

BIOMEDICAL SCIENCES GRADUATE PROGRAMS

Programs

Graduate Degree Programs

- Anatomic Pathology, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/anatomic-pathology-ms/>)
- Anatomy Research, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/anatomy-research-ms/>)
- Anatomy, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/anatomy-ms/>)
- Biochemistry and Applied Bioinformatics, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/biochemistry-and-applied-bioinformatics/>)
- Biochemistry, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/biochemistry-ms/>)
- Bioethics and Medical Humanities, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/bioethics-medical-humanities-ms/>)
- Biomedical Informatics, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/biomedical-bioinformatics-ms/>)
- Biomedical Sciences, PhD (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/biomedical-sciences-phd/>)
- Biomedical Sciences, PhD with Microbiology and Immunology Concentration (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/biomedical-sciences-phd-microbiology-and-immunology-concentration/>)
- Biomedical Sciences, PhD with Pharmacology Concentration (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/biomedical-sciences-phd-pharmacology-concentration/>)
- Clinical Anatomy, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/clinical-anatomy-ms/>)
- Clinical Research Methods, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/clinical-research-methods-ms/>)
- Clinical Research, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/clinical-research-ms/>)
- Medical Genetics and Genomics, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/medical-genetics-genomics-ms/>)
- Medical Sciences, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/medical-sciences-ms/>)
- Microbiology and Immunology, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/microbiology-immunology-ms/>)
- Molecular Medicine and Health Sciences, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/molecular-medicine-and-health-sciences-ms/>)
- Pharmacology, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/pharmacology-ms/>)
- Physiology, MS (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/physiology-ms/>)

Graduate Certificates

- Clinical Ethics Certificate (Graduate) (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/clinical-ethics-cer/>)
- Clinical Research Certificate (Graduate) (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/clinical-research-certificate/>)
- Medical Humanities Certificate (Graduate) (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/medical-humanities-cer/>)
- Research Ethics Certificate (Graduate) (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/research-ethics-cer/>)
- Sports Medicine Certificate (Graduate) (<https://catalog.tulane.edu/medicine/biomedical-sciences-graduate-program/sports-medicine-cer/>)

Courses

Biomedical Sciences (BMSP)

BMSP 6050 Advanced Cell Biology - MS (3)

This course introduces all major aspects of cellular structure and function. It specifically covers cytoplasmic membranes, protein trafficking, cellular signaling and cell proliferating mechanisms.

BMSP 6070 Advanced Cell Biology (3)

BMSP 7100 Biomed Sciences Workshop (1)

Course Limit: 2

BMSP 7110 Workshop (1)

Course Limit: 2

BMSP 7120 Research Topics and Rotations (4)

This course allows for research faculty mentors to present potential dissertation projects available for BMS PhD students to undertake upon choosing a dissertation lab. Research rotations will also be completed in this course.

BMSP 7130 Research Topics and Rotations (4)

This course allows for research faculty mentors to present potential dissertation projects available for BMS PhD students to undertake upon choosing a dissertation lab. Research rotations will also be completed in this course.

BMSP 7140 Biomedical Sci Seminar (1)

Course Limit: 2

BMSP 7150 Seminar (1)

Course Limit: 2

BMSP 7160 Research Topics and Rotations (2-3)

This course allows for BMS PhD students to complete a summer research rotation with BMS faculty to assist with choosing a dissertation advisor.

BMSP 7500 Special Topics (1-6)

Course Limit: 4

BMSP 7770 Physiological Basis of Disease (3)

BMSP 7770 is for first year PhD students in the Biomedical Sciences Graduate Program. This course will provide PhD students with a basic knowledge of physiology organ systems (neuroscience, kidney, GI, cardiovascular, reproduction, endocrinology, respiration), highlighting the pathophysiology of disease mechanisms, and integrates pharmacology and sex differences into the curriculum. The course is team-taught, and faculty emphasize their particular research field. Student performance will be assessed with four examinations. All lectures have learning objectives, and exams will cover the material outlined in the learning objectives and covered in class. No textbook is required but some may be recommended.

BMSP 7990 Independent Study (1-6)

Course Limit: 4

BMSP 9980 Masters Research (0)

Course may be repeated up to unlimited credit hours.

Maximum Hours: 99

BMSP 9990 Dissertation Research (0)

Course may be repeated up to unlimited credit hours.

Maximum Hours: 99

Sports Medicine (SPMD)

SPMD 6100 Foundations of Sports Medicine (3)

This course will provide the students with an overview in the field of sports medicine. The course focuses on the basic information and skills important to the recognition, care, prevention, and preliminary rehabilitation of athletic injuries. The course will explore medical providers involved in total athlete care, provide terminology associated with sports medicine, and discover the human body systems as they pertain to sports medicine.

SPMD 6110 Non-traumatic Injuries (3)

Discuss common non-traumatic injuries in young athletes. Categorize non-traumatic injuries. Analyze athlete pre-participation assessments in terms of specific non-traumatic injury categories. Differentiate among common non-traumatic injuries found in secondary and post-secondary level athletics. Identify proper protocol for assessing critical illnesses and providing care for an injured athlete. Analyze the implementation of guidelines for continuation within the activity by the injured athlete. Understand of ergonomic theory behind safety equipment. Determine the proper protective equipment for an athlete based on sport, athlete age and size. Describe the preparation needed for athletic coverage. Analyze recent incidents of non-traumatic injuries in secondary and collegiate athletics. Identify the key components of an Emergency Action Plan. Review and critique an existing Emergency Action Plan. Develop an Emergency Action Plan.

SPMD 6120 Sports Performance Enhancement (3)

This course offers a comprehensive study of the physical, nutritional, and therapeutic methods of injury recovery while holding a focus on the needs of athletes who want to improve performance within their sport.

SPMD 6130 Continuum of Care: Developing a Sports Medicine Program (3)

This course will explore the process of developing and maintaining a sports medicine program that fully addresses the continuum of care for athletes within an institution or organization at the collegiate and secondary levels. Students will discover the components of a comprehensive athletic healthcare program including: health and safety policies and procedures, roles and responsibilities of involved healthcare providers, and best practices of sports medicine.

Clinical Research (MSCR)

MSCR 6420 Responsible Conduct of Resrch (1)**MSCR 6430 Introduction to Clinical and Translational Research (3)**

In this course, students will study IRB relations and regulations, discuss the required elements in a clinical research contract and the responsibilities of the clinical researcher, identify effective use of research personnel, and develop negotiating skills to facilitate support for clinical research. The course will also encompass the principle of randomization and "intention-to-treat" analysis in experimental studies, integration of clinical trials and lab support, specimen collections and laboratory problem-based learning. A researcher/clinician centric insight into the logistics of technology transfer and intellectual property (IP) development will be studied. The practical aspects of technology transfer in an academic context will be investigated. Discussed topics will include local academic tech transfer policy, related procedures and available resources. Career pathways and opportunities open to the clinical researcher in the academic and private sector will be explored and discussed.

MSCR 6440 Protocol Design and Writing (1-3)**MSCR 6450 Therapeutics Seminar (4)****MSCR 7070 Molecular Medicine (4)**

Study of molecular medicine.

MSCR 7080 Cultural Competence Research (3)**MSCR 7090 Grant Writing (3)****MSCR 7150 Journal Club (1)**

Course Limit: 99

MSCR 7300 Clerkship (0.5-5.75)**MSCR 7400 Surgical Education Conference (1)**

Maximum Hours: 99

MSCR 7410 Surgical Research Consortium (0.5)

Maximum Hours: 99

MSCR 7420 Clinical Mentorships (2)

Maximum Hours: 99

MSCR 7430 Residency Didactics (0.5-0.75)**MSCR 7440 Independent Study (0-3)****MSCR 7450 Practical Skills (3)**

Maximum Hours: 99

MSCR 9980 Mentored Research Component (2)

Course may be repeated up to unlimited credit hours.

Maximum Hours: 99

Biomedical Informatics (BIMI)

BIMI 6100 Elements in Biomedical Informatics (4)

Goals/Mission: To develop an understanding of biomedical informatics, the biomedical data, the practice modern medicine, conduct modern biological research, and health sciences education with information technology. Prerequisites: Students should have a basic understanding of intermediate mathematics. Designation: This course is for graduate students and advanced undergraduate students

BIMI 6200 Introduction to Data Science for Biomedical Informatics (3)

Goals/Mission: The goal is to provide a comprehensive orientation to data science using SQL, R, Python, and programs with application to biomedical informatics. Prerequisites: The course does not require prior programming knowledge. Designation: This course is for graduate students and advanced undergraduates.

BIMI 6300 Fundamentals of Data Analytics (3)

Goals/Mission: To develop an understanding of the integrated behavior of random variables multivariate data sets using R/ Python with application to complex biomedical data. Prerequisites: Students should have a basic understanding of statistics, multivariable calculus, and linear/matrix algebra. Designation: This course is for graduate students and advanced undergraduate students.

BIMI 6400 Health Informatics (3)

Goals/Mission: To develop an understanding of the advanced approaches of bioinformatics and its application. Prerequisites: Students should have a basic understanding of biomedical informatics and statistics. Designation: This course is for graduate students.

BIMI 7100 Statistical Machine and Deep Learning in Biomedical Practice (3)

Goals/Mission: To develop a comprehensive understanding of modeling for pattern recognition in data and utilizing these models to predict future data. This course is for graduate students and advanced undergraduate students with permission of instructor.

Prerequisite(s): BIMI 6200 and 6300.

BIMI 7210 Biomedical Informatics Workshop I - IV (1)

The Biomedical Informatics Workshop is designed to promote reading, writing, oral presentation skills, and critical analysis of biomedical data, and research related to are a key tool for critically appraising articles and keeping up to date with the current literature. BIMI 7210 Workshop I - IV (1 credit hour) allows credit for participation in these journal clubs.

Maximum Hours: 4

BIMI 7220 Biomedical Informatics Research Methods (4)

The first two years are generally devoted to coursework and research. In conjunction with the course work in the first year, students rotate in 6-8 week blocks through three of the division's participating research laboratories of the student's choice. BIMI 7220 Research Methods allows 2 credit hours per rotation. Subsequent years focus on independent research that culminates in a dissertation. Students accepted into the BMS BMI track are required to join faculty in the Division of Biomedical Informatics and Genomics, but may consider one of other faculty outside of the Division for committee members or co-mentors (with approval of the Division Chief).

Maximum Hours: 99

BIMI 7230 Biomedical Informatics Research Methods (2)

The first two years are generally devoted to coursework and research. In conjunction with the course work in the first year, students rotate in 6-8 week blocks through three of the division's participating research laboratories of the student's choice. BIMI 7230 Research Methods allows 2 credit hours per rotation. Subsequent years focus on independent research that culminates in a dissertation. Students accepted into the BMS BMI track are required to join faculty in the Division of Biomedical Informatics and Genomics, but may consider one of other faculty outside of the Division for committee members or co-mentors (with approval of the Division Chief).

Maximum Hours: 99

BIMI 7300 Biomedical Data Science with Cloud Computing (3)

Goals/Mission: To develop an understanding of programming and high-performance computing techniques in data science with cloud computing. This course is for graduate students and advanced undergraduate students with permission of instructor.

Prerequisite(s): BIMI 6100 and 6200.

BIMI 7500 Genomic Sequence and Omics Data Analysis (3)

Goals/Mission: To understand how to use and analyze high-throughput genomics and omics data in biomedical informatics. The course covers various high-throughput omics data, including genomics, transcriptomics, and proteomics data, as well as their data analysis methods and applications in biological and disease studies. Designation: This course is for graduate students and advanced undergraduate students.

Prerequisite(s): BIMI 6100 and 6200.

BIMI 7700 Algorithms in Biomedical Informatics (3)

To develop an understanding of various algorithm design techniques, such as exhaustive search, greedy search, divide-and conquer, dynamic programming, graph-based algorithms, and randomized algorithms, as well as various computational problems in biomedical informatics, such as sequence alignment, genome arrangement, motif finding, and peptide identifications. These problems are used as examples to demonstrate how to solve biomedical problems by mathematical modeling and algorithm design. Designation: This course is for graduate students and advanced undergraduates.

Prerequisite(s): BIMI 6200.

BIMI 7980 Biomedical Informatics Special Topics (1-6)

Special topics course as designed by visiting or permanent faculty. For description, consult the department. Course may be repeated up to unlimited credit hours under separate title.

Course Limit: 4

BIMI 7990 Biomedical Informatics Directed Independent Study (1-6)

The first two years are generally devoted to coursework and research. Subsequent years focus on independent research that culminates in a dissertation. Students accepted into the BMS BMI track are required to join faculty in the Division of Biomedical Informatics and Genomics, but may consider one of other faculty outside of the Division for committee members or co-mentors (with approval of the Division Chief). BIMI 7990 Directed Independent Study allows credit for independent research under the direction of a mentor or co-mentor in the Division of Biomedical Informatics and Genomics.

Maximum Hours: 99

BIMI 8500 Research Methodology of Biomedical Informatics (2)

Goals/Mission: Journal clubs are a key tool for critically appraising articles and keeping up to date with the current literature. Designation: This course is for graduate students only.

Prerequisite(s): BIMI 7500.

Maximum Hours: 99

BIMI 8550 Computational Biology: Structure and Organization (3)

Goals/Mission: To develop an understanding of the advanced approaches of computational biology, and their application. Designation: This course is for graduate students and advanced undergraduate students.

Prerequisite(s): BIMI 6100 and 6200.

BIMI 8600 Advanc Data Sci Ana Tech (3)

Goals/Mission: To develop an understanding of the advanced approaches with algorithms in representation learning, generative adversarial networks, and their application to imaging multi-omics data. Designation: This course is for graduate students and advance undergraduate students.

Prerequisite(s): BIMI 6100, 6200 and 6300.

BIMI 9980 Master's Thesis Research (0)

Goals/Mission: The goal is to develop a deeper understanding of a research field in biomedical informatics and gain capability to design a conceptual framework, conduct data analysis, and write a dissertation proposal. Designation: This course is for graduate students

Prerequisite(s): BIMI 6100, 6200 and 6300.

BIMI 9990 Biomedical Informatics Dissertation Research (0)

Course may be repeated up to unlimited credit hours.

Maximum Hours: 99