MICROBIOLOGY AND IMMUNOLOGY, MS

This one-year post baccalaureate program leading to the degree of Master of Biomedical Science in Microbiology and Immunology has been designed to prepare students for careers in biomedical sciences and to provide an in-depth educational experience to improve the probability of gaining admission to a postgraduate professional school such as medical, dental, veterinary schools or Ph.D. programs. Class size is limited to 20 students. All courses are taught within the Tulane School of Medicine by full time faculty.

Upon graduation, students

- Should have developed core knowledge in Microbiology and Immunology, and the ability to apply their knowledge to problems in these and other disciplines. (Disciplinary and interdisciplinary knowledge)
- Should have developed the ability to perform basic work in a Microbiology or other research laboratory. (Professional competencies)
- Should have developed skills that transcend disciplines and are applicable in any context, such as communications, leadership, and working in teams. (Foundational and transferrable skills)
- Should have developed the ability to apply the scientific method, understand the application of statistical analysis, gain experience in conducting research and other field studies, learn about and understand the importance of research responsibility and integrity, and engage in work-based learning and research in a systematic manner. (Research)

Requirements

Degree Requirements (two tracks available) (https://medicine.tulane.edu/departments/basic-sciences/microbiology-immunology/academic-programs/masters/)

Thesis Track

- At least 27 credit hours of course work during Fall and Spring semesters plus 3 credits for thesis-relevant courses.
- Complete requirements for a thesis, based on library research (generate a review paper).
- At least a "B" average (3.0 GPA) has to be achieved in order to graduate.

Non-thesis track

- At least 30 credit hours of course work during Fall and Spring semesters.
- At least a "B" average (3.0 GPA) has to be achieved in order to graduate.

Program Curriculum (https://medicine.tulane.edu/departments/basic-sciences/microbiology-immunology/academic-programs/masters/)

Students must complete a minimum of 30 credit hours from the courses listed below. Students can take as many credits as desired.

Required Courses (https://medicine.tulane.edu/departments/basic-sciences/microbiology-immunology/academic-programs/masters/)

**Fall semester:**

MIIM-7500 Graduate Medical Microbiology (4 credits). This course is designed to introduce graduate students to bacterial, fungal and viral pathogens that are the etiological agents of the most significant infectious diseases worldwide. The course will focus on the basic mechanisms of microbial pathogenesis with emphasis on the host-microbe interactions and the most recent advances on therapeutic and prophylactic treatments to combat these diseases. Important historical discoveries along with current scientific strategies to study the molecular basis of virulence will be discussed, and recent high impact publications will be assigned for reading and discussion. Course Director: Dr. Lucy Freytag.

MIIM-7600 Medical Immunology (3 credits). This course is designed to provide a basis of terminology relevant to the basic concepts of immunology. It commences with the important components (cell, tissues; antibodies; immunoglobulins) involved in host defense against infectious agents. Introductory lectures serve to describe and differentiate between natural defense (innate) mechanisms and adaptive immunity mediated by functional B and T lymphocytes and their products. Subsequently, cellular interactions, especially the differentiation of helper T cells subsets and the production of relevant cytokines, will be described. This will include the mechanisms of T cell activation and regulation. Finally, clinical immunology will be discussed: autoimmunity and autoimmune diseases; hypersensitivity reactions, including atopic disorders and asthma; mechanisms of transplant rejection; and immunodeficiency disorders. Course Director: Dr. Mairi Noverr.

MIIM-7550 Microbiology Lab (3 credits). This course is designed to teach students how to perform basic laboratory tests using simple diagnostic tests for infectious diseases techniques. The bulk of the course consists of hands-on laboratory experience conducting laboratory tests with simulated clinical specimens and analyzing prepared teaching specimens. Procedures for organism isolation and identification and rapid diagnostic kits will be covered. Course Director: Dr. Louise Lawson.

MIIM-7010 Seminar In Microbiology (1 credit). The main purpose of the Seminar is to provide students with the opportunity to develop the confidence and skills necessary to make successful scientific presentations, enhance their critical thinking, and engage in thoughtful and productive scientific
discussions with their professors and peers. In this course, doctoral graduate students are scheduled to present either a research article or their own work in a 50 min seminar (allowing for 10 min discussion). Masters students are required to attend and participate in the seminars and to write a one-page summary describing the content and significance of each seminar. Course Director: Dr. Lucy Freytag.

**MIIM-7020 Graduate Journal Club** (1 credit). This course is a journal club format for discussion of current topics in Microbiology and Immunology. Students will present a seminar to the class on a selected research paper approved by the course instructor. Students will explain the topic background and specific hypothesis being tested, describe in detail the experimental design and results, and discuss the conclusions reached and whether or not they were justified. The student audience is expected to participate in class discussion following the presentation. In addition, each student is required to write a short summary explaining the hypothesis, content and significance of the findings for each presented paper. Course Director: Dr. Kerstin Honer zu Bentrup.

**Spring semester**

**MIIM-7400 Responsible Conduct of Biomedical Research** (2 credits). This course explores a variety of ethical and policy issues that arise during the conduct of basic, translational, and clinical biomedical scientific research, with special emphasis on research in infectious diseases. Topics addressed include: (1) research misconduct; (2) "every day" ethical issues faced by biomedical scientists; (3) the use of laboratory animals in scientific research; (4) human research participants and scientific research; (5) authorship practices in scientific publications; (6) conflicts of interest arising from scientists acting as policy consultants and experts; (7) data sharing and data secrecy; (8) mentoring; (9) research with stem cells; (10) the "dual-use" dilemma; (11) select agents and bioterrorism; and (12) scientists as citizens. Course sessions will include lectures, discussion periods, and analyses of case studies. Material will be provided to the students at the latest one week before the session. Course Director: Dr. Louise Lawson.

**MIIM-7020 Seminar in Microbiology** (1 credit). The main purpose of the Seminar is to provide students with the opportunity to develop the confidence and skills necessary to make successful scientific presentations, enhance their critical thinking, and engage in thoughtful and productive scientific discussions with their professors and peers. In this course, doctoral graduate students are scheduled to present either a research article or their own work in a 50 min seminar (allowing for 10 min discussion). Masters students are required to attend and participate in the seminars and to write a one-page summary describing the content and significance of each seminar. Course Director: Dr. Lucy Freytag.

**MIIM-7030 Topics in Microbiology** (2 credits). This course is designed to introduce students to a number of current research fields through studying published research papers, general public resource, and other material. Students will pick a topic of their interest, specifically one that is current. Students will present a summary of their topic to the class and will generate questions for their classmates that will stimulate discussions. Topics can include basic, applied, and clinical research and reviews to canvass the latest developments in the field of Microbiology and/or Immunology. Course Director: Dr. Kerstin Honer zu Bentrup.