

# MICROBIOLOGY AND IMMUNOLOGY (MIIM)

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## MIIM 402 Microbes & Hosts (3 Credit Hours)

*Pre-requisites:* Cell Biology BMSC 412, and Molecular Biochemistry BMSC 410 or permission from the instructor

Microbes & Hosts conveys important concepts in bacteriology, virology and immunology as well as the interactions of microbes with host organisms. Through a combination of didactic lectures and group discussions, students will come to appreciate fundamental processes which influence microbe-host interactions.

*Outcomes:*

Students will have a strong understanding of basic principles of microbiology, virology and immunology as well as an understanding of key concepts related to microbe-host interactions

## MIIM 411 Basic Molecular Microbiology (2-3 Credit Hours)

This course is an introduction to fundamental concepts in microbiology

*Outcomes:*

Students will be able to demonstrate an understanding of the morphology, growth, division, development, molecular biology, genetics and physiology of microorganisms

## MIIM 413 Basic Concepts of Immunology (2 Credit Hours)

This course is an introduction to the concepts of host immunity and defense.

*Outcomes:*

Students will be able to understand the fundamental principles of immunobiology, immunochemistry and immunogenetics, host immunity and defense, and the basic concepts of normal host defense versus the untoward responses (hypersensitivity) and their consequences

## MIIM 414 Virology (3 Credit Hours)

This is a survey course that examines animal viruses and their interactions with host cells.

*Course equivalencies:* X-MBIO414/MIIM414

*Outcomes:*

Students will be able to demonstrate an understanding of viral structure and multiplication, and molecular interactions of important animal viruses with their host cells

## MIIM 415 Medical Immunology (2 Credit Hours)

*Pre-requisites:* General Biology and/or Cell Biology Course is open to all Integrated Program in Biomedical Sciences PhD and MS students, graduate Nursing students, medical students, and advanced undergraduate students

The medical immunology course provides an in depth description of the components of the innate and adaptive immune system and how they interact to protect humans against infectious microorganisms. The course will have two 3 hour sessions per week for 8 weeks as well as 2 written exams.

*Outcomes:*

Be able to describe the development and mechanism(s) of activation of the innate and adaptive immune systems, their regulation and outcomes of their inability to do so

## MIIM 420 Methods & Techniques in Microbiology Research (1 Credit Hour)

This course is an introduction to the theory of techniques used for research in microbiology and immunology.

*Outcomes:*

Students will be able to demonstrate competency with various research techniques including spectrophotometry, centrifugation, chromatography, photography, as well as other methods necessary for the study of microbiology, immunology or virology

## MIIM 431 The Molecular Biology of Viruses (3 Credit Hours)

*Pre-requisites:* Include undergraduate or graduate-level courses in cell biology and biochemistry, graduate course 402 Microbes and Hosts, and / or prior approval from the course director(s)

The course will cover molecular biology and biochemistry of virus infections. Current understanding of virus-cell entry, replication, and assembly will be prominent themes. Course will include lectures on viral evolution, ecology, pathogenesis and viral immunology. The interactive course will include lectures, review of current virology literature, and student-led presentations.

*Course equivalencies:* MBIO431/MIIM431

*Outcomes:*

Detailed understanding of virology; be able to integrate concepts in this field with chemistry and health science; comprehend and appreciate current literature; be prepared for lab studies

## MIIM 441 Immunology-Immunochemistry (3 Credit Hours)

This is an advanced immunology course that emphasizes structural concepts in immunology. Review and discussion of current literature exemplifies concepts presented in lecture.

*Outcomes:*

Students will demonstrate an understanding of the chemical definition of antigens, immunogens, structural concepts in immunology, immunoglobulin structure, structure of antigens and their interactions, and recognition of antigen by T-cells and B-cells

## MIIM 442 Cell & Molecular Immunology (3 Credit Hours)

This is an advanced immunology course that examines the cellular and molecular basis of the immune response.

*Outcomes:*

Students will be able to demonstrate an understanding of the cellular and molecular basis of the immune response, as well as the cellular cooperation essential to the nature of immunology

## MIIM 443 Molecular B-Cell Immunology (4 Credit Hours)

This is an advanced molecular immunology course with emphasis on proteins, genes and molecular interactions within the B-lymphocyte compartment of the immune system. Course includes critical evaluation of recent literature.

*Outcomes:*

Students will demonstrate an understanding of proteins, genes and molecular interactions within the B-lymphocyte compartment of the immune system

## MIIM 461 Microbiological Cytology & Ultrastructure (3 Credit Hours)

This is an advanced course that presents the principles and application of light and electron microscopes for the study of cell structure and function.

*Outcomes:*

Students will demonstrate an understanding of the principles of light and electron microscopes and their use as tools in cellular and molecular biology

**MIIM 471 Molecular Microbial Genetics (4 Credit Hours)**

This course introduces advanced students to the importance of genetics to a wide range of biological problems.

*Outcomes:*

Students will demonstrate an ability to read, think, write, and speak critically about various genetic approaches used to identify essential genes, mutagenesis and recombination, transcription, development, symbiosis, and pathogenesis

**MIIM 490 Molecular Biology of Oncogenesis (2 Credit Hours)**

This course is an advanced course that provides a detailed analysis of molecular events that result in the tumorigenic transformation of eukaryotic cells.

*Outcomes:*

Students will demonstrate an understanding of oncogenesis by DNA and RNA tumor viruses, the role of oncogenes and their relationship to normal genes, hormonal effects, and chromosomal abnormalities

**MIIM 492 Research (1-9 Credit Hours)**

Independent research for thesis or dissertation under the supervision of a faculty research advisor. Credit varies based upon assigned effort and time spent in the laboratory. Students receive a letter grade from their research advisor.

**MIIM 501 Seminar (0 Credit Hours)**

This course provides opportunities for students to hear about cutting-edge research being conducted nationally and internationally.

*Outcomes:*

Students will be able to demonstrate a general awareness of current research in the area of microbiology, immunology and virology

**MIIM 502 Special Topics (1-4 Credit Hours)**

This course covers a specific topic in microbiology, immunology or virology.

*Outcomes:*

Students will be able to articulate a general understanding of the selected topic

**MIIM 503 Current Literature (1 Credit Hour)**

This course is a paper-driven course in which papers of current interest are read and discussed.

*Outcomes:*

Students will demonstrate an ability to identify, critically analyze and articulate key concepts of scientific papers

**MIIM 595 Thesis Supervision (0 Credit Hours)**

This course allows the student to pursue a research topic under the mentorship of a faculty advisor.

*Outcomes:*

Students will contribute to the existing body of scientific knowledge and/or methodology in their thesis area; They will defend their results to their committee members

**MIIM 600 Dissertation Supervision (0 Credit Hours)**

This course allows the student to pursue a research topic under the mentorship of a faculty advisor. They will defend their results in a public forum.

*Course equivalencies:* BMSC600/MIIM600/PIOL600

*Outcomes:*

Students will add new knowledge to the existing body of scientific knowledge in their dissertation area