DREXEL UNIVERSITY

College of

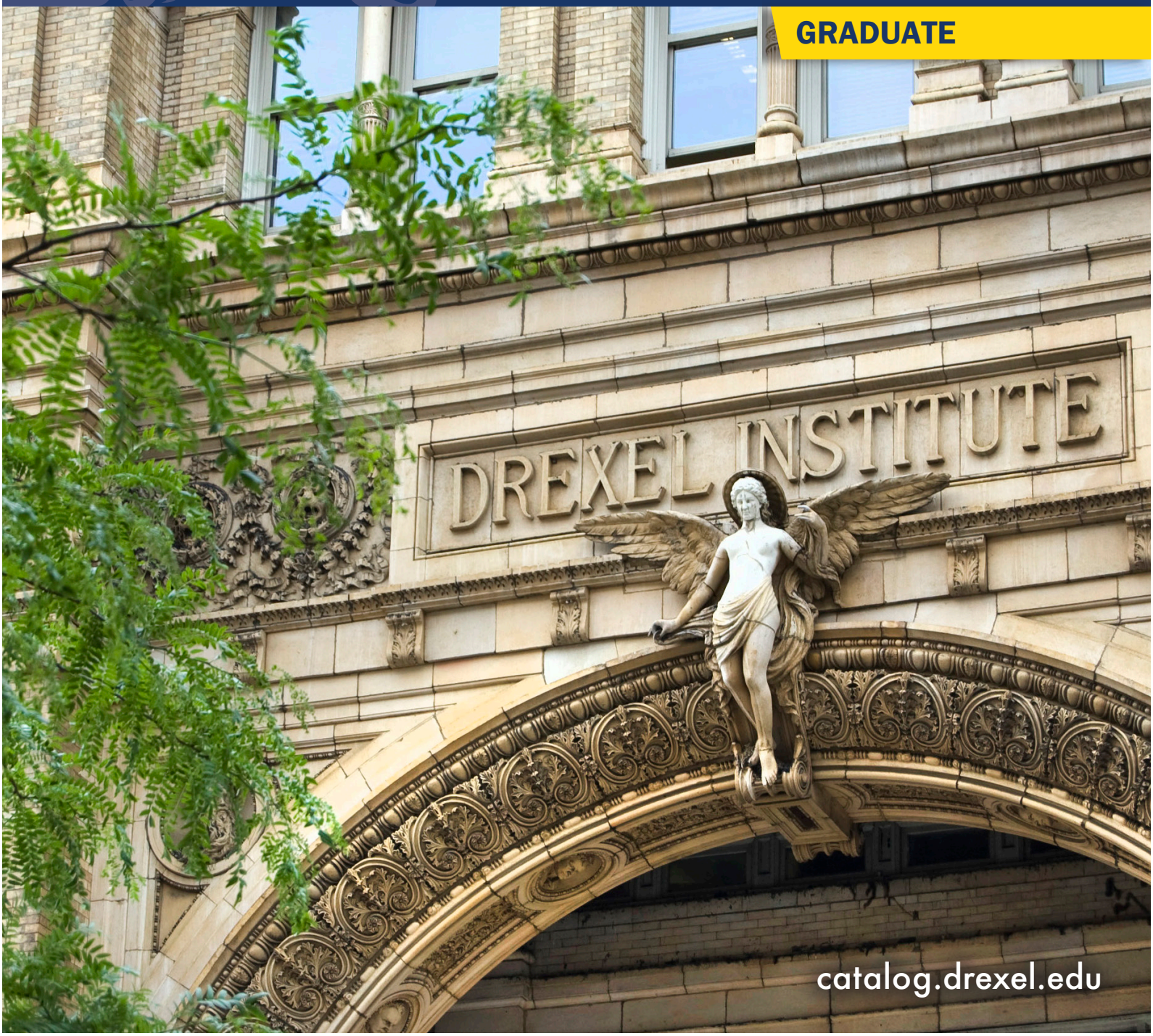
Medicine

Graduate School of Biomedical Sciences and Professional Studies

CATALOG

2024-2025

GRADUATE



catalog.drexel.edu

Table of Contents

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

Overview

Renowned for its innovative, student-centered programs, the Graduate School of Biomedical Sciences and Professional Studies at Drexel University College of Medicine provides academic offerings that attract bright, driven and entrepreneurial applicants.

With over 900 enrolled students, the Graduate School offers doctoral, master's, certificate and professional development programs that emphasize real-world experience in the biomedical sciences and health-related fields. The Graduate School's key mission is to provide cross-disciplinary, intellectually diverse academic programs that are integral to a comprehensive 21st-century graduate education.

The collaborative nature of the Graduate School with other Drexel colleges and schools, such as 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 unique experiences that prepare them to launch their careers in their chosen field of study.

The Graduate School is committed to supporting and promoting an academic success-network, which propels the transition from training in different disciplines to becoming leaders in solving global problems. The next generation of leadership begins here.

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

Majors

- Pharmacology & Physiology (MS) (p. 107)
- Pharmacology & Physiology (PhD) (p. 111)

Minors

- Clinical Research and Organization Management (p. 114)
- Drug Discovery and Development (p. 114)
- Pre-veterinary (p. 115)

Certificates

- Clinical Research (p. 117)
- Drug Discovery and Development (p. 118)
- Fundamental Concepts in Infectious Disease (p. 120)
- Human Lactation Consultant (p. 122)
- Molecular Basis of Cancer (p. 123)
- Pre-Medical, Evening Program (p. 125)
- Quantitative Principles for Clinical Research (p. 126)
- Regulatory Affairs for Cell and Gene Therapy (p. 127)
- Translational Research in Infectious Disease (https://catalog.drexel.edu/graduate/schoolofbiomedicalsciences/translationalresearchinfectiousdiseasepbc/)

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

Drexel University College of Medicine strives for a diverse, equitable and inclusive environment and encourages nontraditional applicants to apply. The College seeks highly qualified and motivated students who demonstrate the desire, intelligence and integrity to become excellent physicians and scientists.

The College of Medicine has campuses in the Philadelphia region for our first- and second-year medical students and graduate students in the Graduate School of Biomedical Sciences and Professional Studies. In 2023, the Health Sciences Building on the University City Campus opened in phases, bringing together all of Drexel's health-related fields of study in one modern space. The College's longstanding Queen Lane Campus is in a suburban-like setting in the East Falls section of Philadelphia and has renowned basic science research laboratories. Additional research facilities are located at the Center City Campus. Our pediatrics department is located at St. Christopher's Hospital for Children, which is owned and operated in partnership with Tower Health and Drexel University. Medical students can receive clinical education at over 20 affiliated hospitals and ambulatory sites chosen for their commitment to teaching as well as medical excellence. The College of Medicine at Tower Health is a regional medical campus near Reading Hospital, where medical students study and complete clerkship training for all four years.

Renowned for its innovative, student-centered programs, the Graduate School of Biomedical Sciences and Professional Studies at Drexel University College of Medicine provides PhD and master's-level academic offerings that emphasize real-world experience. Our graduate students are mentored by and work in partnership with world-renowned faculty.

The College has established one of the largest centers for spinal cord research in the mid-Atlantic region and founded one of the leading centers for malaria study in the nation. Collaborative projects leveraging Drexel University's technological expertise push the frontiers of cell and gene therapy, neuroscience and neuroengineering.

Drexel is designated as an "R1 Doctoral University: Very High Research Activity" in the Carnegie Classification of Institutions of Higher Education and is one of 146 institutions out of approximately 3,900 to receive this prestigious classification, indicating the highest level of research activity. The College of Medicine is proud of its internationally recognized research programs conducted by our basic scientists, and of the many complementary efforts in clinical science and clinical care conducted by our faculty. The College boasts programmatic excellence in fields that include infectious and inflammatory diseases, neuroscience and cancer biology.

Drexel's Partnership Comprehensive Care Practice is the largest HIV treatment office in the greater Philadelphia region. The Drexel Medicine practices provide care to the local community and support the patient care, clinical training and research missions of the College.

Facilities

Drexel University College of Medicine is a living laboratory, giving students a broad variety of hands-on experience, enhanced by clinical rotations in hospitals, practicums and external research opportunities depending on program of study. Students in all programs benefit from the College's campuses,

which offer some of the most advanced facilities in biomedical, health sciences and health care education. College of Medicine faculty members are leaders in developing interactive, computer-based learning tools, ranging from professional formation and biochemical exercises to simulated patients presenting ethical dilemmas. A comprehensive curriculum website, streaming lectures and online slide atlases for histology and pathology are all available.

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

Medical Simulation Centers

The College has state-of-the-art simulation centers for medical education at our campuses in University City in Philadelphia and in West Reading, Pennsylvania. The centers allow students to learn in simulated operating rooms and patient room settings.

Clinical Education Assessment Centers

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 and patient counseling.

Multidisciplinary Laboratories

A range of research facilities provide support for clinical and basic research activities, interdisciplinary programs to develop and implement research, translational research, and mentoring to advance the training of physicians and scientists.

Libraries

The Drexel University Library system serves the needs of students, faculty and staff. The collections emphasize subjects relevant to the health sciences, with extensive online resources to meet the needs of the programs and departments across campuses.

All online resources (databases, electronic journals, etc.) are available to students, faculty and staff who are registered Drexel Library users, and can be accessed from off-campus locations.

The Library staff provides 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.

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 a common practice.

Unique faculty-developed tools, including offerings from the health care communication and professional formation portal, provide web-based video encounters between physician and patient, and help medical students improve their communication skills. Modules on physical exam skills, diagnostic reasoning, symptoms and signs, clinical procedures and other resources are available in the College of Medicine's online clinical skills portal. Medical students have exclusive access to these resources to develop the skills necessary to become physicians in the 21st century.

Biochemistry of Health & Disease MS

Major: Biochemistry of Health & Disease
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 36.0 (non-thesis); 48.0 (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. 9). 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.

Additional Information

For more information, visit the College of Medicine's Biochemistry of Health & Disease program (https://drexel.edu/medicine/academics/graduate-school/biochemistry-of-health-and-disease/) website.

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 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 533S	Core Principles in Biochemistry & Cell Biology	4.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
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 513S	Biotechnology Practicum I	
BIOC 514S	Biotechnology Practicum II	
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		**48.0**

*****

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 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 533S	Core Principles in Biochemistry & Cell Biology	4.0
IDPT 850S	Literature Review Non-Thesis MS	5.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0

Advanced Electives		8.0
Select a minimum of eight credits		
BIOC 502S	Biochemistry 1st Lab Rotation	
BIOC 511S	Communication for Researchers	
BIOC 513S	Biotechnology Practicum I	
BIOC 514S	Biotechnology Practicum II	
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	BIOC 521S	2.0
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 533S	4.0	IDPT 500S	2.0
MCBG 515S	2.0	Advanced Elective	3.0
	13		**10**

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 600S	9.0
BIOC 600S	9.0		
	14		**11**

Total Credits 48

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	BIOC 521S	2.0

IDPT 533S	4.0	IDPT 504S	1.0
MCBG 515S	2.0	IDPT 500S	2.0
		Advanced Elective	2.0
	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 508S	3.0	IDPT 850S	5.0
Advanced Elective	4.0	Advanced Elective	2.0
	9		**9**

Total Credits 36

Program Level Outcomes

- Develop technical skills in modern biochemical science research.
- Demonstrate knowledge of fundamental biochemical processes in living systems.
- Demonstrate ability to define the significance of scientific discovery in health and disease.
- Evince creative and critical thinking skills by developing and testing novel hypotheses
- Clearly communicate scientific knowledge and discovery in written and oral formats.
- Demonstrate proficiency in identifying, evaluating and utilizing scientific literature and other resources.
- Exhibit the highest standards of ethics and scientific integrity.
- Be prepared for work in industrial, academic, and governmental settings

Biochemistry of Health & Disease PhD

Major: Biochemistry of Health and Disease
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Semester
Minimum Required Credits: 121.0
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 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.

Additional Information

For more information, visit the College of Medicine's Biochemistry of Health & Disease program (https://drexel.edu/medicine/academics/graduate-school/biochemistry-of-health-and-disease/) website.

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.

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.

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 (https://discover.drexel.edu/secure/login/) portal after you submit your application.

Resume

Upload your résumé as part of your admission application or through the Discover Drexel (https://discover.drexel.edu/secure/login/) 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 (https://discover.drexel.edu/secure/login/) portal after you submit your application.

Math Science GPA Form

Complete your Math Science GPA form through the Discover Drexel (https://discover.drexel.edu/secure/login/) portal after you submit your application.

Degree Requirements

Required Courses		
BIOC 502S	Biochemistry 1st Lab Rotation	4.0
BIOC 503S	Biochemistry 2nd Lab Rotation	4.0
BIOC 504S	Biochemistry 3rd Lab Rotation	4.0
BIOC 506S	Biochemistry Journal Club *	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 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 533S	Core Principles in Biochemistry & Cell Biology	4.0
IDPT 600S	Thesis Defense	9.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
Advanced Electives		**2.0**
Select at least one Advanced Elective for a minimum of 2.0 credits.		
BIOC 513S	Biotechnology Practicum I	
BIOC 514S	Biotechnology Practicum II	
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	**121.0**

*****

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 533S	4.0	BIOC 521S	2.0
MCBG 515S	2.0	IDPT 500S	2.0
		IDPT 504S	1.0
	13		**15**

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 511S	2.0
BIOC 600S	9.0	BIOC 600S	9.0
		Advanced Elective	2.0
	14		**15**

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 121

Biomedical Studies MS

Major: Biomedical Studies
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 full-time, 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. It offers a unique opportunity to enhance students' credentials to become competitive applicants for medical or other health professional schools.

The first-year curriculum consists of advanced undergraduate courses in physics and chemistry; graduate courses in biochemistry, physiology, anatomy, psychology/sociology and laboratory techniques; a community outreach course; and yearlong dedicated MCAT preparation. 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. The second-year curriculum offers rigorous coursework in biochemistry, physiology, microanatomy and neuroanatomy, utilizing the medical-school-equivalent lectures and laboratory materials of the IMS curriculum (p. 67), 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
Health Sciences Building
60 North 36th Street
Philadelphia, PA 19104

Phone: 267.359.2761
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

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Demonstrate proficiency in science courses required for entry into medical or other health professional school
- Achieve a competitive MCAT score
- Demonstrate an understanding of the ethical standards and professionalism for entering a healthcare profession
- Demonstrate the ability to discuss and communicate current themes in healthcare
- Attain a functional knowledge of medical sciences comparable to the content of the first year medical school curriculum

- Demonstrate an understanding of how to conduct and report scientific research
- Demonstrate knowledge base and skill set for a career and/or future schooling in health care or related fields in health professional programs

Biomedicine and Business MS

Major: Biomedicine and Business
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 nonprofit organizations). Students develop broad core knowledge in biological sciences, biomedical technology development and commercialization, 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: one-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 Interim Program Director Mary Genevieve Carty, DHSc-c, MS, MHEd at mgc24@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 web page (https://online.drexel.edu/online-degrees/biomedical-degrees/ms-biomedicine-business/). (https://www.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 provide 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 J-1 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 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 Requirements (Semester credits)		13.0
MIIM 503S	Biomedical Ethics	
or IDPT 500S	Responsible Conduct of Research	
MIIM 518S	Foundations of Applied Biomedicine *	
MIIM 519S	Commercialization of Biomedical Technology **	
MIIM 631S	Biomedical Innovation Development and Management	
Business (Credits shown have been converted to semester and courses will be listed on the transcript as RCIP versions) ***		4.0
BUSN 501	Measuring and Maximizing Financial Performance	
ECON 601	Managerial Economics	
Elective Courses - Can be mix of Quarter and Semester courses, but credits shown are semester		**19.0**
Students must complete at least one Program-Specific Science elective and at least two business electives, as well as additional electives. The overall number of electives depends on other courses selected.		
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 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
Total Credits	**36.0**

*

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

**

Substitutions: MIIM 525S and MIIM 536S

***

Credits shown for Drexel University College of Medicine courses are semester credits. Credits shown for the LeBow School of Business and Close School of Entrepreneurship have been to converted to semester credits (3.0 quarter credits = 2.0 semester credits). Fall quarter courses may be taken in the Fall semester, and Winter quarter courses may be taken in the Spring semester, as semesters and quarters overlap. This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

Quarter courses will be listed on the transcript as RCIP versions.

Additional Information

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

Sample Plans of Study

Credits shown for Drexel University College of Medicine courses are semester credits. Credits shown for the LeBow School of Business and Close School of Entrepreneurship have been converted to semester credits (3.0 quarter credits = 2.0 semester credits). Fall quarter courses may be taken in the Fall semester, and Winter quarter courses may be taken in the Spring semester, as semesters and quarters overlap. This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

Full-Time, Fall Start

First Year

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 518S (Semester Course)	3.0	MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	9.0
BUSN 501 (Quarter Course; Credits shown have been converted to semester.)*	2.0	MIIM 519S (Semester Course)	3.0		
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	3.0	BUSN 502 (Quarter Course; Credits shown have been converted to semester.)*	2.0		
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	3.0		
	8		**10**		**9**

Second Year

Fall	Credits
MIIM 631S (Semester Course)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	4.0
	9

Total Credits 36

*

Quarter courses will be listed on the transcript as RCIP versions.

Full-Time, Spring Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

Full-time, Summer

First Year

Summer	Credits
MIIM 518S (Semester Course)	3.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	6.0
	9

Second Year

Fall	Credits	Spring	Credits	Summer	Credits
BUSN 501 (Quarter Course; Credits shown have been converted to semester.)*	2.0	BUSN 502 (Quarter Course; Credits shown have been converted to semester.)*	2.0	MIIM 631S (Semester Course)	5.0

Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	6.0	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	4.0
		MIIM 503S (Semester Course)	2.0		
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	3.0		
	8		**10**		**9**

Total Credits 36

*

Quarter courses will be listed on the transcript as RCIP versions.

Part-Time, Fall Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

Part-Time, Spring Start

First Year (Part-Time)

		Spring	Credits	Summer	Credits
		MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	7.0
		MIIM 519S (Semester Course)	3.0		
		BUSN 502 (Quarter Course; Credits shown have been converted to semester.)*	2.0		
			7		**7**

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
BUSN 501 (Quarter Course; Credits shown have been converted to semester.)*	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	6.0	MIIM 631S (Semester Course)	5.0
MIIM 518S (Semester Course)	3.0			Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	3.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	3.0				
	8		**6**		**8**

Total Credits 36

*

Quarter courses will be listed on the transcript as RCIP versions.

Part-Time, Summer Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

				Summer	Credits
				Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	7.0
					7

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
BUSN 501 (Quarter Course; Credits shown have been converted to semester.)*	2.0	MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	6.0
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0		
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	3.0	BUSN 502 (Quarter Course; Credits shown have been converted to semester.)*	2.0		
	8		**7**		**6**

Third Year (Part-Time)

Fall	Credits
MIIM 631S (Semester Course)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester*	3.0
	8

Total Credits 36

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 will 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 will have also made progress in all of Drexel's Student Learning Priorities (DSLPs) (https://drexel.edu/institutionalresearch/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.

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Apply foundation knowledge of basic science, preclinical and clinical research to evaluate the scientific merit of existing and emerging biomedical technologies.
- Analyze and solve complex business problems associated with biomedical product development and commercialization in both new and established firms.
- Evaluate a firm's strategic position in the context of its internal and external environment, and recommend a strategic approach to biomedical technology commercialization.
- Identify and evaluate professional ethical dilemmas and discuss appropriate resolutions.
- Develop and deliver — using appropriate technologies — oral and/or written comprehensive reports, presenting facts, analysis and conclusions.
- Systematically evaluate career opportunities and present a professional profile of oneself within the industry.

Biomedicine and Cell & Gene Therapy MS

Major: Biomedicine and Cell and Gene Therapy
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 36.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 17-2031

About the Program

Drexel's MS in Biomedicine and Cell and Gene Therapy is unique, as students are able to take courses in both the College of Medicine and the College of Engineering. Students are taught by both medical school professors and engineering professors; our program operates at the intersection of these two fields, and our graduates can talk to professionals in both fields. Another unique feature of our curriculum is that every MS student takes a capstone course on the commercialization of a novel biomedical technology and works with a team to develop a commercialization plan. Students also have the option of completing a virtual industry internship to build their resume and experience. Students of all undergraduate backgrounds are welcome, as we will provide foundational coursework.

Additional Information

For questions about the curriculum and program goals, please contact Interim Program Director Mary Genevieve Carty, DHSc-c, MS, MHEd at mgc24@drexel.edu

.

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

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

Admission Requirements

New students are admitted every fall, spring, and summer 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 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.

Degree Requirements

Required Courses		
Science Requirements (Semester credits)		13.0
MIIM 503S	Biomedical Ethics	
or IDPT 500S	Responsible Conduct of Research	
MIIM 518S	Foundations of Applied Biomedicine *	
MIIM 519S	Commercialization of Biomedical Technology **	
MIIM 631S	Biomedical Innovation Development and Management ***	
Cell & Gene Engineering Requirements (Semester Credits) ***		10.0
MIIM 571S	Cell and Gene Therapy 1	

MIIM 572S	Cell and Gene Therapy 2	
CHE 571	Pharmaceutical & Medical Device Manufacturing I (Offered as 3 credit quarter course; course will be listed on the transcript as RCIP version)	
CHE 572	Pharmaceutical & Medical Device Manufacturing II (Offered as 3 credit quarter course; course will be listed on the transcript as RCIP version)	
Electives - Can be mix of Quarter and Semester courses, but credits shown are semester		**13.0**
Students must complete at least one Program-Specific Science elective and at least two engineering electives, as well as additional electives. The overall number of electives depends on other courses selected. ***		
Science, Program-Specific (Select One)		
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 631S	Biomedical Innovation Development and Management	
MIIM 653S	Clinical Correlations in Infectious Disease	
Engineering (Select two) Offered on Quarter Calendar ***		
EGMT 501	Leading and Managing Technical Workers	
EGMT 502	Analysis and Decision Methods for Technical Managers	
EGMT 504	Design Thinking for Engineering Communications	
EGMT 531	Engineering Economic Evaluation & Analysis	
EGMT 535	Financial Management	
EGMT 572	Statistical Data Analysis	
EGMT 573	Operations Research	
EGMT 581	Human Relations and Organizational Behavior	
EGMT 615	New Product Conceptualization, Justification, and Implementation	
EGMT 616	Value Creation through New Product Development	
EGMT 625	Project Planning, Scheduling and Control	
EGMT 630	Global Engineering Project Management	
EGMT 635	Visual System Mapping	
EGMT 650	Systems Thinking for Leaders	
BMES 510	Biomedical Statistics	
BMES 511	Principles of Systems Analysis Applied to Biomedicine I	
BMES 538	Biomedical Ethics and Law	
BMES 546	Biocomputational Languages	

BMES 550	Advanced Biocomputational Languages	
BMES 585	Medical Technology Innovation: Devices	
BMES 588	Medical Device Development	
Total Credits		**36.0**

*****

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

******

Substitution: MIIM 535S and MIIM 536S

****

Credits shown for Drexel University College of Medicine courses are semester credits. Credits shown for engineering courses have been converted to semester credits (3 quarter credits = 2 semester credits). Fall quarter courses may be taken in the Fall semester, and Winter quarter courses may be taken in the Spring semester, as semesters and quarters overlap. This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.
To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.
Quarter courses will be listed on the transcript as RCIP versions.

Sample Plan of Study

Full time, Fall start*

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

Part-Time, Fall Start *

First Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0
MIIM 571S (Semester Course)	3.0	MIIM 572S (Semester Course)	3.0		
CHE 571 (Quarter Course; Credits shown have been converted to semester.)	2.0	CHE 572 (Quarter Course; Credits shown have been converted to semester.)	2.0		
	8		**8**		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
MIIM 631S (Semester Course)	5.0	MIIM 519S (Semester Course)	3.0
MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
	7		**7**

Total Credits 36

*****

For this Plan of Study, the student would need to have some biological background so as to be prepared to take MIIM 571S *Cell and Gene Engineering 1* and CHE 571 *Pharmaceutical & Medical Device Manufacturing 1* concurrently with MIIM 518S *Foundations of Applied Biomedicine*. If a student has a limited background in biology, they are encouraged to develop a Plan of Study that includes MIIM 518S before those course.

Full-Time, Spring Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

Part-Time, Spring Start

First Year (Part-Time)

	Spring	Credits	Summer	Credits
	MIIM 519S (Semester Course)	3.0	MIIM 518S (Semester Course)	3.0
	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
		7		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 571S (Semester Course)	3.0	MIIM 503S (Semester Course)	2.0	MIIM 631S (Semester Course)	5.0
CHE 571 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 572S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0

Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	CHE 572 (Quarter Course; Credits shown have been converted to semester.)	2.0		
	8		**7**		**8**

Total Credits 36

Full-Time, Summer Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year

				Summer	Credits
				MIIM 518S (Semester Course)	3.0
				Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0
					9

Second Year

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 503S (Semester Course)	2.0	MIIM 519S (Semester Course)	3.0	MIIM 631S (Semester Course)	5.0
MIIM 571S (Semester Course)	3.0	MIIM 572S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
CHE 571 (Quarter Course; Credits shown have been converted to semester.)	2.0	CHE 572 (Quarter Course; Credits shown have been converted to semester.)	2.0		
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	1.0		
	9		**9**		**9**

Total Credits 36

Part-Time, Summer Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

				Summer	Credits
				MIIM 518S (Semester Course)	3.0
				Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
					6

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 571S (Semester Course)	3.0	MIIM 572S (Semester Course)	3.0	MIIM 631S (Semester Course)	5.0
CHE 571 (Quarter Course; Credits shown have been converted to semester.)	2.0	CHE 572 (Quarter Course; Credits shown have been converted to semester.)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	2.0		
	8		**7**		**8**

Third Year (Part-Time)

Fall	Credits
MIIM 503S (Semester Course)	2.0
MIIM 519S (Semester Course)	3.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	2.0
	7

Total Credits 36

Biomedicine and Digital Media MS

Major: Biomedicine and Digital Media
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 Graduate School of Biomedical Sciences and Professional Studies at the College of Medicine. The science courses are taught by faculty from the College of Medicine. Faculty from Drexel University's Westphal 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: one-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 (http://www.drexel.edu/drexelcentral/).

Additional Information

For questions about the curriculum and program goals, please email Interim Program Director Mary Genevieve Carty, DHSc-c, MS, MHEd at mgc24@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 provide 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 J-1 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 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 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 Requirements (Semester credits)		
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 (Credits shown have been converted to semester and courses will be listed on the transcript as RCIP versions) ***		4.0
DIGM 520	Interactivity I	
DIGM 530	Game Design I	
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester		**19.0**
Students must complete at least one Program-Specific Science elective and at least two digital media electives, as well as additional electives. The overall number of electives depends on other courses selected.		
Science, Program-Specific (Select One)		
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 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
Digital Media (Select two) (Offered on the Quarter Calendar. Courses will be listed on the transcript as RCIP versions) ***	
ANIM 588	Spatial Data Capture
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
DIGM T580	Special Topics in Digital Media
GMAP 545	Game Development Foundations
GMAP 547	Serious Games
GMAP 548	Experimental Games
GMAP 560	Game Design from the Player's Perspective
Entrepreneurship (Offered on the Quarter Calendar. Courses will be listed on the transcript as RCIP versions) ***	
ENTP 611	Learning from Failure
ENTP 621	Innovation & Ideation
ENTP 641	Innovation in Established Companies
Total Credits	**36.0**

*****

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

******

Substitution: MIIM 535S and MIIM 536S

****

Credits shown for Drexel University College of Medicine courses are semester credits, and credits shown for the Antoinette Westphal College of Media Arts & Design and Close School of Entrepreneurship are quarter courses but have been converted to semester credits. (3.0 quarter credits = 2.0 semester credits). Fall quarter courses may be taken in the Fall semester, and Winter quarter courses may be taken in the Spring semester, as semesters and quarters overlap. This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.
To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.
Quarter courses will be listed on the transcript as RCIP versions.

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

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0
DIGM 520 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 503S (Semester Course)	2.0		
DIGM 530 (Quarter Course; Credits shown have been converted to semester.)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	5.0		
	7		**10**		**9**

Second Year

Fall	Credits
MIIM 631S (Semester Course)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	5.0
	10

Total Credits 36

Full-time, Spring Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year

	Spring	Credits	Summer	Credits
	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0
	MIIM 503S (Semester Course)	2.0		
	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	5.0		
		10		**9**

Second Year

Fall	Credits	Spring	Credits
MIIM 518S (Semester Course)	3.0	MIIM 631S (Semester Course)	5.0
DIGM 520 (Quarter Course; Credits shown have been converted to semester.)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	5.0
DIGM 530 (Quarter Course; Credits shown have been converted to semester.)	2.0		
	7		**10**

Total Credits 36

Full-time, Summer Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year

	Summer	Credits
	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	10.0
		10

Second Year

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0	MIIM 631S (Semester Course)	5.0
DIGM 520 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	5.0
DIGM 530 (Quarter Course; Credits shown have been converted to semester.)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0		
	7		**9**		**10**

Total Credits 36

Part-time, Fall Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0

DIGM 520 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 503S (Semester Course)	2.0	
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	
	8		**8**	**9**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
DIGM 530 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 631S	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0		
	6		**5**

Total Credits 36

Part-time, Spring Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

	Spring	Credits	Summer	Credits
	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0
	MIIM 503S (Semester Course)	2.0		
	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0		
		8		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
DIGM 520 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 518S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0
DIGM 530 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 631S (Semester Course)	5.0		
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0				
	8		**8**		**6**

Total Credits 36

Part-time, Summer Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

		Summer	Credits
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	7.0
			7

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
DIGM 520 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 518S (Semester Course)	3.0	MIIM 631S (Semester Course)	5.0
DIGM 530 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	2.0		
	6		**8**		**8**

Third Year (Part-Time)

Fall	Credits
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	7.0
	7

Total Credits 36

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 will 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)

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.

Program Level Outcomes

- Apply foundational knowledge of molecular and cell biology and infectious disease to develop digital media designs for health care and biomedical applications (e.g., mobile apps, interactive media, animations).
- Apply digital design skills (e.g., 3D modeling, animation, interactivity, gaming and other digital media methods) to develop scientifically accurate digital assets.
- Conduct market and industry research and analysis to evaluate and develop commercialization strategies for digital platforms within the biomedical industry.
- Identify and evaluate professional ethical dilemmas and discuss appropriate resolutions.
- Develop and deliver — using appropriate technologies — oral and/or written comprehensive reports, presenting facts, analysis and conclusions.
- Systematically evaluate career opportunities and present a professional profile of oneself within the industry.

Biomedicine and Entrepreneurship MS

Major: Biomedicine and Entrepreneurship
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 also designed to facilitate new venture creation.

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. Graduates will 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 Graduate School of Biomedical Sciences and Professional Studies within 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 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: one-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 Interim Program Director Mary Genevieve Carty, DHSc-c, MS, MHEd at mgc24@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 web page. (https://drexel.edu/medicine/academics/graduate-school/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. A minimum cumulative grade point average (GPA) of 3.0 is strongly preferred.

Applicants must also submit the following requirements for consideration:

- Official transcripts from all colleges and universities attended.
- 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.
- References from at least three instructors or professionals.

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 J-1 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 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 (Credits shown have been converted to semester, Credits shown have been converted to semester and courses will be listed on the transcript as RCIP versions)		4.0
ENTP 501	Entrepreneurship Practice & Mindset **	
ENTP 540	Approaches to Entrepreneurship **	
Electives		**19.0**
Students must complete at least one program-specific Science elective and at least two entrepreneurship electives, as well as additional electives. The overall number of electives depends on other courses selected.		
Science, Program-Specific (Pick at least one, but more than one 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 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
Entrepreneurship (Select two) (Offered on the Quarter Calendar. Courses will be listed on the transcript as the RCIP versions) **	
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
Total Credits	**36.0**

*****

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

******

Credits shown for Drexel University College of Medicine courses are semester credits. Credits shown for the Close School of Entrepreneurship are quarter credits but have been converted to semester credits. (3.0 quarter credits = 2.0 semester credits). Fall quarter courses may be taken in the Fall semester, and Winter quarter courses may be taken in the Spring semester, as semesters and quarters overlap. This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

Quarter courses will be listed on the transcript as RCIP versions.

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. Science courses are offered on a semester basis; entrepreneurship courses are offered on a quarter basis. Semesters and quarters overlap. Credits shown for Entrepreneurship courses are quarter credits but have been converted to semester credits. (3.0 quarter credits = 2.0 semester credits). This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.

Students must enroll in at least 4.5 semester credits to qualify for financial aid.

Full-Time, Fall Start

First Year

Fall	Credits	Spring	Credits	Summer	Credits
ENTP 540 (Quarter Course; Credits shown have been converted to semester.)	2.0	ENTP 501 (Quarter Course; Credits shown have been converted to semester.)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0
MIIM 518S (Semester Course)	3.0	MIIM 503S (Semester Course)	2.0		
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	MIIM 519S (Semester Course)	3.0		

		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0		
	8		**10**		**9**

Second Year

Fall	**Credits**
MIIM 631S (Semester)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
	9

Total Credits 36

Full-Time, Spring Start

Students must enroll in at least 4.5 semester credits to qualify for financial aid.

First Year

	Spring	**Credits**	**Summer**	**Credits**
	ENTP 501 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 518S (Semester Course)	3.0
	MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0
	MIIM 519S (Semester Course)	3.0		
	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0		
		10		**9**

Second Year

Fall	**Credits**	**Spring**	**Credits**
ENTP 540 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 631S (Semester Course)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
	8		**9**

Total Credits 36

Full-time Summer Start

Students must enroll in at least 4.5 semester credits to qualify for financial aid.

First Year

		Summer	**Credits**
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0
			9

Second Year

Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
ENTP 540 (Quarter Course; Credits shown have been converted to semester.)	2.0	ENTP 501 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 631S (Semester Course)	5.0
MIIM 518S (Semester Course)	3.0	MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	MIIM 519S (Semester Course)	3.0		
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0		
	8		**10**		**9**

Total Credits 36

Part-Time, Fall Start

Students must enroll in at least 4.5 semester credits to qualify for financial aid.

First Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
ENTP 501 (Quarter Course; Credits shown have been converted to semester.)	2.0	ENTP 540 (Quarter Course; Credits shown have been converted to semester.)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0
MIIM 518S (Semester Course)	3.0	MIIM 503S (Semester Course)	2.0		

Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	MIIM 519S (Semester Course)	3.0		
	8		**7**		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits		
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	7.0	MIIM 631S (Semester Course)	5.0		
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0		
	7		**8**		

Total Credits 36

Part-Time, Spring Start

Students must enroll in at least 4.5 semester credits to qualify for financial aid.

First Year (Part-Time)

		Spring	Credits	Summer	Credits
		MIIM 503S (Semester Course)	2.0	MIIM 518S (Semester Course)	3.0
		MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
			5		**7**

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
ENTP 540 (Quarter Course; Credits shown have been converted to semester.)	2.0	ENTP 501 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 631S (Semester Course)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
	8		**8**		**8**

Total Credits 36

Part-Time, Summer Start

Students must enroll in at least 4.5 semester credits to qualify for financial aid.

First Year (Part-Time)

				Summer	Credits
				Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	8.0
					8

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
ENTP 540 (Quarter Course; Credits shown have been converted to semester.)	2.0	ENTP 501 (Quarter Course; Credits shown have been converted to semester.)	2.0	MIIM 631S (Semester Course)	5.0
MIIM 518S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
	5		**6**		**9**

Third Year (Part-Time)

Fall	Credits
MIIM 503S (Semester Course)	2.0
MIIM 519S (Semester Course)	3.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
	8

Total Credits 36

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 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

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.

Program Level Outcomes

- Apply foundation knowledge of basic science, preclinical and clinical research to evaluate the scientific merit of existing and emerging biomedical technologies.
- Think and act innovatively to add value to an established company, small and growing ventures, or a new venture within the biomedical industry.
- Evaluate a firm’s strategic position in the context of its internal and external environment, and recommend a strategic approach to biomedical technology commercialization.
- Identify and evaluate professional ethical dilemmas and discuss appropriate resolutions.
- Develop and deliver — using appropriate technologies — oral and/or written comprehensive reports, presenting facts, analysis and conclusions.
- Systematically evaluate career opportunities and present a professional profile of oneself within the industry.

Biomedicine and Law MS

Major: Biomedicine and Law

Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 provides 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 toward individuals interested in careers focused on technology development.

Graduates 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 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 Graduate School of Biomedical Sciences and Professional Studies within 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 law courses.

- Non-thesis program (36.0 semester credits 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: one-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 Interim Program Director Mary Genevieve Carty, DHSc-c, MS, MHEd at mgc24@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. A minimum cumulative grade point average (GPA) of 3.0 is strongly preferred.

Applicants must also submit 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/#apply) are accepted 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 (Semester credits)		
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 (Credits shown have been converted to semester and courses will be listed on the transcript as RCIP versions) ***		5.0
LSTU 550	Introduction to the Legal System	
LSTU 602	Patients and Privacy: HIPAA and Related Regulations	
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester		**18.0**
Students must complete at least one program-specific Science elective and at least two Law electives, as well as additional electives. The overall number of electives depends on other courses selected. ***		
Science, Program-Specific (Required to pick at least one course, but more than one 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 524S	Vaccines and Vaccine Development	
MIIM 525S	Principles of Biocontainment	
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 two courses) LSTU courses are offered on the Quarter Calendar but courses will be listed on the transcript as RCIP versions. ***	
LAW 610S	Reproductive Rights & Justice
LAW 674S	Health Care Fraud and Abuse
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 551	Compliance Skills: Auditing, Investigation & Reporting
LSTU 554	Risk Assessment and Management
LSTU 600	Health Care Rules and Regulations
LSTU 601	Health Care Quality, Patient Safety and Risk Management
Total Credits	**36.0**

*****

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

******

Substitutions: MIIM 535S and MIIM 536S

****

Science and law courses with the LAW prefix are offered on a semester basis, and law courses with the LSTU prefix are offered on a quarter basis. Semesters and quarters overlap, and 3.0 quarter credits = 2.0 semester and 4.0 quarter credits = 2.6 semester credits. This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

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. Science courses are offered on a semester basis; some Law courses (LSTU) are offered on a quarter basis. Semesters and quarters overlap. Credits shown for LSTU courses are quarter credits (3.0 quarter credits = 2.0 semester credits). This program requires a minimum of 36.0 semester credits to meet the degree requirements. If a minor is added to the curriculum, the required number of credits to complete the program is 42.0 semester credits.

Students must enroll in at least 4.5 semester credits to qualify for financial aid.

Full-time, Fall Start

First Year

Fall	Credits	Spring	Credits	Summer	Credits
LSTU 550 (Quarter Course; Credits shown have been converted to semester.)	2.5	LSTU 602 (Quarter Course; Credits shown have been converted to semester.)	2.5	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0		
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0		
	8.5		**8.5**		**9**

Second Year

Fall	Credits
MIIM 503S (Semester Course)	2.0
MIIM 631S (Semester Course)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
	10

Total Credits 36

Full-time, Spring Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year

	Spring	Credits	Summer	Credits
	LSTU 602 (Quarter Course; Credits shown have been converted to semester.)	2.5	LSTU 550 (Quarter Course; Credits shown have been converted to semester.)	2.5
	MIIM 503S (Semester Course)	2.0	MIIM 518S (Semester Course)	3.0
	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
		7.5		**9.5**

Second Year

Fall	Credits	Spring	Credits
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0	MIIM 631S (Semester Course)	5.0
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	5.0
	9		**10**

Total Credits 36

Full-time, Summer Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year

	Summer	Credits
	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	10.0
		10

Second Year

Fall	Credits	Spring	Credits	Summer	Credits
LSTU 550 (Quarter Course; Credits shown have been converted to semester.)	2.5	LSTU 602 (Quarter Course; Credits shown have been converted to semester.)	2.5	MIIM 631S (Semester Course)	5.0
MIIM 518S (Semester Course)	3.0	MIIM 503S (Semester Course)	2.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0	MIIM 519S (Semester Course)	3.0		
	9.5		**7.5**		**9**

Total Credits 36

Part-time, Fall Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
LSTU 550 (Quarter Course; Credits shown have been converted to semester.)	2.5	LSTU 602 (Quarter Course; Credits shown have been converted to semester.)	2.5	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	10.0
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0		
	5.5		**5.5**		**10**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
MIIM 503S (Semester Course)	2.0	MIIM 631S (Semester Course)	5.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	5.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0
	7		**8**

Total Credits 36

Part-time, Spring Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

		Credits		Credits
	LSTU 602 (Quarter Course; Credits shown have been converted to semester.)	2.5	LSTU 550 (Quarter Course; Credits shown have been converted to semester.)	2.5
	MIIM 519S (Semester Course)	3.0	MIIM 518S (Semester Course)	3.0
		5.5		**5.5**

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
MIIM 503S (Semester Course)	2.0	MIIM 631S (Semester Course)	5.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	6.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	3.0		
	8		**8**		**9**

Total Credits 36

Part-time, Summer Start

To qualify for financial aid, each semester students must enroll in #4.5 semester credits per term.

First Year (Part-Time)

		Summer	Credits
		Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	9.0
			9

Second Year (Part-Time)

Fall	Credits	Spring	Credits	Summer	Credits
LSTU 550 (Quarter Course; Credits shown have been converted to semester.)	2.5	LSTU 602 (Quarter Course; Credits shown have been converted to semester.)	2.5	MIIM 631S (Semester Course)	5.0
MIIM 518S (Semester Course)	3.0	MIIM 519S (Semester Course)	3.0	Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	4.0
	5.5		**5.5**		**9**

Third Year (Part-Time)

Fall	Credits
Electives - Can be mix of Quarter and Semester courses, but credits are shown as semester	7.0
	7

Total Credits 36

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 will 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.

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Apply foundation knowledge of basic science, preclinical and clinical research to evaluate the scientific merit of existing and emerging biomedical technologies.
- Demonstrate a basic understanding of the United States legal system and structure, and major regulatory entities relevant to the biomedical industry.
- Conduct research to develop commercialization strategies for biomedical products that are compliant with U.S. regulations.
- Identify and evaluate professional ethical dilemmas and discuss appropriate resolutions.
- Develop and deliver — using appropriate technologies — oral and/or written comprehensive reports, presenting facts, analysis and conclusions.
- Systematically evaluate career opportunities and present a professional profile of oneself within the industry.

Biotechnology MS

Major: Biotechnology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 Master of Science in Biotechnology is designed to train laboratory personnel in the theory and practice of state-of-the-art technologies for biochemical analysis. It is an innovative, graduate degree program that emphasizes hands-on training in the latest laboratory techniques used across the biotechnology and biomedical industries. This program furnishes students with the necessary technical skills to successfully seek gainful employment in both biotechnology/pharmaceutical firms and academic laboratories. It does so by using a two-pronged approach that combines theory with hands-on instruction under the direct supervision of our diverse and accomplished research faculty. The program is appropriate for recent college graduates or experienced technicians wishing to bolster their methodological base.

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

Additional Information

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

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 (Thesis)

Required Courses		
BIOC 507S	Biochemistry Seminar Series *	3.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
BIOC 513S	Biotechnology Practicum I	4.0
BIOC 514S	Biotechnology Practicum II	4.0
BIOC 521S	Introduction to Biochemical Data	2.0
BIOT 512S	Biotechnology Journal Club *	3.0
BIOT 600S	Biotechnology Thesis Research **	18.0
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 533S	Core Principles in Biochemistry & Cell Biology	4.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
General Electives		
BIOC 511S	Communication for Researchers	
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
BIOT 502S	Group Dynamics in STEM	
BIOT 503S	Professional Portfolio Development	
BIOT T580S	Special Topics in Biotechnology	
IDPT 600S	Thesis Defense	
Total Credits		**47.0**

*****

1 credit course, may be repeated for credit

******

9 credit course, may be repeated for credit.

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 *	3.0
BIOC 508S	Experimental Approaches to Biochemical Problems	3.0
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
or BIOT 560S	Biotechnology Internship	
BIOC 521S	Introduction to Biochemical Data	2.0
BIOT 512S	Biotechnology Journal Club *	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 533S	Core Principles in Biochemistry & Cell Biology	4.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
Advanced Electives		**0.0-5.0**
BIOC 603S	Advanced Topics in Biochemistry and Molecular Biology	
BIOT 502S	Group Dynamics in STEM	
BIOT 503S	Professional Portfolio Development	
BIOT T580S	Special Topics in Biotechnology	
Total Credits		**41.0-46.0**

*****

Taken a minimum of three times, for one credit each.

Sample Plan of Study (Thesis)

First Year

Fall	Credits	Spring	Credits
BIOC 507S	1.0	BIOC 514S	4.0
BIOC 513S	4.0	BIOC 521S	2.0
BIOT 512S	1.0	BIOT 512S	1.0
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
MCBG 515S	2.0		
	13		**10**

Second Year

Fall	Credits	Spring	Credits
BIOC 507S	1.0	BIOC 507S	1.0
BIOC 508S	3.0	BIOT 600S	9.0
BIOT 512S	1.0		
BIOT 600S	9.0		
	14		**10**

Total Credits 47

Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
BIOC 507S	1.0	BIOC 514S	4.0
BIOC 513S	4.0	BIOC 521S	2.0
BIOT 512S	1.0	BIOT 512S	1.0
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
MCBG 515S	2.0		
	13		**10**

Second Year

Fall	Credits	Spring	Credits
BIOC 507S	1.0	BIOC 515S	8.0
BIOC 508S	3.0	BIOC 507S	1.0
BIOC 516S or BIOT 560S	4.0		
BIOT 512S	1.0		
	9		**9**

Total Credits 41

Program Level Outcomes

- Proficiently perform key molecular biology and biochemistry techniques in the laboratory.
- Design experiments and follow research protocols that leave them equipped for independent performance in a laboratory.
- Demonstrate and communicate fundamental knowledge obtained through courses, laboratory experience and the scientific literature.
- Demonstrate and apply the ethical and professional standards of scientific research including truthful presentation of ideas and data.
- Demonstrate oral and written communication skills, and record keeping, as evidenced by journal club presentations, required paper and lab notebooks.

- Compete for job opportunities at biotechnology or pharmaceutical companies or in academic laboratories as evidenced by interviews and securing a position upon completion of the program.

Cancer Biology MS

Major: Cancer Biology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 42.0 (non-thesis); 51.0 (thesis)
Classification of Instructional Programs (CIP) code: 26.0911
Standard Occupational Classification (SOC) code: 19-1042

About the Program

The goal of the Master of Science in Cancer Biology program is to provide an understanding of the fundamentals of cancer from an interdisciplinary perspective, including:

- Biology and molecular biology of cancer initiation
- Metastasis
- Treatment
- 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 on both the theoretical and practical levels.

Additional Information

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

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

51.0 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 533S	Core Principles in Biochemistry & Cell Biology	4.0
MCBG 513S	Molec & Cell Biology Seminar *	4.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
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		**51.0**

*****

Taken each semester

******

Taken a minimum of two times in the second year.

Non-Thesis Option

42.0 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 533S	Core Principles in Biochemistry & Cell Biology	4.0
IDPT 850S	Literature Review Non-Thesis MS	5.0
MCBG 513S	Molec & Cell Biology Seminar *	4.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
Advanced Electives		**4.0**
Select a minimum of four 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		**42.0**

*

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 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 501S	2.0
MCBG 513S	1.0	IDPT 504S	1.0
MCBG 515S	2.0	MCBG 513S	1.0
	13		**11**
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 51

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 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 501S	2.0
MCBG 513S	1.0	IDPT 504S	1.0
MCBG 515S	2.0	MCBG 513S	1.0
	13		**11**
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	5.0
Elective(s)	4.0	MCBG 513S	1.0
	9		**9**

Total Credits 42

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Develop technical skills in modern cancer biology research.
- Demonstrate knowledge of fundamental cell and cancer cell biology.
- Demonstrate ability to define the significance of scientific discovery in cancer research.
- Have developed a comprehensive awareness of treatment and management modalities for cancer.

- Evince creative and critical thinking skills by developing and testing novel hypotheses.
- Clearly communicate scientific knowledge and discovery in written and oral formats.
- Demonstrate proficiency in identifying, evaluating and utilizing scientific literature and other resources.
- Exhibit the highest standards of ethics and scientific integrity.

Clinical Research for Health Professionals MS

Major: Clinical Research for Health Professionals
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 advance their professional opportunities.

Online coursework coupled with supervised independent research activities will allow health care professionals in any academic hospital setting throughout the U.S. to receive an MS degree from Drexel University College of Medicine.

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 resubmission 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 9 hours of 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 of Biomedical Sciences and Professional Studies faculty. The student must submit a 7- to 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

Robert Sterling, PhD
Director, Graduate Programs in Clinical Research
rcs336@drexel.edu (RCS336@drexel.edu)
267.359.2310

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	
CR 639S	Healthcare Inequities in Biomedical Research	
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 573S	Patient Generated Data in Clinical 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 571S	Health Information Technology in Biomedical R&D	
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	
CR 637S	Risk Management in Clinical Research	
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.

Program Level Outcomes

- 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.
- Demonstrate sound ethical principles and values as they are recognized and upheld in research involving a human population.
- Use current statistical knowledge and methods in the design, implementation, conduct, and assessment of clinical trial management.
- Explain the elements of clinical study design, implementation, and data integrity and quality assurance.
- Evaluate scientific and clinical research literature to effectively interpret the results of clinical research, thereby enhancing the decision-making process.
- Demonstrate a basic understanding of fundamental principles in biostatistics and how they apply to clinical trials and medical data, choosing the appropriate study design, reviewing case report forms, report and analysis plans, and statistical sections of the clinical study report.
- Effectively communicate the content and relevance of clinical research findings to the scientist and non-scientist community.

Clinical Research Organization and Management MS

Major: Clinical Research Organization and Management
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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, all of which are 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 courses are offered solely online. Visit Drexel University Online for details.

Additional Information

Robert Sterling, PhD
Director, Graduate Programs in Clinical Research
rcs336@drexel.edu
267.359.2310

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/) web page.

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) web page.

Degree Requirements

The Master of Science in Clinical Research Organization and Management program consists of 12 courses (36.0 credits). Any courses offered by the Clinical Research Organization 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	
CR 639S	Healthcare Inequities in Biomedical Research	
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	

CR 573S	Patient Generated Data in Clinical Research
Biostatistics and Data Management	
CR 500S	Epidemiology
CR 520S	Applications of Clinical Research Biostatistics
CR 527S	Clinical Data Management
CR 571S	Health Information Technology in Biomedical R&D
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
CR 637S	Risk Management in Clinical Research
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**

Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
Program Requirements	6.0	Program Requirements	6.0
	6		**6**

Second Year

Fall	Credits	Spring	Credits
Program Requirements	6.0	Program Requirements	6.0
	6		**6**

Third Year

Fall	Credits	Spring	Credits
Program Requirements	6.0	Program Requirements	6.0
	6		**6**

Total Credits 36

Program Level Outcomes

- 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.
- Demonstrate sound ethical principles and values as they are recognized and upheld in research involving a human population.
- Use current statistical knowledge and methods in the design, implementation, conduct, and assessment of clinical trial management.
- Explain the elements of clinical study design, implementation, and data integrity and quality assurance.
- Summarize the legislative and regulatory framework that supports the development and registration of new medicines, devices, and biologics.
- Describe and evaluate the design conduct and documentation of clinical trials as required for GCP guidelines.

Drexel Pathway to Medical School MS

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

About the Program

The Drexel Pathway to Medical School (DPMS) is an intensive, one-year master's degree program that, upon its successful completion with specific benchmarks, provides candidates a conditional acceptance for matriculation into Drexel University College of Medicine's MD program. Conveniently located in the state-of-the-art Health Sciences Building (https://drexel.edu/medicine/about/campuses/university-city/) in the heart of University City, this program offers a unique opportunity for dedicated students to further enhance their academic backgrounds by completing rigorous coursework that builds skills for clinical problem-solving. 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
60 N. 36th Street, Room 10W28
Health Sciences Building
Philadelphia, PA 19102

Phone: 267.359.2315
Email: CoM_MedicalSciences@drexel.edu

Visit Drexel University College of Medicine's website for more information about 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.

Program Level Outcomes

- Demonstrate medical sciences knowledge and competencies comparable to first year medical school curriculum.
- Develop leadership skills that will enhance future training in the health professions.
- Develop the ability to be creative, critical, and analytical thinkers.
- Demonstrate knowledge base and skill set compatible with success in health professional programs and careers.
- Develop competencies with statistics, data analysis, and interpretation.
- Develop the ability to critically read and analyze scientific literature and understand its impact on medicine and society.
- Demonstrate their ability to communicate effectively.
- Build the foundations of a professional network.
- Demonstrate professionalism, ethical and technical competencies required in the broad areas of observation, motor function, behavioral and social skills as exemplified by effective medical practitioners.

Drug Discovery and Development MS

Major: Drug Discovery and Development
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 multiple aspects of 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 or accelerate professional advancement in the pharmaceutical and biotechnology industry. It covers all facets 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 is flexible and 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 Drug Discovery and Development (https://drexel.edu/medicine/academics/graduate-school/drug-discovery-development/) program web page.

Admission Requirements

For acceptance to the program, the applicant must have completed a four-year life science, physical science, pharmacy, health science 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
- References from at least two instructors, supervisors or relevant professionals
- Current resume
- Personal statement

- 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.

Visit Drexel University's Graduate Admissions (https://drexel.edu/admissions/grad/) 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/medicine/admissions/overview/).

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 *		
Elective Options		18.0-20.0
CBIO 510S	Cancer Biology	
CMCA 500S	Foundations in Bioscience 1	
CMCA 501S	Foundations in Bioscience 2	
CMCA 510S	Introduction to Cancer Biology	
CMCA 520S	Molecular Basis of Cancer	
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 571S	Health Information Technology in Biomedical R&D	

CR 573S	Patient Generated Data in Clinical Research
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
CR 637S	Risk Management in Clinical Research
CR 639S	Healthcare Inequities in Biomedical Research
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
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
PHRM 528S	Drug Development Strategy & Planning
PHRM T580S	Special Topics in Pharmacology
Quarter Elective Course Options (must be approved by advisor)	
Total Credits	**38.0-40.0**

*

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
CR 520S	3.0	PHRM 526S	3.0
PHRM 525S	3.0	IDPT 500S	2.0
Elective	3.0	PHRM 517S	1.0
		PHRM 512S	3.0
	9		**9**

Second Year

Fall	Credits	Spring	Credits
PHRM 527S	1.0	Electives	10.0
PHRM 605S	4.0		
PHRM 519S	2.0		
Electives	3.0		
	10		**10**

Total Credits 38

Part Time Sample Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
PHRM 525S	3.0	CR 612S or IDPT 500S	3.0
Elective	3.0	PHRM 526S	3.0
	6		**6**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CR 520S*	3.0	PHRM 512S	3.0
PHRM 527S	1.0	Elective	3.0
	4		**6**
Third Year			
Fall	**Credits**	**Spring**	**Credits**
Electives	6.0	Electives	6.0
	6		**6**
Fourth Year			
Fall	**Credits**		
PHRM 605S or 610S*	4.0		
	4		
Total Credits 38			

*

Note: This term 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 Level Outcomes

- Demonstrate a working knowledge of the Drug Discovery and Development process and an understanding of the fundamental scientific principles that guide the development of novel therapeutics
- Recognize the role and evaluate the contributions of representatives of different disciplines, organizational functions and agencies involved in advancing a candidate molecule from the laboratory to the market.
- Demonstrate a working knowledge of the fundamental principles of pharmacology and a familiarity with the mechanism of action of commonly used drugs
- Evaluate the properties of a candidate molecule and assess its therapeutic potential, identify key strengths and weaknesses and recommend remedies to overcome limitations
- Demonstrate sound ethical principles and values and the ability to work independently or in diverse groups to complete tasks or assignments
- Synthesize information from multiple and diverse sources and identify the most fruitful plan of action
- Demonstrate the ability to communicate technical information clearly and effectively in both written and oral form to scientific and non-scientific audiences

Histotechnology MS

Major: Histotechnology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 them to apply the knowledge and techniques learned during their didactic courses in a clinical hospital setting. The practicum allows the student the opportunity to perform routine as well as specialized histotechnology techniques under the supervision of a qualified histotechnologist.

Program Accreditation

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

Professional Certification

The American Society for Clinical Pathology Board of Certification (ASCP BOC) has established a national certification program for histotechnologists. Graduates of the Master of Science in 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 nonprofit 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 and 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 web 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 the director 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
- 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:

Chris Mignogna
Master of Histotechnology, Program Director
Drexel University College of Medicine
Chris Mignogna christopher.mignogna@pennmedicine.upenn.edu
215-662-7275

Kelly M. Lozier, MS, PA(ASCP)^{CM}
Clinical Faculty and Clinical Coordinator
Graduate School of Biomedical Sciences and Professional Studies
60 N. 36th Street, Room 10W32

Health Sciences Building
Philadelphia, PA 19104
267.359.2536
kmm599@drexel.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

Program Level Outcomes

- Demonstrate the ability to properly account for and process submitted tissue(s) including appropriate specimen accessioning and selection of the correct processing cycle to ensure adequate fixation and tissue type.
- Demonstrate the ability to orient, embed and document tissue pieces in each cassette.
- Demonstrate the ability to use a precision microtome including selecting the correct micron setting for specific tissue types and stains to be performed and using proper cutting technique.
- Demonstrate the ability to perform hematoxylin and eosin (H&E) staining including proper slide drying technique, choosing appropriate staining times and selecting appropriate tissue for quality control.
- Demonstrate the ability to perform special stains including preparing staining solutions, selecting appropriate control tissue and performing special stains according to procedure.
- Demonstrate mastery of lab management skills such as basic administrative, budgetary, supervisory, and teaching duties. These duties include administrative maintenance of surgical pathology protocols, procedures and policies, maintenance of slides and blocks for appropriate length of time, proper maintenance of equipment, provision of adequate supplies, and maintaining the cleanliness of all areas of the surgical pathology laboratory.

Immunology MS

Major: Immunology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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, as well as higher professional degree programs, such as medical, veterinary and physicians' assistant schools.

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. It is available in both traditional on-campus and online formats.

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 9 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. Although the research component is an elective, students may choose to undertake 6.0 research credits toward completion of the degree program.

The experiential research component of the curriculum, if chosen, 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 the program directors. If a research project is not available, students may choose to prepare a detailed review of the literature in their chosen field of interest.

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

For the traditional on-campus format, classes can be attended at either of Drexel University College of Medicine's locations: the 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. Classes may be designed as hybrid courses, using a combination of online and traditional in-class learning materials. The program may also be completed in a fully online format. 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) may 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, , recommendation letters, and relevant research and professional experience.

Online applications are considered year-round. Potential students are encouraged to apply no later than July 20 for Fall admission or December 7 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 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.		18.0
Possible Electives		
MIIM 502S	Microbiology and Immunology Journal Club	
MIIM 520S	Science Communication and Outreach	
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 532S	Fundamentals of Molecular Medicine III	
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 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 655S	Emerging Biomedical Interventions for Human Disease
MIIM 660S	Current Concepts in Molecular Medicine I
MLAS 529S	Molecular Genetics
PHRM 525S	Drug Discovery and Development I
PHRM 526S	Drug Discovery and Development II
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/institutionalresearch/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

Program Level Outcomes

- Develop broad core knowledge in molecular biology, biochemistry, cell biology and immunology.
- Develop a working knowledge of innate and adaptive immune responses, how these responses can be protective, and how they contribute to disease.
- Develop skills in analytical and critical thinking related to immunological research documented in the primary literature and in collegial presentations.
- Develop skills in basic, translational, or clinical research and apply analytical skills and critical thinking to data analyses.
- Develop professional ethics necessary for the responsible conduct of research.
- Develop oral and written communication skills and demonstrate the ability to interact and work effectively with others in work settings involving cultural and demographic diversity.
- Develop other soft skills (e.g. collaboration, problem solving, career planning, networking) that facilitate career advancement and promotion.

Infectious Disease MS

Major: Infectious Disease
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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. Online learning, synchronous activities, and research experiences cover fundamentals of molecular biology, cell biology and immunology, as well as the basic science, 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 human 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 training program. Although learners can complete the program in two years (four semesters) as full-time students, many opt to enroll on a part-time basis, taking three or more 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 laboratory biosafety. Graduate courses in the curriculum involve completion of examinations and other assessments, participation in seminars and journal clubs, and (if applicable) performance of research in the field of infectious disease. The degree is conferred upon successful completion of a minimum of 36.0 credits of course work.

Learning Format

The Master of Science in Infectious Disease program features a completely online curriculum. Students accepted into the program will take courses designed with activities that maximize interactions among students and faculty, including live (synchronous) sessions with instructors and guest speakers. Most synchronous activities are scheduled in the late afternoon/early evening to facilitate the participation of working professionals.

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 science 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
- Clinical infectious disease research focused on infectious diseases in humans

Many students choose to engage in a hands-on research internship consisting of a 16-week research project in a laboratory at an academic institution or a company that specializes in biotechnologies or pharmaceuticals. Students in the online program can make arrangements with academic institutions or biotechnology companies near where they live or work. Alternatively, 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 14 elective credits by completing lecture-based elective courses offered as part of the curriculum.

Additional Information

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

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

Visit the website for more information about the online Master of Science in Infectious Disease (https://drexel.edu/medicine/academics/graduate-school/infectious-disease/) program.

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 undergraduate 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.

An international applicant (non-United States citizen) must meet the same requirements for admission as an applicant from the United States. In addition, an applicant 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 website for the online Master of Science in Infectious Disease program for more information. For detailed information regarding application deadlines, the online application process, and specific requirements for applying to the College of Medicine, start by visiting Drexel University's Infectious Disease (https://drexel.edu/academics/grad-professional-programs/medicine/infectious-disease/) page.

Degree Requirements

Courses with an MIIM or IDPT designation are offered by Drexel University College of Medicine and are taught on a semester schedule (fall and spring). Courses are presented online. While many activities in online courses can be completed asynchronously (i.e., at times that you choose), some courses include synchronous activities for which students 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 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		**14.0**
MIIM 520S	Science Communication and Outreach	
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 532S	Fundamentals of Molecular Medicine III	
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 621S	Biomedical Research I	
MIIM 622S	Biomedical Research II	
MIIM 625S	Advanced Molecular Virology	
MIIM 652S	Research Internship in Infectious Disease	
MIIM 655S	Emerging Biomedical Interventions for Human Disease	
MIIM 660S	Current Concepts in Molecular Medicine I	
MLAS 529S	Molecular Genetics	
Total Credits		**36.0**

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.

Full-time

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

Part-time

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) (https://drexel.edu/institutionalresearch/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

Program Level Outcomes

- Develop broad core knowledge in molecular biology, biochemistry, cell biology, immunology and microbiology.
- Develop a working knowledge of clinically relevant pathogens that cause infectious disease in humans, including how these pathogens are transmitted, how they replicate and the mechanisms by which they cause disease in humans.
- Develop skills in analytical and critical thinking in the preparation of presentations and analysis of published literature.
- Develop professional ethics necessary for the responsible conduct of research.
- Develop oral and written communication skills and demonstrate the ability to interact and work effectively with others in work settings involving cultural and demographic diversity.
- Develop other soft skills (e.g., collaboration, problem solving, career planning, networking) that facilitate career advancement and promotion.

Intensive Medical Sciences MS

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

About the Program

Intensive Medical Sciences (IMS) is an accelerated nine-month, intensive, non-thesis "special master's" program for students who have completed their pre#medical school coursework and wish to enhance their credentials by taking courses equivalent in rigor to first-year medical school coursework.

Students who successfully complete the IMS program with specific benchmarks will be provided a conditional acceptance for matriculation into Drexel University College of Medicine's MD program. The program is located in the state-of-the-art Health Sciences Building (https://drexel.edu/medicine/about/campuses/university-city/) in the heart of University City.

Additional Information

Drexel University College of Medicine
Division of Pre-medical and Pre-health Programs
Graduate School of Biomedical Sciences and Professional Studies
Health Sciences Building
60 N. 36th Street
Philadelphia, PA 19104

Phone: 267.359.2761
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

Applicants must have a minimum cumulative math-science (BCPM) GPA of 3.3 and a minimum MCAT total score of 509 (with no section less than 126) or 511 (with no section less than 124) to be considered. 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

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Demonstrate medical sciences knowledge and competencies comparable to first year medical school curriculum.
- Demonstrate critical thinking and analysis skills
- Develop the ethical standards and professionalism for entering a healthcare profession
- Demonstrate the ability to discuss and effectively communicate current themes in healthcare
- Demonstrate an understanding for effective leadership and professionalism for future training in the health professions.
- Demonstrate a knowledge base and skill set necessary for success in health professional programs.
- Demonstrate knowledge and awareness of multiple areas of potential synergy and/or conflict between medicine and society

Interdisciplinary Health Sciences MS

Major: Interdisciplinary Health Sciences
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 health care. The IHS program offers students a broad range of elective courses from which to choose, and students receive personalized guidance from a program advisor as they select those electives that best meet their needs and interests.

During the second year of IHS, students 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 health care career interests of each student. Also during their second year, students select one of three Capstone Project Tracks: (1) Independent Research Track, (2) Laboratory/Clinical Research Track, or (3) Community Service Research Track. All tracks teach students to communicate complex scientific information in written and oral formats, and to hone their critical thinking and analysis skills.

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 health care 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/) web page.

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	IHS Capstone Project Proposal	2.0
IHS 508S	IHS Capstone Project Presentation	1.5
IHS 509S	IHS Capstone Project 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 511S	Biology of Cancer	3.0
IHS 512S	Principles of Immunology	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
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 511S	Biology of Cancer	3.0
IHS 512S	Principles of Immunology	3.0
IHS 514S	Molecular Biology & Biochemistry of the Cell	3.0
IHS 517S	Biological Anthropology	3.0

IHS 518S	Human Skeleton	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 552S	Structure of the Human Body	3.0
MFSP 553S	Human Structure Lab	1.0
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:		
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
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 505S	Healthcare in Spanish I	3.0
IHS 515S	Exploring Diversity in Healthcare	2.0
IHS 516S	Strategic Communication and Professional Development	2.0
MFSP 585S	Clinical Forensic Emergency Medicine and Traumatology	2.0
MFSP 588S	Advanced Topics in Cell Biology	2.0
MSPP 512S	Psychosocial and Behavioral Factors in Health and Medicine	3.0

*****

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.

Program Level Outcomes

- Demonstrate academic success in biomedical and health science courses with content relevant to the student's health profession career goals
- Become a competitive applicant for the student's chosen health professional school, or for direct entry into the healthcare workforce via academic success, competitive standardized exam scores, and other key metrics.
- Demonstrate independence and creativity in designing and completing a cohesive, concentration-specific research project, and honing critical thinking and analysis skills
- Demonstrate an ability to effectively communicate complex scientific information in a variety of formats to scientific and non-scientific audiences
- Develop an ability to self-assess by critically evaluating strengths, weakness etc., and applying this knowledge toward appropriate decision making with respect to health profession career goals and outcome evaluation
- Attain a high level of ethical standards and professionalism compatible with a career in the health professions
- Develop leadership skills that will enhance future training in the health professions.
- Demonstrate medical sciences knowledge and competencies comparable to Drexel's first year medical school curriculum.
- Develop the ability to be creative, critical, and analytical thinkers.
- Demonstrate knowledge base and skill set compatible with success in health professional programs and careers.
- Demonstrate knowledge and awareness of multiple areas of potential synergy and/or conflict between medicine and society.
- Demonstrate the ability to communicate effectively.
- Develop as a well-rounded, competitive applicant for future educational endeavors in the medical and health sciences.
- Attain a high level of ethical standards and professionalism compatible with a career in the health professions

Laboratory Animal Science MLAS

Major: Laboratory Animal Science
Degree Awarded: Master of Laboratory Animal Science (MLAS)
Calendar Type: Semester
Minimum Required Credits: 48.0
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 are seeking advanced career positions in laboratory animal science and laboratory animal facility management. Alternatively, the MLAS degree is 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 consist primarily of classroom instruction, while the last semester is reserved for experiential learning. The program is flexible for traditional and nontraditional 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 may elect to complete a pre-vet minor (p. 115) 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 placements 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. Students currently working in a laboratory animal facility, with a minimum of two years' experience are exempt from the *Laboratory Animal Practicum* (MLAS 801S) - 12.0 credits.

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
60 N. 36th Street, Room 10W16
Health Sciences Building
Philadelphia, PA 19104
Tel. 267.359.2329 | Fax: 215.762.7961
eev25 (eev25@drexel.edu)@drexel.edu (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 504S	Public Outreach for 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
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 507S	LAT Certification Prep	
MLAS 508S	LATG Certification Prep	
MLAS 514S	Hematopoiesis (Upenn)	
MLAS 529S	Molecular Genetics	
MLAS 530S	Biostats In Vet Science	
MLAS 531S	Embryology	
MLAS 545S	Fundamentals of Histology	

MSPA 520S	Medical Terminology	
MSPA 580S	Medical Microbiology I	
MSPP 511S	Concepts in Biochemistry and Cell Biology	
PHGY 503S	Graduate Physiology	
PHRM 512S	Graduate Pharmacology	
Total Credits		**48.0**

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
MLAS Elective	3.0-4.0		
	16-17		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
MLAS 525S	2.0	MLAS 535S	4.0
MLAS 503S	3.0	MLAS 504S	3.0
	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 48-49

*****

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 504S	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 will begin their practicum in the spring, but it may continue into the summer depending on their location.

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Demonstrate mastery of the laboratory animal science field (local and federal regulations, laboratory animal care, facility management, veterinary care, and research).
- Summarize the importance of animal research in biomedical science.
- Demonstrate a working knowledge of the basic sciences in the laboratory animal field (microbiology, genetics, statistics, biology, chemistry, biochemistry, and physics).

- Demonstrate flexibility and adaptability in changing environments.
- Collaborate with others to achieve shared goals.
- Participate in local and national professional laboratory animal science organizations and contribute to biomedical research outreach efforts through volunteerism.

Medical Science MS

Major: Medical Science
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 59.0
Classification of Instructional Programs (CIP) code: 26.9999
Standard Occupational Classification (SOC) code: 11-9121

About the 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.

Additional Information

Drexel University College of Medicine
Division of Pre-medical and Pre-health Programs
Health Sciences Building
60 North 36th Street
Philadelphia, PA 19104
267.359.2761
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**

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

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Demonstrate medical sciences knowledge and competencies comparable to first year medical school curriculum.
- Build the foundations of a robust professional network.
- Develop a knowledge base, technical skills, and a sense of professionalism necessary for a career that encompasses discovery.
- Develop as a well-rounded, competitive applicant for future educational endeavors in the medical and health sciences
- Demonstrate knowledge and awareness of multiple areas of potential synergy and/or conflict between medicine and society.
- Develop leadership skills that will enhance future training in the health professions.
- Demonstrate the ability to be creative, critical, and analytical thinkers.
- Demonstrate knowledge base and skill set compatible with success in health professional programs and careers.
- Demonstrate research design competencies.
- Demonstrate ability to execute a variety of technical or analytical methods relevant to their field of research.
- Demonstrate competencies with statistics, data analysis, and interpretation.
- Demonstrate ability to critically read and analyze their own work and the scientific literature and understand its impact on medicine and society.
- Demonstrate their ability to communicate effectively.
- Conduct research in an ethical manner.

Medical Science (MD/MS)

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

About the 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 in Medical Science degree accepts 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 transfers them into the Graduate School of Biomedical Sciences and Professional Studies where they are enrolled in the second year of the MMS program. If they successfully complete the required coursework, they 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
Health Sciences Building, 10th floor
60 North 36th Street
Philadelphia, PA 19104
267.359.2761
Email: CoM_MedicalSciences@drexel.edu

Degree Requirements

Required Courses		
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
Transfer credits from MD program		10.0
Elective Course		
NEUR 500S	Statistics for Neuro/Pharm Research	
Total Credits		**30.0**

Sample Plan of Study

Second Year			
Fall	**Credits**	**Spring**	**Credits**
MMSP 501S	6.0	MMSP 502S	6.0
MMSP 503S	3.0	MMSP 504S	3.0
Transfer credits from MD program	10.0		
MMSP 505S	2.0		
	21		**9**

Total Credits 30

Program Level Outcomes

- Demonstrate medical sciences knowledge and competencies comparable to first year medical school curriculum.
- Demonstrate the ability to be creative, critical, and analytical thinkers.
- Demonstrate knowledge base and skill set compatible with success in health professional programs.
- Demonstrate research design competencies.

- Demonstrate ability to execute a variety of laboratory techniques relevant to their field of research.
- Demonstrate competencies with statistics, data analysis, and interpretation.
- Demonstrate ability to critically read and analyze their own work and the scientific literature and understand its impact on medicine and society.
- Demonstrate their ability to communicate effectively.
- Understand how to conduct research in an ethical manner.
- Build the foundations of a robust professional network.
- Develop a knowledge base, technical skills, and a sense of professionalism necessary for a career that encompasses discovery.
- Develop as a well-rounded, competitive applicant for future educational endeavors in the medical and health sciences.

Microbiology & Immunology MS

Major: Microbiology & Immunology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 39.0 (MS, non-thesis); 48.0 (MS, thesis);
Classification of Instructional Programs (CIP) code: 26.0599
Standard Occupational Classification (SOC) code: 19-1022

About the Program

The Department of Microbiology & Immunology offers 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, all driven by investigators with national and international reputations and with extended histories of extramural funding from NIH, as well as other sources. Students are exposed to an integrated curriculum that includes the essentials for biomedical research, as well as emphasizing host-pathogen interactions through a series of molecular pathogenesis courses covering viruses, bacteria, fungi and parasites, as well as immunology. Upon completing these programs, students pursue careers in academic, governmental or industrial settings.

The MS program provides students a broad background in microbiology and immunology and the techniques used in microbiology and immunology research. There are both thesis and non-thesis options for an MS degree. The thesis option combines coursework 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 MS degree completion is two years.

Additional Information

For more information, visit the College of Medicine's Microbiology & 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 minimum 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 program's faculty with whom they may share scientific interests to discuss the applicant's suitability to the program and/or potential projects in relevant laboratories.

Drexel University College of Medicine's Graduate 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 & Immunology program specific website (https://drexel.edu/medicine/academics/graduate-school/microbiology-immunology/how-to-apply/?_gl=1*11du4yy*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQzMzk3LjUyLjAuMA..).

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 502S	Learn Early As Professionals I (LEAP I)	1.0
IDPT 504S	Learn Early and Practice (LEAP II)	1.0
IDPT 533S	Core Principles in Biochemistry & Cell Biology	4.0
IDPT 850S	Literature Review Non-Thesis MS	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 517S	Applied Statistics for Biomedical Sciences	2.0
MIIM 606S	Microbiology and Immunology Seminar *	4.0
Advanced Electives		**4.0-6.0**
Select a minimum of four credits of Advanced Electives.		
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 620S	Advanced Omics	
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		**39.0-41.0**

*****

Taken each semester.

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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 517S	Applied Statistics for Biomedical Sciences	2.0
MIIM 600S	Microbiology and Immunology Thesis Research **	18.0
MIIM 606S	Microbiology and Immunology Seminar *	4.0
General Electives		**0.0-8.0**
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 620S	Advanced Omics
MIIM 625S	Advanced Molecular Virology
MIIM 630S	Advanced Molecular Biology
Total Credits	**48.0-56.0**

*****

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/)

Sample Plan of Study (MS)

Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 533S	4.0	IDPT 500S	2.0
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	MIIM 517S	2.0
	11		**9**

Second Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
MIIM 502S	1.0	IDPT 850S	5.0
MIIM 504S	4.0	MIIM 502S	1.0
MIIM 606S	1.0	MIIM 606S	1.0
Advanced Elective I	2.0-3.0	Advanced Elective II	2.0-3.0
	9-10		**10-11**

Total Credits 39-41

Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 504S	4.0	MIIM 513S	3.0
MIIM 508S	3.0	MIIM 517S	2.0
MIIM 512S	2.0	MIIM 606S	1.0
MIIM 606S	1.0	General Electives	0.0-8.0
		MIIM 505S	
		MIIM 506S	
	16		**10-18**

Second 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**

Total Credits 48-56

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Demonstrate and communicate fundamental knowledge obtained through courses, laboratory experience and the scientific literature.
- Design experiments and develop research protocols that leave students equipped for independent performance in a laboratory.
- Perform key experiments and follow research protocols in molecular biology, microbiology and immunology techniques.
- Perform data analysis and interpretation of data in molecular biology, microbiology and immunology techniques.
- Demonstrate and apply the ethical and professional standards of scientific research including truthful presentation of ideas and data.
- Demonstrate written communication skills and record-keeping as evidenced by required paper and laboratory notebooks and preparation of scientific publications.
- Demonstrate oral communication skills as evidenced by Journal Club presentations and presentation of research at local, national and international meetings.
- Compete for job opportunities at biotechnology or pharmaceutical companies or in academic laboratories through development of a curriculum vitae, resume, cover letters, and/or research and teaching statements as evidenced by interviews and securing a position upon completion of the program.

Microbiology & Immunology PhD

Major: Microbiology & Immunology
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Semester
Minimum Required Credits: 126.0
Classification of Instructional Programs (CIP) code: 26.0599
Standard Occupational Classification (SOC) code: 19-1022

About the Program

The Department of Microbiology & Immunology offers students a PhD degree. The program is 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, all driven by investigators with national and international reputations and with extended histories of extramural funding from NIH and other sources. Students are exposed to an integrated curriculum that includes the essentials for biomedical research, as well as emphasizing host-pathogen interactions through a series of molecular pathogenesis courses covering viruses, bacteria, fungi and parasites, as well as immunology. Upon completing these programs, students pursue careers in academic, governmental or industrial settings.

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, visit the College of Medicine's Microbiology & Immunology program (https://drexel.edu/medicine/academics/graduate-school/microbiology-immunology/?_gl=1*1fte8a5*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQzNjMzLjE0LjAuMA..) 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 minimum 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.

Drexel University College of Medicine's Graduate 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 & Immunology program, please visit the Microbiology & Immunology program website (https://drexel.edu/medicine/academics/graduate-school/microbiology-immunology/how-to-apply/?_gl=1*1o8v65a*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQzNjc1LjUyLjAuMA..).

To learn more about applying to Drexel University 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/) website.

Degree Requirements

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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 517S	Applied Statistics for Biomedical Sciences	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 620S	Advanced Omics	
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		**126.0-128.0**

*****

Taken each semester until Thesis Defense

******

Taken each semester starting in Year two until Thesis Defense

Sample Plan of Study

Full-Time Option 126-128

First Year			
Fall	**Credits**	**Spring**	**Credits**
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
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 517S	2.0

		MIIM 606S	1.0
	16		**18**

Second Year

Fall	**Credits**	**Spring**	**Credits**
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 600S	9.0	MIIM 514S	2.0
MIIM 606S	1.0	MIIM 606S	1.0
Advanced Elective	2.0-3.0	MIIM 600S	9.0
		Advanced Elective	2.0-3.0
	13-14		**15-16**

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 126-128

Part-Time Option

Post-Master Credits Required: 39.0

First Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
IDPT 502S	1.0	MIIM 513S	3.0
IDPT 533S	4.0	MIIM 606S	1.0
MIIM 606S	1.0	IDPT 500S	2.0
		IDPT 504S	1.0
	6		**7**

Second Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 508S	3.0	MIIM 504S	4.0
MIIM 512S	2.0	MIIM 517S	2.0
	6		**7**

Third Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MIIM 505S	4.0	MIIM 506S	4.0
Advanced Elective	2.0-3.0	Advanced Elective	2.0-3.0
	6-7		**6-7**

Fourth Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MIIM 514S	2.0	MIIM 600S (*)	5.0
MIIM 600S (*)	5.0	MIIM 502S	1.0
		MIIM 606S	1.0
	7		**7**

Fifth Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 600S (*)	5.0	MIIM 600S (*)	5.0

MIIM 606S	1.0	MIIM 606S	1.0
	7		**7**

Sixth Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MIIM 502S	1.0	MIIM 502S	1.0
MIIM 600S (*)	5.0	MIIM 606S	1.0
MIIM 606S	1.0	MIIM 600S (*)	5.0
	7		**7**

Seventh Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MIIM 502S	1.0	IDPT 600S	9.0
MIIM 606S	1.0		
MIIM 600S (*)	5.0		
	7		**9**

Total Credits 96-98

*****

Program total credits are 126.0 to 128.0
Other program requirements include the Preliminary Examination and Qualifying Examination.
Part-time students may spend approximately 9.5 years in the MIIM PhD program.
Students with a related MS degree may be admitted to the Part-time PhD program with advanced standing. This may reduce the requirements for graduation.
*MIIM Thesis Research is a variable credit course (1-9 credits). A total of 63.0 credits must be earned.

Program Level Outcomes

Upon completion of the program, graduates will be prepared to:

- Have attained functional knowledge of the fields of virology, immunology, bacteriology, mycology and parasitology.
- Have attained a general knowledge of the basic concepts in biochemistry, molecular biology and cell biology.
- Be able to critically read and analyze the current literature within the research field.
- Be able to communicate effectively in science.
- Be able to conduct basic or applied research in microbiology or immunology.
- Understand how to conduct scientific research in a professional and ethical manner.
- Be prepared for a career in the biotechnology or pharmaceutical field.
- Be prepared for advanced training or education in microbiology or immunology.

Molecular & Cell Biology & Genetics MS

Major: Molecular & Cell Biology & Genetics
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 36.0 (MS, non-thesis); 49.0 (MS, thesis);
Classification of Instructional Programs (CIP) code: 26.0210
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The interdisciplinary, research-oriented Molecular & Cell Biology & 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. It offers the opportunity for students to choose from approximately 80 faculty members in 10 different departments/centers to pursue their research interests. The 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.

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 the 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. MS students take the same courses as PhD students, while also gaining extensive biomedical research experience. A minimum of two years of full-time study is required for a master's degree. Students who wish to continue their graduate training after MS degree completion 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.

Additional Information

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

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 & Cell Biology & Genetics program (https://drexel.edu/medicine/academics/graduate-school/molecular-cell-biology-genetics/?_gl=1*9x9j3*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQzOTIxLjguMC4w) website.

Degree Requirements

Thesis Option

49 semester 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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
MCBG 600S	MCBG Thesis Research **	18.0
Statistics Requirement		**2.0**
Select at least one Statistics Course from the following courses for a minimum of two credits.		
BIOC 521S	Introduction to Biochemical Data †	
or CR 520S	Applications of Clinical Research Biostatistics	
or IDPT 501S	Biostatistics I	
or MIIM 517S	Applied Statistics for Biomedical Sciences	
or NEUR 500S	Statistics for Neuro/Pharm Research	
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	
CR 515S	Intro to Clinical Trials	
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 518S	New Frontiers in Therapy	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
PHRM 602S	Research Methods in Pharmacology	
General Electives		
BIOC 513S	Biotechnology Practicum I	
BIOC 514S	Biotechnology Practicum II	
BIOC 515S	Biotechnology Practicum III	
BIOC 516S	Biotechnology Practicum IV	
IDPT 508S	Teaching Practicum II	
IDPT 507S	Teaching Practicum I	
IDPT 509S	Teaching Practicum III	
IDPT 600S	Thesis Defense	
MCBG 502S	MCBG 2nd Lab Rotation ***	
MCBG 503S	MCBG 3rd Lab Rotation	
Total Credits		**49.0**

*****

Taken each semester in the FT program and each semester for the first two years in the PT.

******

Taken each semester starting in the spring semester of year one for FT and spring of year three for PT.

****

Required if the student has not identified a thesis laboratory.

†

If BIOC 521S is taken as a requirement, it cannot be taken as an elective.

Non-Thesis Option

36 semester 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 533S	Core Principles in Biochemistry & Cell Biology	4.0
IDPT 850S	Literature Review Non-Thesis MS	5.0
MCBG 506S	Advanced Cell Biology	2.0
MCBG 512S	MCBG Journal Club *	4.0
MCBG 513S	Molec & Cell Biology Seminar *	4.0
MCBG 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
Statistics Requirement		
Select at least one statistics course from the following courses for a minimum of two credits:		2.0

BIOC 521S	Introduction to Biochemical Data **	
or CR 520S	Applications of Clinical Research Biostatistics	
or IDPT 501S	Biostatistics I	
or MIIM 517S	Applied Statistics for Biomedical Sciences	
or NEUR 500S	Statistics for Neuro/Pharm Research	
Advanced Electives		
Select at least three Advanced Electives for a minimum of nine credits.		9.0
BIOC 508S	Experimental Approaches to Biochemical Problems	
BIOC 511S	Communication for Researchers	
BIOC 513S	Biotechnology Practicum I	
BIOC 514S	Biotechnology Practicum II	
BIOC 515S	Biotechnology Practicum III	
BIOC 516S	Biotechnology Practicum IV	
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	
CR 515S	Intro to Clinical Trials	
MCBG 501S	MCBG 1st Lab Rotation	
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 518S	New Frontiers in Therapy	
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 600S	MCBG Thesis Research	
Total Credits		**36.0**

*****

Taken each semester in the FT program and each semester for the first two years in the PT.

******

If BIOC 521S is taken as a requirement, it cannot be taken as an elective.

Sample Plan of Study

Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
MCBG 501S	4.0	MCBG 506S	2.0
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
MCBG 515S	2.0	Statistics Requirement	2.0

		BIOC 521S, CR 520S, IDPT 501S, MIIM 517S, NEUR 500S, or CR 520S	
		General Electives	0.0-4.0
		MCBG 502S	
	13		**9-13**

Second 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
Advanced Elective	3.0	Advanced Elective	2.0
	14		**13**

Total Credits 49-53

Part-time Thesis Option

First Year (Part-Time)

Fall	Credits	Spring	Credits
IDPT 533S	4.0	IDPT 500S	2.0
MCBG 512S	1.0	MCBG 506S	2.0
MCBG 513S	1.0	MCBG 512S	1.0
		MCBG 513S	1.0
	6		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
MCBG 515S	2.0	Advanced Elective	3.0
	5		**6**

Third Year (Part-Time)

Fall	Credits	Spring	Credits
MCBG 501S	4.0	IDPT 501S, BIOC 521S, CR 520S, MIIM 517S, or NEUR 500S	2.0
Advanced Elective	2.0	MCBG 600S	4.5
	6		**6.5**

Fourth Year (Part-Time)

Fall	Credits	Spring	Credits
MCBG 600S	6.5	MCBG 600S	7.0
	6.5		**7**

Total Credits 49

Part Time students typically spend 4 years in the MCBG MS program (Theis Track). Part-time students must not exceed 8 credits per semester.

Part-time students earn no more than 8.0 credits per semester.

*MCBG Thesis Research is a variable credit course (1-9 credits). A total of 18.0 credits must be earned.

**Select at least one statistics course from the selection (IDPT 501S, BIOC 521S, MIIM 517S, NEUR 500S, or CR 520S)

Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
MCBG 512S	1.0	MCBG 506S	2.0
MCBG 513S	1.0	MCBG 512S	1.0
MCBG 515S	2.0	MCBG 513S	1.0
		Advanced Elective	2.0
	9		**9**

Second Year

Fall	Credits	Spring	Credits
MCBG 512S	1.0	IDPT 850S	5.0
MCBG 513S	1.0	MCBG 512S	1.0
Advanced Elective	7.0	MCBG 513S	1.0
		Statistics Requirement	2.0
		BIOC 512S, CR 520S, IDPT 501S, MIIM 517S, or NEUR 500S	
	9		**9**

Total Credits 36

Part-time Non-Thesis Option

First Year (Part-Time)

Fall	Credits	Spring	Credits
IDPT 533S	4.0	IDPT 500S	2.0
MCBG 512S	1.0	MCBG 506S	2.0
MCBG 513S	1.0	MCBG 512S	1.0
		MCBG 513S	1.0
	6		**6**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
MCBG 515S	2.0	Advanced Elective	3.0
	5		**6**

Third Year (Part-Time)

Fall	Credits	Spring	Credits
Advanced Elective	3.0	IDPT 501S, BIOC 521S, CR 520S, MIIM 517S, or NEUR 500S	2.0
Advanced Elective	3.0	IDPT 850S	5.0
	6		**7**

Total Credits 36

Part Time students typically spend 3 years in the MS PhD program (Non-Thesis track). Part-time students must not exceed 8.0 credits per semester.

Part-time students earn no more than 8.0 credits per semester.

**Select at least one statistics course from the selection (IDPT 501S, BIOC 521S, MIIM 517S, NEUR 500S, or CR 520S)

Molecular & Cell Biology & Genetics PhD

Major: Molecular & Cell Biology & Genetics
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Semester
Minimum Required Credits: 123.0
Classification of Instructional Programs (CIP) code: 26.0210
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The interdisciplinary, research-oriented Molecular & Cell Biology & Genetics program offers a PhD degree. 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 80 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.

This program is research focused, with the ultimate goal of training students to become leaders of scientific research in academics and industry. The PhD candidates must pass a qualifying examination by November 1 of their third year. During the course of the program, the PhD candidates must

also submit at least one manuscript and prepare a second manuscript for publication. The average amount of time required to complete the PhD requirements is five years.

Additional Information

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

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 & Cell Biology & Genetics program (https://drexel.edu/medicine/academics/graduate-school/molecular-cell-biology-genetics/?_gl=1*1224xx2*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQ0MjUyLjIyLjAuMA..) website.

Degree Requirements

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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 515S	Techniques in Molecular & Cell Biology & Genetics	2.0
MCBG 600S	MCBG Thesis Research **	63.0
Statistics Requirement		**2.0**
Select at least one statistics course from the following courses for a minimum of two credits:		
BIOC 521S	Introduction to Biochemical Data	
or CR 520S	Applications of Clinical Research Biostatistics	
or IDPT 501S	Biostatistics I	
or MIIM 517S	Applied Statistics for Biomedical Sciences	
or NEUR 500S	Statistics for Neuro/Pharm Research	
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
CR 515S	Intro to Clinical Trials
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 518S	New Frontiers in Therapy
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	**123.0**

*****

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.

****

If BIOC 521S is taken as a requirement, it cannot be taken as an elective.

Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
MCBG 501S	4.0	MCBG 502S	4.0
MCBG 512S	1.0	MCBG 503S	4.0
MCBG 513S	1.0	MCBG 506S	2.0
MCBG 515S	2.0	MCBG 512S	1.0
		MCBG 513S	1.0
		Statistics Requirement	2.0
		BIOC 521S, CR 520S, IDPT 501S, MIIM 517S, or NEUR 500S	
	13		**17**

Second Year

Fall	Credits	Spring	Credits
MCBG 512S	1.0	MCBG 600S	9.0
MCBG 513S	1.0	MCBG 512S	1.0
MCBG 600S	9.0	MCBG 513S	1.0
Advanced Elective	5.0	Advanced Elective	2.0
	16		**13**

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 123

Ph.D. Program Part-time Option

Post-Master Credit needed for Program: 39 Credits

First Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
IDPT 533S	4.0	MCBG 506S	2.0
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
		IDPT 500S	2.0
	6		**6**

Second Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
IDPT 502S	1.0	MCBG 502S	4.0
MCBG 501S	4.0	IDPT 504S	1.0
MCBG 515S	2.0	BIOC 521S, IDPT 501S, MIIM 517S, NEUR 500S, or CR 520S (**)	2.0
	7		**7**

Third Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MCBG 503S	4.0	MCBG 600S (*)	5.0
MCBG 512S	1.0		
MCBG 513S	1.0		
	6		**5**

Fourth Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MCBG 600S (*)	5.0	MCBG 600S (*)	5.0
MCBG 512S	1.0	Advanced Elective	2.0
MCBG 513S	1.0		
	7		**7**

Fifth Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MCBG 600S (*)	5.0	MCBG 600S (*)	5.0
MCBG 512S	1.0	Advanced Elective	2.0
MCBG 513S	1.0		
	7		**7**

Sixth Year (Part-Time)

Fall	**Credits**	**Spring**	**Credits**
MCBG 600S (*)	5.0	MCBG 600S (*)	5.0
MCBG 512S	1.0	MCBG 512S	1.0
MCBG 513S	1.0	MCBG 513S	1.0
	7		**7**

Seventh Year (Part-Time)			
Fall	**Credits**	**Spring**	**Credits**
MCBG 600S (*)	5.0	IDPT 600S	9.0
MCBG 512S	1.0		
MCBG 513S	1.0		
	7		**9**

Total Credits 95

*****

Other program requirements include the Preliminary Examination and the Qualifying Examination.
Part-time students may spend approximately 9 years in the MCBG PhD program.
Part-time students earn no more than 8.0 credits per semester.
Students with a related MS degree may be admitted to the Part-time MCBG PhD program with advanced standing. This may reduce the requirements for graduation.
*MCBG Thesis Research is a variable credit course (1-9 credits). A total of 63.0 credits must be earned.

******

**Select at least one statistics course from the selection (IDPT 501S, BIOC 521S, MIIM 517S, NEUR 500S, or CR 520S)

Program Level Outcomes

- Be prepared to acquire independent and competitive careers in scientific research.
- Have the skills to function on and lead interdisciplinary and multidisciplinary teams.
- Be able to use and apply state-of-the-art techniques to conduct independent and collaborative scientific investigations.
- Have the ability to independently and broadly explore the scientific literature and develop novel hypotheses based upon the existing knowledge base.
- Have the ability to combine the existing scientific knowledge and the results of their own scientific investigations to develop novel avenues of research.
- Be able to identify problems and troubleshoot in scientific investigations.
- Have a broad education in biomedical sciences so as to understand the impact of scientific investigations on human society.
- Be able to effectively communicate science, in written and oral formats, with a wide range of audiences including both scientists and non-scientists.
- Understand and abide by ethical and professional standards of the field.

Molecular Basis of Cancer MS

Major: Molecular Basis of Cancer
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 36.0
Classification of Instructional Programs (CIP) code: 26.0911
Standard Occupational Classification (SOC) code: 19-1042

About the Program

The Master of Science in Molecular Basis of Cancer aims to provide students with in-depth understanding of academic and practical knowledge in basic and translational cancer research, with emphasis in molecular targets and therapeutics. This program is designed to help students establish or advance their career within the pharmaceutical and biotechnology industry. The specialized focus of the degree will be on research and development relevant to new diagnostics, therapeutics and treatment of cancers of various etiologies. After establishing foundational knowledge in molecular and cellular cancer biology, special attention will be given to topics including therapeutic and target identification, drug discovery and development, mechanisms of tumor growth and metastasis, and the processes by which tumors evade therapeutic interventions during the course of treatment.

It should be noted that this program is “stackable” with the Post-baccalaureate Certificate Program in Molecular Basis of Cancer (p. 123) (CMCA) and all completed courses in the certificate program can be applied toward the MS degree.

The MS in Molecular Basis of Cancer is available to individuals who have already obtained a BS or BA degree in the life, physical or health sciences and wish to pursue industry-focused training. This includes individuals who wish to have a broader base of information about cancer biology and research, those who may wish to transition into the industry or those who have recently transitioned into the industry.

In general, the MS in Molecular Basis of Cancer will encompass three years of required and elective graduate courses. The successful completion of the MS degree in the program will be determined by grades obtained in the interactive online courses and participation in virtual journal clubs. A total of 36 semester credits is required to complete the program. The program is designed to prepare students for careers in cancer biology basic science, translational and clinical research in government, industry and academic environments.

Additional Information

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

Jessica Chen, PhD
jc4632@drexel.edu

Admission Requirements

For acceptance to the Master of Science Program in Molecular Basis of Cancer, the applicant must have completed a four-year, biology or chemistry-based BA/BS degree program with a preferred GPA of at least 3.0. All students must submit three confidential letters of recommendation, a personal statement explaining their interest in the program, a current resume or curriculum vitae, 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.

Degree Requirements

Required Courses		
MCAN 521S	Advanced Molecular Mechanisms of Cancer	2.0
CMCA 500S	Foundations in Bioscience 1	3.0
CMCA 501S	Foundations in Bioscience 2	3.0
CMCA 510S	Introduction to Cancer Biology	2.0
CMCA 520S	Molecular Basis of Cancer	3.0
CR 520S	Applications of Clinical Research Biostatistics *	2.0-3.0
or MIIM 517S	Applied Statistics for Biomedical Sciences	
CR 612S	Fundamentals of Compliance *	2.0-3.0
or MIIM 503S	Biomedical Ethics	
Elective Courses *		**19.0-17.0**
CMCA 551S	Control of the Cell Cycle and Cell Death	
CMCA 552S	Experimental Approaches in Cancer Research	
CMCA T580S	Special Topics in the Molecular Basis of Cancer	
MCAN 553S	Biochemistry of Cancer Therapeutics Discovery	
MCAN 554S	Current Topics in Cell Biology	
MCAN 560S	Practicum in Molecular Basis of Cancer	
MCAN T580S	Special Topics in Cancer Therapeutics	
MIIM 521S	Biotechniques I: Molecular and Genomic Methods	
MIIM 522S	Biotechniques II: Immunological Methods	
MIIM 527S	Immunology, Immunopathology and Infectious Diseases	
MIIM 545S	Introduction to Infectious Diseases	
MIIM 654S	Clinical Correlations in Immunology	
MIIM 655S	Emerging Biomedical Interventions for Human Disease	
MLAS 529S	Molecular Genetics	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
Total Credits		**36.0**

*****

If student takes a 2 credit class, they must add elective credits to their plan in order to reach 36 credit minimum for degree. Students may need to add up to 2 credits total to free electives.

Sample Plans of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
CMCA 500S	3.0	CMCA 501S	3.0
CR 612S*	3.0	CMCA 510S	2.0
	6		**5**
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CMCA 520S	3.0	Electives	6.0
Electives	4.0		
	7		**6**

Third Year

Fall	Credits	Spring	Credits
CR 520S*	3.0	MCAN 521S	2.0
Electives	3.0	Electives	4.0
	6		**6**

Total Credits 36

*****

If a student takes MIIM 517S (2 credit), they must add 1 elective credit to their plan. If a student takesMIIM 503S (2 credits), they must add 1 elective credit to their plan. In order to reach the 36 credit minimum for this degree, students may need to add up to 2 credits total to free electives.

First Year

	Spring	Credits
	CMCA 500S	3.0
	CMCA 510S	2.0
		5

Second Year

Fall	Credits	Spring	Credits
CMCA 501S	3.0	Electives	6.0
CR 612S*	3.0		
	6		**6**

Third Year

Fall	Credits	Spring	Credits
CMCA 520S	3.0	MCAN 521S	2.0
Electives	4.0	Electives	4.0
	7		**6**

Fourth Year

Fall	Credits
CR 520S*	3.0
Electives	3.0
	6

Total Credits 36

*****

If a student takesMIIM 517S (2 credit), they must add 1 elective credit to their plan. If a student takesMIIM 503S (2 credits), they must add 1 elective credit to their plan. In order to reach the 36 credit minimum for this degree, students may need to add up to 2 credits total to free electives.

Molecular Medicine MS

Major: Molecular Medicine
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 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 & Immunology and by the Institute for Molecular Medicine & 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, and for higher professional degree programs, such as medical, veterinary and physicians' assistant schools.

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. It is available in both traditional on-campus and online formats.

Curriculum

The 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. Although the research component is an elective, students may choose to undertake 6.0 research credits toward completion of the degree program.

The experiential research component of the curriculum, if chosen, 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- to 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 less intensive experience spanning two semesters, or conduct an independent research project, with the approval and supervision of program directors. If a research project is not available, students may choose to prepare a detailed review of the literature in their chosen field of interest.

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

For the traditional on-campus format, classes can be attended at Drexel University College of Medicine's locations in Center City or Queen Lane 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. Classes may be designed as hybrid courses, using a combination of online and traditional in-class learning materials. The program may also be completed in a fully online format. 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) may 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, recommendation letters, and relevant research or professional experiences.

Online applications are considered year-round. Potential students are encouraged to apply no later than July 20 for fall admission or December 7 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 Master 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 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.		12.0
MIIM 520S	Science Communication and Outreach	
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 555S	Molecular Mechanisms of Microbial Pathogenesis	
MIIM 613S	Emerging Infectious Diseases	
MIIM 621S	Biomedical Research I	
MIIM 622S	Biomedical Research II	
MIIM 625S	Advanced Molecular Virology	
MIIM 650S	Research Internship in Molecular Medicine	
MIIM 655S	Emerging Biomedical Interventions for Human Disease	
MLAS 529S	Molecular Genetics	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
Choose at least two of the following:		4.0
MIIM 540S	Viruses and Viral Infections	
MIIM 541S	Bacteria and Bacterial Infections	
MIIM 542S	Mycology and Fungal Infections	
MIIM 543S	Parasitology and Parasitic Diseases	
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/institutionalresearch/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 MS

Major: Neuroscience
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 41.0 (MS, non-thesis); 55.0 (MS, thesis);
Classification of Instructional Programs (CIP) code: 26.1501
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The Graduate School of Biomedical Sciences and Professional Studies within the College of Medicine offers an interdepartmental and multidisciplinary Master of Science program in Neuroscience. The program provides a vibrant research component 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, injury and disease of the nervous system. Upon completing these programs, students pursue careers in academic research, teaching, pharmaceutical research, industry, government, academic administration, public policy and beyond.

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.

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 neuroengineering,) and behavioral neuroscience are encouraged to apply. There are no minimum 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 for the program and/or potential projects in relevant laboratories.

The Drexel University College of Medicine Graduate 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 University 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 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.

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
IDPT 850S	Literature Review Non-Thesis MS	5.0
NEUR 500S	Statistics for Neuro/Pharm Research	2.0
NEUR 501S	Neuroscience 1st Lab Rotation	4.0
NEUR 508S	Graduate Neuroscience I	2.0
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	2.0
NEUR 610S	Graduate Neuroscience III	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
Required Electives		**1.0-4.0**
Select one of the following electives:		
NEUR 611S	Advanced Neuroscience	
NEUR 634S	Motor Systems	

Suggested Electives		
MCBG 506S	Advanced Cell Biology	
Total Credits		**41.0-44.0**

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 502S	Neuroscience 2nd Lab Rotation	4.0
NEUR 503S	Neuroscience 3rd Lab Rotation	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.

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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	2.0
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	2.0
NEUR 610S	Graduate Neuroscience III	4.0
Required Electives		**1.0-4.0**
Select at least one of the following Advanced Electives		
NEUR 611S	Advanced Neuroscience	
or NEUR 634S	Motor Systems	
Total Credits		**55.0-58.0**

*

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 503S	Neuroscience 3rd Lab Rotation	4.0
PHRM 507S	Prin of Neuropharmacology	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

*

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.

Sample Plan of Study Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 533S	4.0	NEUR 602S	6.0
NEUR 501S	4.0	NEUR 609S	2.0
NEUR 508S	2.0		
	11		**9**

Second Year

Fall	Credits	Spring	Credits
NEUR 500S	2.0	IDPT 500S	2.0
NEUR 520S	2.0	NEUR 521S	2.0
NEUR 610S	4.0	IDPT 850S	5.0
PHRM 507S	3.0	NEUR 611S or 634S	1.0-4.0
Suggested Elective			
	11		**10-13**

Total Credits 41-44

Sample Plan of Study Thesis

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 533S	4.0	NEUR 502S	4.0
NEUR 501S	4.0	NEUR 602S	6.0
NEUR 508S	2.0	NEUR 609S	2.0
	11		**13**

Second Year

Fall	Credits	Spring	Credits
NEUR 500S	2.0	IDPT 500S	2.0
NEUR 520S	2.0	NEUR 521S	2.0
NEUR 600S	9.0	NEUR 600S	9.0
NEUR 610S	4.0	NEUR 611S or 634S	1.0-4.0
	17		**14-17**

Total Credits 55-58

Program Level Outcomes

- Have a basic multidisciplinary knowledge of developmental, cellular, behavioral and systems neuroscience.
- Demonstrate skills in conducting primary research in the neuroscience, including experimental design, conduct of experiments, interpretation of data and presentation of results.
- Participate in scientific meetings and other discussant-oriented endeavors.
- Have gained insight and commitment into the ethics of biomedical research as it applies to the neurosciences.
- Have a thorough knowledge of the scientific literature that relates to their specific research projects, as well as skills in how to effectively use the scientific literature to achieve future goals.
- Have a basic knowledge of nervous system disorders such as traumatic injury, developmental and psychiatric diseases, and addiction.

Neuroscience PhD

Major: Neuroscience
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Semester
Minimum Required Credits: 119
Classification of Instructional Programs (CIP) code: 26.1501
Standard Occupational Classification (SOC) code: 11-9121

About the Program

The Graduate School of Biomedical Sciences and Professional Studies within the College of Medicine offers an interdepartmental and multidisciplinary graduate program in Neuroscience leading to a PhD degree. The program provides a vibrant research component 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, injury and disease of the nervous system. Upon completing these programs, students pursue careers in academic research, teaching, pharmaceutical research, industry, government, academic administration, public policy and beyond.

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.

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.

Program Requirements

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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	2.0
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	2.0
NEUR 610S	Graduate Neuroscience III	4.0
Advanced Electives		**1.0-4.0**
Select at least one of the following Advanced Electives		
NEUR 611S	Advanced Neuroscience	
or NEUR 634S	Motor Systems	
Suggested Electives		
MCBG 506S	Advanced Cell Biology	
NEUR 503S	Neuroscience 3rd Lab Rotation	
PHRM 507S	Prin of Neuropharmacology	
IDPT 507S	Teaching Practicum I	
IDPT 508S	Teaching Practicum II	
IDPT 509S	Teaching Practicum III	
Total Credits		**119.0-122.0**

* Taken each Fall from Year 2 until Year 5
** Taken each Spring from Year 2 until Year 4
*** Taken each semester starting the Second Year, until Thesis Defense

Sample Plan of Study

First Year				
Fall	**Credits**	**Spring**		**Credits**
IDPT 502S	1.0	IDPT 504S		1.0
IDPT 533S	4.0	NEUR 502S		4.0
NEUR 501S	4.0	NEUR 602S		6.0
NEUR 508S	2.0	NEUR 609S		2.0
	11			**13**
Second Year				
Fall	**Credits**	**Spring**		**Credits**
NEUR 500S	2.0	IDPT 500S		2.0
NEUR 520S	2.0	NEUR 521S		2.0
NEUR 600S	9.0	NEUR 600S		9.0
NEUR 610S	4.0	Advanced Elective		
		NEUR 611S or 634S		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 119-122

Pathologists’ Assistant MS

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

About the Program

The Graduate School of Biomedical Sciences and Professional Studies offers the Master of Science in Pathologists' Assistant (PathA) program. A pathologists' assistant is an intensely trained allied health professional who provides anatomic pathology services under the direction and supervision of a pathologist. Pathologists' assistants interact with pathologists in the same manner that physicians' assistants carry out their duties under the direction of physicians in surgical and medical practice.

The PathA program at Drexel University College of Medicine offers traditional and nontraditional students the opportunity to train in the highly specialized field of anatomic pathology and earn a Master of Science degree. The two-year, full-time program begins in May of each year. The first year is the didactic portion of the program, supplemented by laboratory exposure. The second year is the clinical education portion of the program, composed of several hospital-based rotations offering progressively responsible experience in autopsy pathology, forensic pathology, pediatric pathology and surgical pathology. These rotations are supplemented with informal classroom education and examinations conducted monthly at the University.

Program Accreditation

The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS): NAACLS, in conjunction with the American Association of Pathologist' Assistants, has established national standards for pathologists' assistant educational 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 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): The ASCP BOC, in conjunction with the American Association of Pathologist' Assistants, 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 was founded in 1972 as a not-for-profit volunteer organization of allied health practitioners dedicated to the advocacy and advancement of the pathologists' assistant profession. The AAPA advocates, promotes and sustains the highest education and professional standards for the profession, for all associated educational training programs and for individual pathologists' assistants. It is the mission of the AAPA to provide their members with high-quality, targeted continuing education (CE) opportunities, as well as professional development and leadership activities to include networking and support. Additionally, the AAPA strives to promote and support high quality standards within the scope of practice for pathologists' assistants in anatomic pathology, ensuring the provision of high-quality patient care.

- **VISION: The AAPA will be the premier professional association for pathologists' assistants, supporting the individual practitioners as they serve patients, pathologists, and the profession.**
- **MISSION STATEMENT: The AAPA is dedicated to providing comprehensive professional support for pathologists' assistants.**
- **CORE VALUES: Quality Patient Care, Education, Advocacy, Collaboration.**

Visit the AAPA **(**https://www.pathassist.org/**) website for 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 web page.

Contact Information

James W. Moore, MHS, PA(ASCP)[CM]
Assistant Professor/Program Director
Graduate School of Biomedical Sciences and Professional Studies
60 N. 36th Street, Room 10W35
Health Sciences Building
Philadelphia, PA 19104
267.359.2327
jwm44@drexel.edu

Kelly M. Lozier, MS, PA(ASCP)[CM]
Clinical Faculty and Clinical Coordinator
Graduate School of Biomedical Sciences and Professional Studies
60 N. 36th Street, Room 10W32
Health Sciences Building
Philadelphia, PA 19104
267.359.2536
kmm599@drexel.edu

Pathologists' Assistant (PathA) Program
Division of Interdisciplinary and Career-Oriented Programs
60 N. 36th Street
Health Sciences Building
Philadelphia, PA 19104
267.359.2761
CoM_career-oriented@drexel.edu

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. Lab-based science courses are required.

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

See the Pathologists' Assistant *How to Apply* web page for detailed instructions.

For further information, contact:

Pathologists' Assistant (PathA) Program
Division of Interdisciplinary and Career-oriented Programs
60 N. 36th Street
Health Sciences Building
Philadelphia, PA 19104
267.359.2761
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

Program Level Outcomes

- Demonstrate the ability to prepare, describe and dissect human tissue surgical specimens including appropriate specimen accessioning, describing gross anatomic features, preparing tissues for histologic processing and photographing all pertinent gross findings.
- Demonstrate the ability to perform duties relating to the administrative maintenance of surgical pathology protocols, reports and data, and assuring the completion of specimen coding and billing.
- Demonstrate laboratory maintenance skills including assuring proper maintenance of equipment, provision of adequate supplies and cleanliness of the surgical pathology suite.
- Demonstrate knowledge of the procedures associated with the preparation of human postmortem examinations including ascertaining proper legal authorization for autopsy, retrieving the patient's medical chart and other pertinent data for review with the attending pathologist(s); and coordinating any requests for special specimen sampling.
- Demonstrate the ability to perform postmortem examinations, which may include: external examination, in situ organ inspection, evisceration, dissection, and dictation or recording of data, as well as selecting, preparing and submitting appropriate gross tissue sections for analysis.
- Demonstrate the ability to maintain anatomic pathology protocols, photographic and microscopic slides, and complete coding of samples.
- Demonstrate the ability to perform basic administrative, budgetary, supervisory and teaching duties.

Pharmacology & Physiology MS

Major: Pharmacology & Physiology
Degree Awarded: Master of Science (MS)
Calendar Type: Semester
Minimum Required Credits: 39.0 (MS, non-thesis); 55.0 (MS, thesis);
Classification of Instructional Programs (CIP) code: 26.1002
Standard Occupational Classification (SOC) code: 19-1042

About the Program

The College of Medicine's Graduate School of Biomedical Sciences and Professional Studies offers a Master of Science degree in Pharmacology & Physiology. The program requires 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 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.

The MS program, requiring two years of full-time study, provides 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 completion 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.

Additional Information

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

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

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 & Physiology program (https://drexel.edu/medicine/academics/graduate-school/pharmacology-physiology/?_gl=1*1s735cf*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQ0NjI5LjguMC4w) web page.

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
IDPT 850S	Literature Review Non-Thesis MS	5.0
PHRM 502S	Current Topics in Pharmacology & Physiology *	4.0
PHRM 507S	Prin of Neuropharmacology	3.0
PHRM 512S	Graduate Pharmacology	3.0
PHRM 517S	Advanced Topics in Pharmacology	1.0
PHGY 503S	Graduate Physiology	4.0
Advanced Electives		
Select at least three Advanced Electives		9.0
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
Total Credits	**39.0**

*

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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 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	**55.0**

*****

Taken each semester.

******

Taken each semester starting in the second year.

Sample Plan of Study

Non-Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
PHGY 503S	4.0	PHRM 502S	1.0
PHRM 502S	1.0	PHRM 512S	3.0
		PHRM 517S	1.0
		Advanced Elective	3.0
	10		**11**

Second Year

Fall	Credits	Spring	Credits
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 507S	3.0	IDPT 850S	5.0
IDPT 501S or NEUR 500S	2.0	Advanced Elective	3.0
Advanced Elective	3.0		
	9		**9**

Total Credits 39

Thesis Option

First Year

Fall	Credits	Spring	Credits
IDPT 502S	1.0	IDPT 500S	2.0
IDPT 533S	4.0	IDPT 504S	1.0
PHGY 503S	4.0	PHRM 502S	1.0
PHRM 502S	1.0	PHRM 504S	4.0
PHRM 503S	4.0	PHRM 512S	3.0
		PHRM 517S	1.0
	14		**12**

Second Year

Fall	Credits	Spring	Credits
IDPT 501S or NEUR 500S	2.0	PHRM 502S	1.0
PHRM 502S	1.0	PHRM 600S	9.0
PHRM 507S	3.0	Advanced Elective	2.0
PHRM 600S	9.0		
Advanced Elective	2.0		
	17		**12**

Total Credits 55

Program Level Outcomes

- Identify and describe fundamental concepts in pharmacology and physiology.
- Design and perform hypothesis-driven research that applies concepts in pharmacology, physiology and drug discovery and discuss its translational impact.
- Communicate scientific concepts and data from the literature as well as their own research to a broad range of audiences.
- Critically analyze and evaluate scientific literature regarding the broad range of subject areas associated with pharmacology.
- Work effectively and collegially in collaborations as well as independently in the execution of research projects and associated analysis of scientific data.
- Conduct themselves with maturity and integrity in professional endeavors and demonstrate an understanding of ethical standards in science such as appropriate attribution of ideas and truthful presentation of data and conclusions.

Pharmacology & Physiology PhD

Major: Pharmacology & Physiology
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Semester
Minimum Required Credits: 121.0
Classification of Instructional Programs (CIP) code: 26.1002
Standard Occupational Classification (SOC) code: 19-1042

About the Program

The College of Medicine's Graduate School of Biomedical Sciences and Professional Studies offers a PhD degree in Pharmacology & Physiology. The program requires 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 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. The program requires the defense of a thesis based on original research.

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, visit the College of Medicine's Pharmacology & Physiology (https://drexel.edu/medicine/academics/graduate-school/pharmacology-physiology/?_gl=1*1tz9m3k*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQ0Mzg0LjYwLjAuMA..) program website.

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

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 & Physiology (https://drexel.edu/medicine/academics/graduate-school/pharmacology-physiology/?_gl=1*1afjbao*_ga*OTEwNTAxODM1LjE2NjQ0NjE3MzI.*_ga_6KJ1PNLE19*MTY4NTYzODE1Ny42MzUuMS4xNjg1NjQ0NDczLjQwLjAuMA..) program webpage.

Program Requirements

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 533S	Core Principles in Biochemistry & Cell Biology	4.0
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 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		**121.0-130.0**

*

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
IDPT 502S	1.0	IDPT 504S	1.0
IDPT 533S	4.0	PHRM 502S	1.0
PHGY 503S	4.0	PHRM 504S	4.0
PHRM 502S	1.0	PHRM 505S	4.0
PHRM 503S	4.0	PHRM 512S	3.0
		PHRM 517S	1.0
	14		**14**

Second Year

Fall	Credits	Spring	Credits
IDPT 501S or NEUR 500S	2.0	IDPT 500S	2.0
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 507S	3.0	PHRM 600S	9.0
PHRM 600S	9.0	Electives	2.0
Electives	2.0		
	17		**14**

Third Year

Fall	Credits	Spring	Credits
IDPT 507S	1.0-4.0	IDPT 508S	1.0-4.0
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 600S	9.0	PHRM 600S	9.0
	11-14		**11-14**

Fourth Year

Fall	Credits	Spring	Credits
PHRM 502S	1.0	PHRM 502S	1.0
PHRM 600S	9.0	PHRM 600S	9.0
IDPT 509S	1.0-4.0		
	11-14		**10**

Fifth Year

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

Total Credits 121-130

Program Level Outcomes

- Identify and describe fundamental concepts in pharmacology and physiology.
- Design and perform hypothesis driven research that applies concepts in pharmacology, physiology, and drug discovery and discuss its translational impact.
- Communicate scientific concepts and data from the literature as well as their own research to a broad range of audiences.
- Critically analyze and evaluate scientific literature regarding the broad range of subject areas associated with pharmacology.
- Work effectively and collegially in collaborations as well as independently in the execution of research projects and associated analysis of scientific data.
- Conduct themselves with maturity and integrity in professional endeavors and demonstrate an understanding of ethical standards in science such as appropriate attribution of ideas and truthful presentation of data and conclusions.

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.

For more information, please visit the Graduate Minors (https://www.online.drexel.edu/online-degrees/graduate-minors.aspx) web page.

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.

Additional Information

For more information about this program, visit the Drug Discovery and Development (https://drexel.edu/medicine/academics/graduate-school/drug-discovery-development/) program web page.

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.

Graduate Minor in Pre-veterinary

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. 71). 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	
MSPA 520S	Medical Terminology	
MSPA 580S	Medical Microbiology I	
MSPP 511S	Concepts in Biochemistry and Cell Biology	
PHGY 503S	Graduate Physiology	

PHRM 512S	Graduate Pharmacology	
Total Credits		**9.0**

Post-Baccalaureate 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 toward 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, 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

Robert Sterling, PhD
Director, Graduate Programs in Clinical Research
rcs336@drexel.edu
267.359.2310

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
CR 639S	Healthcare Inequities in Biomedical Research
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
CR 573S	Patient Generated Data in Clinical Research
Biostatistics and Data Management	
CR 500S	Epidemiology
CR 520S	Applications of Clinical Research Biostatistics
CR 527S	Clinical Data Management
CR 571S	Health Information Technology in Biomedical R&D
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
CR 637S	Risk Management in Clinical Research
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

Post-Baccalaureate 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 only allows for federal financial aid (including Federal Direct Student Loans) for terms that are 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 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 toward a Master of Science 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 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 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 for the program, and all qualifications, including professional experience, will be taken into consideration.

For additional information, please visit the Drug Discovery and Development certificate (https://drexel.edu/medicine/academics/graduate-school/drug-discovery-development/certificate-in-drug-discovery-and-development/) website.

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

Post-Baccalaureate Certificate in Fundamental Concepts in Infectious Disease

Certificate Level: Graduate
Admission Requirements: Bachelor's degree or higher
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 10.0
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: 26.0508
Standard Occupational Classification (SOC) Code: 19-1022, 19-1029

About the Program

This 10-credit, part-time, online certificate program provides an academic credential for individuals seeking to gain critical thinking and problem-solving skills to explore human pathogens and the molecular mechanisms they use to cause disease. The program is ideal for individuals seeking foundational coursework in aspects of basic, translational and clinical infectious disease research, but who do not have the time and/or need for more in-depth course offerings provided by the advanced certificate in Translational Research in Infectious Disease (https://catalog.drexel.edu/graduate/schoolofbiomedicalsciences/translationalresearchinfectiousdiseasepbc/)or the MS in Infectious Disease. (p. 62)

Those who successfully complete the certificate program and wish to broaden their infectious disease education may apply the certificate credits toward an online MS in Infectious Disease (p. 62).

Admission Requirements

A completed four-year bachelor's degree in biology, biochemistry, cell biology, microbiology, immunology or a related field (no marine biology, botany or environmental science degrees). Previous coursework in the areas of cell biology and/or molecular biology or equivalent knowledge (as determined by the program director when students apply) is required.

Applicants must have strong academic writing and reading skills.

Required documents:

- Official transcripts of all undergraduate and graduate schools attended. A minimum cumulative grade point average (GPA) of 3.0 is strongly preferred.
- A one-page essay explaining past successes, why the certificate is being pursued, what the applicant will contribute to the program and how the skills gained will further their career goals. If the applicant's GPA is below 3.0, an additional 500-word explanation should be added to the essay, describing any factors that resulted in the GPA.
- Two letters of support describing the applicant's competencies for graduate work; at least one academic letter of support is preferred. Professional references are accepted from supervisors but not colleagues or friends.
- A current curriculum vitae (CV) or resume.
- No GRE requirement. 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, all applicants whose primary language is not English or whose undergraduate degree is from a college or university outside of the United States are required to submit official Test of English as a Foreign Language (TOEFL) scores or International English Language Testing System (IELTS) scores.

- TOEFL score needs to be at least 90 with at least a 27 in both the reading and writing sections.
- IELTS score should be 7.5 or higher.

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 programs. Foreign applicants should check with their visa sponsors for eligibility. Drexel University cannot sponsor F-1 or J-1 visas for individuals interested in online, hybrid or part-time programs.

The completed certificate may be used to fulfill degree requirements of the Master of Science in Infectious Disease (p. 62). Acceptance into the certificate program does not automatically guarantee acceptance into the Master of Science in Infectious Disease program.

Online applications are accepted year-round for consideration for fall admission.

Program Requirements

Required Courses		
MIIM 527S	Immunology, Immunopathology and Infectious Diseases	3.0
MIIM 545S	Introduction to Infectious Diseases	4.0
MIIM 653S	Clinical Correlations in Infectious Disease	3.0
Total Credits		**10.0**

Sample Plan of Study

First Year (Part-Time)			
Fall	**Credits**	**Spring**	**Credits**
MIIM 527S	3.0	MIIM 545S	4.0
	3		**4**
Second Year (Part-Time)			
Fall	**Credits**		
MIIM 653S	3.0		
	3		

Total Credits 10

Additional Information:

For questions about the curriculum and program goals, please contact the program director, Fred Krebs, PhD, at fck23@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 (https://drexel.edu/drexelcentral/).

Certificate in Human Lactation Consultant

Certificate Level: Undergraduate
Admission Requirements: Associate's degree or equivalent
Certificate Type: Certificate
Number of Credits to Completion: 16.0
Instructional Delivery: Campus
Calendar Type: Semester
Expected Time to Completion: 1 year
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 51.0815
Standard Occupational Classification (SOC) Code: 31-9099

About the Program

The Human Lactation Consultant program is designed to provide an opportunity for individuals interested in becoming Internationally Board Certi#ed Lactation Consultants (IBCLCs) to obtain the required 90 hours of didactic coursework and 300 hours of supervised practice to be eligible to sit for the certi#cation exam. The courses are designed for current Drexel students, practicing health care and public health professionals outside of Drexel, and others interested in entering the health professions. There is currently a strong global and national emphasis on increasing breastfeeding to promote health at the population level, prevent acute and chronic illness and decrease societal health care costs. The United States Surgeon General, the Centers for Disease Control and Prevention, Healthy People 2020, the Institutes of Medicine, the Joint Commission, Michelle Obama’s Let’s Move Campaign and many professional associations include breastfeeding as a key health strategy.

The certi#cate program consists of four 2-credit didactic courses in lactation and two 4-credit supervised practice classes. The didactic coursework is offered in the classroom setting. The supervised practice is offered in clinical hospital and outpatient sites, as well as area WIC offices affiliated with Drexel.

Students who wish to become IBCLCs must complete all six courses. To be eligible to take the certifying exam given by the International Board of Lactation Consultant Examiners, they must have also completed coursework including anatomy and physiology, biology, child growth and development, nutrition and psychology, which may be taken at Drexel or other institutions. Drexel has accreditation as a Pathway 2 Program with the Lactation Education Accreditation and Approval Review Committee.

Admission Requirements

Applicants must have a minimum of an associate’s degree or equivalent.

The International Board of Lactation Consultant Examiners requires education in 14 health science subjects in addition to education provided in human lactation and breastfeeding during the certi#cate program. Health sciences courses may be completed either prior to enrolling in the certi#cate program, or while enrolled in the certi#cate program. All sciences courses must be completed before the Certi#cate in Human Lactation Consultant will be awarded.

A minimum of one quarter, term or semester of each of the following academic subjects must be completed at an accredited college or university:

- Biology
- Human anatomy/human physiology
- Infant and child growth and development
- Introduction to clinical research
- Nutrition
- Psychology, counseling skills OR communication skills
- Sociology, cultural sensitivity OR cultural anthropology

The remaining six subjects may be completed at an accredited college or university, OR through continuing education courses:

- Basic life support
- Medical documentation
- Medical terminology
- Occupational safety and security for health professionals
- Professional ethics for health professionals
- Universal safety precautions and infection control

A detailed description of acceptable coursework to ful#ll these requirements is available on the International Board of Lactation Consultant Examiners (https://iblce.org/step-1-prepare-for-ibclc-certification/) website.

Program Requirements

Required Courses		
CHLC 205S	Introduction to Human Lactation	2.0
CHLC 305S	Clinical Issues in Human Lactation I	2.0
CHLC 355S	Clinical Issues in Human Lactation II	2.0
CHLC 405S	Public Policy of Breastfeeding	2.0
CHLC 485S	Clinical Internship in Lactation for Pathway 2 (taken 2 times)	8.0
Total Credits		**16.0**

Sample Plan of Study

Part-time Sample Plan of Study

First Year

Fall	Credits	Spring	Credits
CHLC 205S	2.0	CHLC 355S	2.0
CHLC 305S	2.0	CHLC 405S	2.0
CHLC 485S	4.0	CHLC 485S	4.0
	8		**8**

Total Credits 16

Additional Information

For more information about this certificate, please visit the Human Lactation Consultant Certificate (https://drexel.edu/medicine/academics/graduate-school/human-lactation-consultant-certification/) web page.

Post-Baccalaureate Certificate in Molecular Basis of Cancer

Certificate Level: Graduate
Admission 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: Aid eligible
Classification of Instructional Program (CIP) Code: 26.0911
Standard Occupational Classification (SOC) Code: 19-1029

About the Program

The online Molecular Basis of Cancer post-baccalaureate certificate program trains students to understand the molecular, cellular and physiological basis of cancer. The program utilizes the College of Medicine's renowned faculty expertise in cancer research to train graduate students in basic, translational and clinical research in cancer biology. This training will prepare students for careers in cancer biology research. For career advancers who are already employed, the curriculum will expand their knowledge base to provide detailed understanding of the physiological basis of cancer. To accommodate working students, the curriculum is formatted as an online, asynchronous curriculum, compatible with part-time enrollment.

Admission Requirements

Applicants must have completed a four-year biology- or chemistry-based BA/BS degree program with a preferred GPA of at least 2.75, two confidential letters of recommendation, a personal statement explaining their interest in the program, a current résumé and all previous official educational transcripts. No standardized test is required for admission. A math-science GPA form can be filled out through the Discover Drexel portal after the application is completed.

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.

Transcripts

- Applicant must have completed a four-year biology- or chemistry-based BA/BS degree program with a preferred GPA of at least 2.75. Provide official transcripts from all colleges and universities attended.
- If your GPA is below this target, please briefly explain the conditions surrounding your GPA as a part of your essay (will not count toward the 500 word target).

- 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 a NACES.org (https://www.naces.org/) member.
- Applicants are responsible for supplying all necessary documentation and paying all necessary fees to have their transcripts evaluated. Please have the course-by-course evaluation sent to the mailing address listed below.

Standardized Test Scores

- The Graduate Record Exam (GRE) is not required for admission to the Molecular Basis of Cancer post-baccalaureate certificate program.
- TOEFL or IELTS scores are required for international applicants or applicants who earned a degree outside the U.S. 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, interests 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.

Resumé

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

Letters of Recommendation

- Two 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.

Application Fee

- An application fee of $75 U.S. is required.
- Students who find this fee a hardship should contact the program director.

Math-Science GPA Form

- Complete your math-science GPA form through the Discover Drexel portal after you submit your application.

Additional Information

For more information, please visit the Molecular Basis of Cancer (https://drexel.edu/medicine/academics/graduate-school/molecular-basis-of-cancer/) certificate website.

Program Requirements

Required Courses		
CMCA 500S	Foundations in Bioscience 1	3.0
CMCA 501S	Foundations in Bioscience 2	3.0
CMCA 510S	Introduction to Cancer Biology	2.0
CMCA 520S	Molecular Basis of Cancer	3.0
Electives		**4.0**
Elective Options		
CMCA 551S	Control of the Cell Cycle and Cell Death	
CMCA 552S	Experimental Approaches in Cancer Research	
PHRM 512S	Graduate Pharmacology	
PHRM 525S	Drug Discovery and Development I	
PHRM 526S	Drug Discovery and Development II	
Total Credits		**15.0**

Sample Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
CMCA 500S	3.0	CMCA 501S	3.0
CMCA 510S	2.0	Elective	2.0
	5		**5**
Second Year			
Fall	**Credits**		
CMCA 520S	3.0		
Elective	2.0		
	5		

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 College of Medicine offers the part-time Evening Post-baccalaureate Pre-medical certificate (PMED). This program gives individuals with a non-science baccalaureate degree the opportunity to continue working or fulfilling other daytime responsibilities while taking courses in the evening to prepare 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 face-to-face or in a hybrid format with asynchronous lectures and on-campus labs.

A linkage opportunity with Drexel University College of Medicine has been established for successful students upon completing the PMED program. Additional 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 five consecutive semesters distributed over two years. The curriculum, which is detailed below, offers the prerequisite science courses required by most health professional schools, as well as electives and a formal MCAT review course at no additional charge.

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/) web page.

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/) web page.

Post-Baccalaureate 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 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 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

Robert Sterling, PhD
Director, Graduate Programs in Clinical Research
rcs336@drexel.edu
267.359.2310

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.

Post-Baccalaureate Certificate in Regulatory Affairs for Cell and Gene Therapy

Certificate Level: Graduate
Admissions Requirements: Bachelor's degree or higher
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 14.0
Instructional Delivery: Online
Calendar Type: Semester
Expected Time to Completion: 1-2 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.0720
Standard Occupational Classification (SOC) Code: 17-2031

About the Program

The Certificate in Regulatory Affairs for Cell and Gene Therapy trains leaders for this growing discipline and prepares them to bring new therapeutics to market. Students will learn how to manage everything from pre-clinical IND-enabling studies to product licensure, and on into post-approval lifecycle management, post-approval change reporting categories, accelerated approval mechanisms, managing agency inspections, ethics, CMC, and international market requirements for cell and gene regulatory affairs.

Admission Requirements

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 submit the following for consideration:

- Official transcripts from all colleges and universities attended.
- 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.
- References from at least three instructors or professionals.
- 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 J-1 visas for individuals interested in online, hybrid or part-time programs.

Online applications are accepted 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.

Program Requirements

Required Courses		
MIIM 573S	Regulatory Affairs for Cell and Gene Therapy 1	3.0
MIIM 574S	Regulatory Affairs for Cell and Gene Therapy 2	3.0
MIIM 503S	Biomedical Ethics	2.0
Electives (choose 2)		6.0
CR 514S	World Wide Regulatory Submissions	
CR 523S	Current Issues in Review Boards	
CR 551S	International Regulatory Affairs	
CR 515S	Intro to Clinical Trials	
Total Credits		**14.0**

Sample Plan of Study

Fall Start, Part-Time

First Year (Part-Time)

Fall	Credits	Spring	Credits
MIIM 573S	3.0	MIIM 574S	3.0
MIIM 503S	2.0	Elective	3.0
Elective	3.0		
	8		**6**

Total Credits 14

Spring Start, Part-Time

First Year (Part-Time)

	Spring	Credits	Summer	Credits
	MIIM 503S	2.0	Elective	3.0
	Elective	3.0		
		5		**3**

Second Year (Part-Time)

Fall	Credits	Spring	Credits
MIIM 573S	3.0	MIIM 574S	3.0
	3		**3**

Total Credits 14

Note: Only spring semester is more 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 only be disbursed to students this term.

Summer Start, Part-Time

First Year (Part-Time)

		Summer	Credits
		Elective*	3.0
			3

Second Year (Part-Time)

Fall	Credits	Spring	Credits
MIIM 573S	3.0	MIIM 574S	3.0
MIIM 503S	2.0	Elective	3.0
	5		**6**

Total Credits 14

*

Note: First Year Summer 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.

Additional Information

For questions about the curriculum and program goals, please contact Program Director Sujata Bhatia, MD, PhD, 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. (https://drexel.edu/drexelcentral/)

Index