CR 625S	Health Policy and Economics *
CR 635S	Strategic Planning *
MIIM 524S	Vaccines and Vaccine Development *
PHRM 507S	Prin of Neuropharmacology
PHRM 512S	Graduate Pharmacology *
PHRM 517S	Advanced Topics in Pharmacology
PHRM 605S	Research in Drug Discovery and Development
PHRM T580S	Special Topics in Pharmacology
Total Credits	**9.0**

* Available online

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

Pre-Veterinary Graduate Minor

About the Graduate Minor

Students desiring to attend veterinary medical school will have the option to elect to complete a pre-vet minor within the Master of Laboratory Animal Science (MLAS) program (p. 65). The addition of these courses to the MLAS program will help to further enhance the student's application to veterinary medical school by providing additional rigorous and relevant graduate level coursework.

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.

Admission into the PVET minor is primarily open to MLAS students. Admission into the minor by other program students is at the discretion of the MLAS program director in concert with the director/academic advisor of the potential applicant.

Program Requirements

Choose 9.0 credits from the list below:	**9.0**
IHS 514S	Molecular Biology & Biochemistry of the Cell
MLAS 500S	Animal Nutrition
MLAS 545S	Fundamentals of Histology
MSPP 511S	Concepts in Biochemistry and Cell Biology
PHGY 503S	Graduate Physiology
PHRM 512S	Graduate Pharmacology
Total Credits	**9.0**

Certificate in Clinical Research

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree or higher
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 1.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0719
Standard Occupational Classification (SOC) Code: 11-9111

About the Program

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://online.drexel.edu/online-degrees/biomedical-degrees/ms-crom/)

Admission Requirements

A bachelor's degree from a regionally accredited institution in the United States or an equivalent international institution.

Cumulative GPA of 3.0 (graduate degree GPA will be considered along with the undergraduate GPA)

Required documents:

- A completed application
- Official transcripts from all universities of colleges and other post-secondary educational institutions (including trade schools) attended
- Two letters of recommendation
- Essay on your past successes, goals, and objectives for pursuing this program
- Resume
- Additional requirements for international students

A telephone interview may be requested.

Additional Information

Kamran Mohiuddin, M.D., M.B.A.,FAPCR
Director, Graduate Programs in Clinical Research
km3668@drexel.edu
215-762-3812

Visit the Drexel University Online website for more program information and to apply to the certificate (http://online.drexel.edu/online-degrees/biomedical-degrees/cert-cr/) program.

Program Requirements

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
New Product Research and Development		
CR 525S	Scientific Writing and Medical Literature	
CR 600S	Designing the Clinical Trial	
CR 609S	Innovative Product Development	
CR 614S	Introduction to Clinical Pharmacology	
CR 620S	Regulatory, Scientific and Social Issues Affecting Biotech Research	
Compliance and Safety Surveillance		

CR 555S	Compliance & Monitoring Issues
CR 570S	Principles and Practice of Pharmacovigilance
CR 633S	Quality Assurance Audits
Ethics and Law	
CR 505S	Ethical Issues in Research
CR 511S	The History of Misconduct in Biomedical Research
CR 565S	Contemporary Issues in Human Research Protection
Regulatory	
CR 501S	Emerging Trends in Medical Device Regulation
CR 508S	Medical Device Combination Product Regulation
CR 514S	World Wide Regulatory Submissions
CR 523S	Current Issues in Review Boards
CR 535S	Current Federal Regulatory Issues in Biomedical Research
CR 551S	International Regulatory Affairs
Biostatistics and Data Management	
CR 500S	Epidemiology
CR 520S	Applications of Clinical Research Biostatistics
CR 527S	Clinical Data Management
CR 631S	Applications of Clinical Research Biostatistics II
Clinical Research Management	
CR 510S	Sponsored Projects Finance
CR 512S	Fundamentals of Academic Research Administration
CR 536S	Clinical Project Management
CR 541S	Patient Recruitment and Informed consent
CR 550S	Leadership Skills
New Therapeutic Product Business and Strategic Planning	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D
CR 518S	Clinical Trial Budgeting
CR 546S	Clinical Outsourcing
CR 617S	Informatics in Pharm Res & Development
CR 625S	Health Policy and Economics
CR 635S	Strategic Planning
Total Credits	**15.0**

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

Sample Plan of Study

Term 1	Credits Term 2	Credits Term 3	Credits
CR 515S	3.0 CR 612S	3.0 CR 545S	3.0
Elective	3.0 Elective	3.0	
	6	**6**	**3**

Total Credits 15

Certificate in Drug Discovery and Development

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree or higher
Certificate Type: Post-baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 2 years
*Financial Aid Eligibility: Aid eligible**
Classification of Instructional Program (CIP) Code: 26.1001
Standard Occupational Classification (SOC) Code: 19-1042

The current plan of study for this program would only allow for federal financial aid (including Federal Direct Student Loans) for terms that are at least a minimum of 4.5 credits for graduate courses and 6.0 credits for undergraduate courses. This is based on current regulations from the U.S. Department of Education.

About the Program

The certificate in Drug Discovery and Development program provides in-depth exposure to the multiple elements involved in the discovery and development of prescription medications. This program has been designed to help students establish an enduring and productive career and advance within the pharmaceutical and biotechnology industry. It covers all aspects of drug discovery and development ranging from the identification and validation of molecular drug targets through to regulatory approval and commercialization. Students will also be exposed to critical clinical, legal and business aspects associated with the successful development of a marketed drug. There is also an extensive range of elective courses that provide specialized training in specific elements of the discovery and development process. It should be noted that this is a “stackable” certificate and all completed courses in this program can be applied towards a Master’s Degree in Drug Discovery and Development.

The certificate in Drug Discovery and Development is available to individuals who have already obtained a BS or BA degree in the life, physical or health sciences who may wish to pursue industry-focused training. This includes individuals 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 have recently transitioned into the industry. The curriculum has been designed with the recognition that the complex and specialized nature of the pharmaceutical and biotechnical industries requires a diversity of expertise.

Admission Requirements

Students must meet all entrance requirements of the MS program. The applicant must have completed a four-year bachelor’s degree, nursing degree or equivalent program in a relevant subject area with a preferred GPA of at least 2.75. All students must submit two confidential letters of recommendation, a personal statement explaining their interest in the program and all previous official educational transcripts. No standardized test is required for admission but if one has been taken, such as the GRE and MCAT, the scores should be submitted for review. The merit of each applicant will be evaluated by the admissions committee of the program and all qualifications, including professional experience will be taken into consideration.

Program Requirements

Required Semester Courses		
PHRM 525S	Drug Discovery and Development I [**]	3.0
PHRM 526S	Drug Discovery and Development II [**]	3.0
Electives [*]		**9.0**
CBIO 510S	Cancer Biology	
CR 500S	Epidemiology [**]	
CR 505S	Ethical Issues in Research [**]	
CR 513S	Business Processes and Contemporary Concerns in Pharmaceutical R & D [**]	
CR 514S	World Wide Regulatory Submissions [**]	
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 550S	Leadership Skills [**]	
CR 555S	Compliance & Monitoring Issues [**]	
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	Introduction to Clinical Pharmacology [**]	
CR 617S	Informatics in Pharm Res & Development [**]	
CR 620S	Regulatory, Scientific and Social Issues Affecting Biotech Research [**]	
CR 625S	Health Policy and Economics [**]	
CR 635S	Strategic Planning [**]	
CR T980S	Special Topics in Clinical Research	
IDPT 500S	Responsible Conduct of Research	
MIIM 508S	Immunology I [**]	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods [*]	
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 500S	Statistics for Neuro/Pharm Research	
NEUR 508S	Graduate Neuroscience I	
PHGY 503S	Graduate Physiology	
PHRM 502S	Current Topics in Pharmacology & Physiology	

PHRM 503S	Pharm & Phys 1st Lab Rotation
PHRM 507S	Prin of Neuropharmacology
PHRM 512S	Graduate Pharmacology *
PHRM 516S	Advanced Topics in Physiology
PHRM 517S	Advanced Topics in Pharmacology
PHRM 518S	New Frontiers in Therapy
PHRM 519S	Methods in Biomedical Research
PHRM 520S	Internship in Drug Discovery and Development
PHRM 521S	Intensive Internship in Drug Discovery and Development
PHRM 527S	Current Topics in Drug Discovery and Development **
PHRM 605S	Research in Drug Discovery and Development
Total Credits	**15.0**

* Courses not listed below may be taken as electives only with the approval of the Program Director.

** Available online

Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
PHRM 525S	3.0	PHRM 526S	3.0
	3		**3**

Second Year

Fall	Credits	Spring	Credits
Elective 1	3.0	Elective 2	3.0
		Elective 3	3.0
	3		**6**

Total Credits 15

Evening Post-Baccalaureate Pre-Medical Certificate Program

Certificate Level: Undergraduate
Admissions Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 32.0
Instructional Delivery: Campus; Hybrid
Calendar Type: Semester
Expected Time to Completion: 2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.1199
Standard Occupational Classification (SOC) Code: 11-9121

About the Program

The Graduate School of Biomedical Sciences and Professional Studies at Drexel University's College of Medicine offers the part-time Evening Post-Baccalaureate Pre-Medical certificate (PMED). 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, delivered either face-to-face or in a hybrid format with asynchronous lectures and on-campus labs.

A linkage opportunity has been established for successful students upon completion of the PMED program. In addition, affiliation agreements include Edward Via College of Osteopathic Medicine, Touro College of Osteopathic Medicine, Philadelphia College of Osteopathic Medicine, and the Robert Wood Johnson School of Medicine.

The program consists of 5 semesters parsed out over 2 years. 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 along with an elective math course. During the second year, students take organic chemistry and general biology in the summer and fall semesters. In the final spring semester, a formal MCAT review course is offered to students, expense-free. In addition, two elective courses are offered including Molecular Biology & Biochemistry and Sociology & Psychology.

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.

The program's application can be found on the College of Medicine's Evening Post-Baccalaureate Pre-Med Certificate Admissions (https://drexel.edu/medicine/academics/graduate-school/evening-post-baccalaureate-pre-medical/how-to-apply/) webpage.

Program Requirements

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
Optional		
PMED 151S	College Algebra & Trigonometry	
PMED 240S	Conceptual Reviews in General and Organic Chemistry	
PMED 250S	Molecular Biology & Biochemistry	
PMED 800S	Registered for Degree Only	
PMED T180S	Special Topics in Pre-Medical	
PMED T280S	Special Topics in Pre-Medical	
Total Credits		**32.0**

Sample Plan of Study

First Year

Fall	Credits	Spring	Credits	Summer	Credits
PMED 111S	3.0	PMED 131S	3.0	PMED 211S	3.0
PMED 112S	1.0	PMED 132S	1.0	PMED 212S	1.0
PMED 121S	3.0	PMED 141S	3.0	PMED 221S	3.0
PMED 122S	1.0	PMED 142S	1.0	PMED 222S	1.0
	8		**8**		**8**

Second Year

Fall	Credits	Spring	Credits
PMED 231S	3.0	Optional	
PMED 232S	1.0	PMED 800S	
PMED 241S	3.0	PMED 240S	
PMED 242S	1.0	PMED T180S	
		PMED T280S	
		PMED 250S	
	8		**0**

Total Credits 32

Additional Information

For more information, visit Drexel's College of Medicine Evening Post-Baccalaureate Pre-Medical Certificate Program (https://drexel.edu/medicine/academics/graduate-school/evening-post-baccalaureate-pre-medical/) webpage.

Certificate in Quantitative Principles for Clinical Research

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree or higher
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completed: 1.5 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0000; 51.0719
Standard Occupational Classification (SOC) Code: 11-9111

About the Program

This certificate of study addresses the needs of residents and fellows to attain knowledge in the basic principles of clinical research—analyzing data, understanding medical literature, and communicating results. 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://online.drexel.edu/online-degrees/biomedical-degrees/ms-crom/) or the Clinical Research for Health Professionals (http://online.drexel.edu/online-degrees/biomedical-degrees/ms-crhp/) program to obtain an MS degree.

Admissions Requirements

A bachelor's degree from a regionally accredited institution in the United States or an equivalent international institution.

Required Documents

- A completed application
- Official transcripts from all universities or colleges and other post-secondary educational institutions (including trade schools) attended
- Resume
- Additional requirements for international students

Program Requirements

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**

Additional Information

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215-762-3812

Visit the Drexel University Online website for additional information and to apply to the Quantitative Principles for Clinical Research (http://online.drexel.edu/online-degrees/biomedical-degrees/qpcr/) program.

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