MICROBIOLOGY AND IMMUNOLOGY
http://biomed.med.miami.edu

Overview
Microbiology and Immunology is a multidisciplinary program encompassing the areas of cellular and molecular immunology, virology, microbial genetics, and pathogenic bacteriology.

The goals of the department’s graduate program are to provide each student with the opportunity to acquire the theoretical background and conceptual framework with the technical research skills necessary to attain a PhD. During the first year of study, a broad educational base in all disciplines together with laboratory rotations introduce students to the diverse array of research topics. Students then choose one area of concentration for their research. The varied interests of the faculty provide numerous opportunities for student participation and a broad choice in dissertation research.

Active research in immunology includes the areas of cytotoxicity, programmed cell death, cytokine receptor signaling, clinical and experimental bone marrow transplantation, stem cell biology, gene therapy for cancer treatment, antigen recognition, cell differentiation and communication, aging of the immune system, interleukins, genetic control of immunoglobin production, gene activation, and evolution of the immune response. Research in other areas includes molecular biology of virus-host interaction in both animal and human systems, control and regulation of bacterial pathogenesis, selective tumor chemotherapy and radiation therapy, and therapy of parasitic infections.

Goals
The goals of the MIC Graduate Program include training and acquisition of:
• A broad scientific reasoning ability and knowledge base in Microbiology and Immunology
• Technical skills required for experiments in the area of specialization
• Presentation skills required for teaching, scientific talks, manuscripts, and grants
• A preparation for a scientific career in academia, industry, or teaching within 5 ½ years

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Admission
Admission Requirements
Applicants to biomedical programs should have a bachelor degree in a biological or related discipline (e.g., psychology, chemistry, engineering, physics). Although there are no prerequisite requirements, courses in general biology, cell/molecular biology, calculus, general physics, organic chemistry, physical chemistry, and biochemistry are encouraged. Applications are generally accepted from September to December for fall entry only. Select applicants will be offered an interview.

COMPETITIVE CANDIDATES WILL HAVE THE FOLLOWING:
• Excellent academic record
• Competitive GRE exam scores
• Research experience in a laboratory setting
• Publications of abstract and / or papers
• Co-authorship in a peer-reviewed journal is recommended
• Strong letters of recommendation from research scientists who know the candidate well
• Motivation to pursue state-of-the-art biomedical research

APPLICANTS MUST SUBMIT THE FOLLOWING:
• Online Application
• Application Fee
• Official Academic Transcripts
• GRE General Test
• English Proficiency Exam (non-native speakers)
• Statement of Purpose
• Resume / CV

Full application instructions can be found at: http://biomed.med.miami.edu/apply

Program Plan

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**Total Credit Hours:** 62-63

### Courses

**MIC 601. Medical Microbiology. 5 Credit Hours.**
Course discusses the nature of microbial agents of infectious disease as well as relationship of virulence to host resistance and fundamental immunologic concepts. Microbial physiology and genetics, the structure, design, and mechanism of action on antimicrobials are also.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**MIC 625. Mechanisms of Microbial Virulence. 2 Credit Hours.**
This course will focus on the mechanisms employed by bacterial and viral pathogens to produce disease in animals and humans. The course is divided into two 3 week modules. The first module will cover bacterial pathogens with an emphasis on the bacteria-host cell interaction. Specific topics will include: bacterial attachment and invasion of eukaryotic cells, virulence gene regulation, secretion of virulence factors, bacterial toxins and obligate intracellular bacterial pathogens. The second module will cover viruses and human viral diseases with an emphasis on viral replication, gene expression, virus-host cell interactions and viral oncology. Classes will consist of a mixture of lectures and discussions of recent or classic papers. There will be 2 exams.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**MIC 705. Faculty Research and Discussions. 1 Credit Hour.**
Forum for the discussion of the current research projects and interests of the faculty. This course provides students with the opportunity to exchange ideas about important scientific questions and the technologies being applied to experimentally address the hypotheses being tested.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall.
MIC 711. Accelerated Basic Science Medical Curriculum. 1-18 Credit Hours.
Beginning in the latter part of June each year, extending to the middle of February of the ensuing year, the following accelerated and intensive complete basic science medical curriculum is offered: Embryology, Gross Anatomy, Histology, Biochemistry, Neuroanatomy, Biophysics and Neurophysiology, Systemic Physiology, Pathology, Medical Microbiology, and Pharmacology. single grade will be entered on the graduate transcript for this course.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MIC 716. Advanced Molecular Biology. 3 Credit Hours.
The molecular basis of cellular function and regulation in both prokaryotic and eucaryotic systems. The molecular genetics and biochemistry of the genetic material and its utilization during replication, transcription, translation, cellular growth, division, and differentiation. Recombinant DNA technology and molecular genetics are discussed. This course is designed for graduate students in biological sciences. A good background in biology or biochemistry is recommended.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 726. Laboratory Experimentation. 4 Credit Hours.
One or two laboratory training sessions of 6-12 weeks each. Each student rotates through faculty research laboratories in the areas of immunology, molecular biology, and microbiology, (bacteriology, virology, parasitology) where they receive "hands on" experience by participating in ongoing research projects.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 727. Laboratory Experimentation. 6 Credit Hours.
Two or three laboratory training sessions of 6-12 weeks each. Each student rotates through faculty research laboratories in the areas of immunology, molecular biology and microbiology, (bacteriology, virology, parasitology) where they receive "hands on" experience by participating in ongoing research projects.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MIC 728. Principles of Immunology. 3 Credit Hours.
This team-taught course will present immunological concepts and reasoning in immunological research. The course is divided into 7 weekly modules. Each module has a common theme and consists of 3 lectures on immunological concepts and one session where students present and discuss a research paper related to the theme of each module. The paper discussion session will include use of disease models as a portal to understand the function of immune system in health and disease. The module topics are (a) lymphoid cell development, (b) antigen recognition, (3) initiation of immune responses, (4) T lymphocyte effector development and function, (5) T cell immunity versus tolerance, (6) B cell immunity, and (7) innate immunity. There will be one exam following the first 4 modules and the second exam after the remaining 3 modules.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MIC 731. Special Work. 1-5 Credit Hours.
Special work, lecture, laboratory or a combination of these, as determined by advisor in accord with student's individual interest. Course is offered only on demand.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 751. Advanced Molecular Immunology. 3 Credit Hours.
The molecular mechanisms for generation of antigen specific receptor diversity and the specific gene activation during lymphocyte differentiation.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 755. Infectious Agents and the Immune System. 3 Credit Hours.
This course is intended to explore, at an advanced level, the dynamic equilibrium that exists between microbial pathogens and host immune systems with emphasis on factors that influence progression to disease or sterilizing immunity. Mechanisms employed by the host and pathogen to shift that equilibrium in their favor will be discussed taking into account interactions at the cell system, cellular, and sub-cellular levels. To facilitate interaction between the two fields, both an immunological and a microbial/viral faculty member will be present at all classes.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MIC 761. Advanced Topics in Molecular Biology of Animal Viruses. 2 Credit Hours.
This course is organized around four major themes of virological studies: (i) viral genome transcription, replication, and virus assembly; (ii) viral pathogenesis; (iii) virus cell interactions; and (iv) antiviral strategies. Most recent research developments in these areas are covered through lectures by participating faculty members as well as paper presentations by students.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MIC 775. Advanced Microbiology and Immunology. 3 Credit Hours.
This course will explore in depth the current and advanced concepts and topics in selected areas of Microbiology and Immunology. The classes will consist of a mixture of lectures and discussions of recent papers. Besides covering recent advances and cutting edge experimental approaches in cellular and molecular immuno and microbiology, this course will also expose students to breakthrough concepts and themes that link the disciplines of immunology, microbiology and virology.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.
MIC 780. Research Ethics. 1 Credit Hour.
The NIH Guide for Grants and Contracts stipulates that Institutions receiving support for National Research Service Award Training Grants are required to develop a program in the principles of Scientific Integrity. This program should be an integral part of the proposed training effort. The University of Miami School of Medicine has chosen to respond to this requirement with this course. This course must be taken during the first semester in the Department or Program. This is a six-hour course and is given in two sessions of three hours each.

Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 799. Advanced Topics. 1-3 Credit Hours.
Subject matter offerings based upon student demand and availability of faculty. Subtitles describing the topics to be offered will be shown in parentheses in the printed class schedule, following the title "Advanced Topics".

Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MIC 810. Master's Thesis. 1-6 Credit Hours.
The student working on his/her master's thesis enrolls for credit, in most departments not to exceed six, as determined by his/her advisor. Credit is not awarded until the thesis has been accepted.

Components: THI.
Grading: SUS.
Typically Offered: Offered by Announcement Only.

MIC 820. Research in Residence. 1 Credit Hour.
Used to establish research in residence for the thesis for the master's degree after the student has enrolled for the permissible cumulative total in MIC 710 (usually six credits). Credit not granted. May be regarded as full time residence.

Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MIC 830. Doctoral Dissertation. 1-12 Credit Hours.
Required of all candidates for the Ph.D. The student will enroll for credit as determined by his/her advisor but not for less than a total of 24. Not more than 12 hours of MIC 730 may be taken in a regular semester, nor more than six in a summer session. Where a student has passed his/her (a) qualifying examinations, and (b) is engaged in an assistantship, he/she may still take the maximum allowable credit stated above.

Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

MIC 840. Doctoral Dissertation - Post Candidacy. 1-12 Credit Hours.

Components: THI.
Grading: SUS.
Typically Offered: Fall.