

# MOLECULAR MICROBIOLOGY AND IMMUNOLOGY (MMI)

**NOTE: All prerequisites for Molecular Microbiology and Immunology (MMI) courses must be completed with a grade of "C-" or better.**

## Molecular Microbiology and Immunology (MMI) Courses

### MMI 1053. Introductory Microbiology. (3-0) 3 Credit Hours.

Prerequisite: BIO 1233 or BIO 1203 (formerly listed as BIO 1404 in previous catalogs); concurrent enrollment in MMI 1061 is recommended for students intending to complete both courses. A general study of microorganisms, their characteristics, isolation, growth, and importance in nature, particularly with regards to public health and human disease. (Formerly BIO 1053. Credit cannot be earned for both BIO 1053 and MMI 1053. MMI 1053 cannot substitute for MMI 3713.) Generally offered: Fall, Spring, Summer. Course Fee: LRS1 \$46.20; STSI \$21.60.

### MMI 1061. Introductory Microbiology Laboratory. (0-3) 1 Credit Hour.

Prerequisites: BIO 1233 or BIO 1203 (formerly listed as BIO 1404 in previous catalogs), and completion of or concurrent enrollment in MMI 1053. Course provides basic microbiology lab skills and procedures, with emphasis on the growth, identification, and control of microbes of concern to health-care professionals. Immunodeficient and pregnant students must contact the Coordinator of the Microbiology Teaching Labs, for additional instructions prior to the class start date. (Formerly BIO 1061. Credit cannot be earned for both BIO 1061 and MMI 1061. MMI 1061 cannot substitute for MMI 3722.) Generally offered: Fall, Spring, Summer. Course Fees: IUB2 \$10; L001 \$30; LRS1 \$15.40; STSI \$7.20.

### MMI 3013. Introduction to Clinical Medicine and Pathology. (3-0) 3 Credit Hours.

Prerequisite: BIO 1233 or BIO 2313. Introduction to concepts of human disease, diagnosis, and underlying pathology. (Formerly BIO 3013. Credit cannot be earned for both BIO 3013 and MMI 3013.) Generally offered: Fall. This course has Differential Tuition. Course Fee: IUB2 \$10.

### MMI 3343. Microbial Evolution. (3-0) 3 Credit Hours.

Prerequisite: BIO 2313. Microbes are everywhere. They contribute to the health of our bodies and of natural ecosystems. Microbial pathogens continue to emerge and re-emerge, underscoring considerable epidemic challenges to public health. In this course, you will be introduced to the major principles of microbial evolution. Topics to be covered include natural selection, adaptation, the origins of life, and evolution of virulence and antimicrobial resistance. (Same as BIO 3323. Formerly MMI 3323. Credit can only be earned for one of the following: BIO 3323, MMI 3323, and MMI 3343.) Generally offered: Fall and Spring. This course has Differential Tuition. Course Fee: IUB2 \$10.

### MMI 3353. Molecular and Cell Biology. (3-0) 3 Credit Hours.

Prerequisite: BIO 2313; prior completion of BCH 3303 is recommended. A detailed study of cell structure and function, genes and their expression, genetic engineering, emerging genetic and molecular techniques, genome sequences, epigenetics, cellular signaling pathways, and cell cycle in prokaryotic and eukaryotic cells. Students who have taken NDRB 3813 and NDRB 3913 should not also take MMI 3353. Generally offered: Spring. This course has Differential Tuition. Course Fee: IUB2 \$10.

### MMI 3713. Microbiology. (3-0) 3 Credit Hours.

Prerequisite: BIO 2313; concurrent enrollment in MMI 3722 is recommended for students intending to complete both courses. A comprehensive study of microorganisms, including their composition, morphology, growth, metabolism, classification, ecology, and significance in disease. MMI 1053 cannot substitute for MMI 3713. (Formerly BIO 3713. Credit cannot be earned for both MMI 3713, BIO 3713, and ES 3103.) Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: IUB2 \$10.

### MMI 3722. Microbiology Laboratory. (1-6) 2 Credit Hours.

Prerequisite: BIO 2313 and completion or concurrent enrollment in MMI 3713. Basic microbiology techniques with emphasis on microscopy, cell staining and characterization, species isolation techniques, bacterial cultivation, nutrition, and physical requirements, and the physical and chemical control of microbes. Immunodeficient and pregnant students must contact the Coordinator of the Microbiology Teaching Labs for additional instructions prior to the class start date. (Formerly BIO 3722. Credit cannot be earned for both BIO 3722 and MMI 3722. BIO 1061 cannot substitute for MMI 3722.) Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: IUB2 \$10; L001 \$30.

### MMI 3733. MMI Research Experience. (0-9) 3 Credit Hours.

Prerequisite: Permission in writing (form available in the MMI Department Office) from the faculty mentor, the student's advisor, the Department Chair, and the Dean of the College. The Department of Molecular Microbiology & Immunology offers a mentored laboratory-based research experience for undergraduate students in which they can gain real-world research experiences while also learning about the broader impacts of their work within the microbiology and immunology fields. This course has Differential Tuition. Course Fee: L001 \$30; IUB2 \$10.

### MMI 3743. Bacteriology. (3-0) 3 Credit Hours.

Prerequisite: BIO 2313 and MMI 3713; prior completion of MMI 3722 is also recommended. A study of the phylogeny of prokaryotes, structure and function of prokaryotic cells, ecology and physiological diversity of prokaryotes, growth and control of microorganisms, genetics of bacteria and bacteriophages, bacteria as agents of disease, antibacterials, and other chemotherapeutics, human applications of microbiology, microbial genomics, and principles of microbial biotechnology. (Formerly BIO 3743. Credit cannot be earned for both BIO 3743 and MMI 3743.) Generally offered: Fall. This course has Differential Tuition. Course Fee: IUB2 \$10.

### MMI 4473. Advanced Clinical Medicine and Pathology. (3-0) 3 Credit Hours.

Prerequisite: MMI 3013. Advanced concepts of human disease, diagnosis, and underlying pathology. (Formerly BIO 4473. Credit cannot be earned for both BIO 4473 and MMI 4473.) Generally offered: Spring. This course has Differential Tuition. Course fee: IUB2 \$10.

### MMI 4483. Medical Mycology. (3-0) 3 Credit Hours.

Prerequisite: BIO 2313. Comprehensive study of causative agents, pathogenesis, and treatment of human fungal diseases. (Formerly BIO 4483. Credit cannot be earned for both BIO 4483 and MMI 4483.) Generally offered: Fall. This course has Differential Tuition. Course Fee: IUB2 \$10.

### MMI 4723. Virology. (3-0) 3 Credit Hours.

Prerequisite: BIO 2313. Introduction to the molecular, genetic, and biological properties of viruses. Course covers the basic concepts of virus structure, replication, virus/host interactions, pathogenesis, and evolution. (Formerly BIO 4723. Credit cannot be earned for both BIO 4723 and MMI 4723.) Generally offered: Fall and Spring. This course has Differential Tuition. Course Fee: IUB2 \$10.

**MMI 4743. Immunology. (3-0) 3 Credit Hours.**

Prerequisite: BIO 2313; concurrent enrollment in MMI 4752 is recommended for students intending to complete both courses. This course introduces students to the molecular, cellular, and genetic principles of innate and adaptive immunity. The course covers the development of B and T lymphocytes, and explains how these components of adaptive immunity function in the contexts of infection by pathogenic microbes, allergic reactions, autoimmunity, transplant rejection, cancer, and vaccination. (Formerly BIO 4743. Credit cannot be earned for both BIO 4743 and MMI 4743.) Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course fee: IUB2 \$10.

**MMI 4752. Immunology Laboratory. (0-6) 2 Credit Hours.**

Prerequisite: BIO 2313 and completion or concurrent enrollment in MMI 4743. Laboratory applications of principles presented in MMI 4743. (Formerly BIO 4752. Credit cannot be earned for both BIO 4752 and MMI 4752.) Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: IUB2 \$10; L001 \$30.

**MMI 4763. Parasitology. (3-0) 3 Credit Hours.**

Prerequisite: BIO 2313; prior completion of MMI 3713 is strongly recommended. This course focuses on eukaryotic parasites of medical or veterinary importance: their life cycles, epidemiology, control, and the diseases and pathology they cause. Evolutionary aspects of host-parasite interactions, the diversity of parasite biology, and the interrelationships between parasitology, vector biology, and public health will be emphasized. (Formerly BIO 4763. Credit cannot be earned for both BIO 4763 and MMI 4763.) Generally offered: Spring. This course has Differential Tuition. Course Fee: IUB2 \$10; LRS1 \$46.20.

**MMI 4773. Microbial Ecology and Metagenomics. (3-0) 3 Credit Hours.**

Prerequisite: BIO 2313 and MMI 1053 or MMI 3713. This course will provide an overview of microbial ecology principles and application of microbial ecological approaches to understand microbial structure and function across environments, including the soil, freshwater, and marine environments. The course will focus its content on prokaryotes and fungi. An emphasis in this course will be on learning foundational concepts in microbiome science and applying concepts to laboratory and computational techniques through hands-on experiments. (Same as BIO 4773, credit cannot be earned for both BIO 4773 and MMI 4773.) Generally offered: Spring. This course has Differential Tuition. Course Fee: IUB2 \$10.

**MMI 4783. Microbial Genomes and Virulence. (3-0) 3 Credit Hours.**

Prerequisite: BIO 2313; prior completion of MMI 3713 is recommended. This course is focused on microbial pathogens of medical importance. Insights into the genome make-up and virulence inventories of pathogens is essential for understanding their biology, epidemiology, human disease, and trajectories of pathogen evolution. Topics covered include the basic concepts of genome sequencing, pathogen-specific virulence traits, and the role of genetic exchange in genome evolution, speciation, fitness, and pathogenicity. (Formerly BIO 4783. Credit cannot be earned for both BIO 4783 and MMI 4783.) Generally offered: Spring. This course has Differential Tuition. Course Fee: IUB2 \$10; LRS1 \$46.20.

**MMI 4911. Independent Study. (0-0) 1 Credit Hour.**

Prerequisite: Permission in writing (form available in the MMI office) from the instructor, an undergraduate academic advisor, the Department Chair, and the Dean of the College in which the course is offered. Independent reading, non-laboratory research, discussion, and/or writing under the direction of a faculty member. Will be applied to the degree as a free elective. May be repeated for credit, but no more than 6 semester credit hours of MMI 4911-3 will apply to a bachelor's degree regardless of discipline. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: IUB2 \$10.

**MMI 4912. Independent Study. (0-0) 2 Credit Hours.**

Prerequisite: Permission in writing (form available in the MMI office) from the instructor, an undergraduate academic advisor, the Department Chair, and the Dean of the College in which the course is offered. Independent reading, non-laboratory research, discussion, and/or writing under the direction of a faculty member. Will be applied to the degree as a free elective. May be repeated for credit, but no more than 6 semester credit hours of MMI 4911-3 will apply to a bachelor's degree regardless of discipline. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: IUB2 \$10.

**MMI 4913. Independent Study. (0-0) 3 Credit Hours.**

Prerequisite: Permission in writing (form available in the MMI office) from the instructor, an undergraduate academic advisor, the Department Chair, and the Dean of the College in which the course is offered. Independent reading, non-laboratory research, discussion, and/or writing under the direction of a faculty member. Will be applied to the degree as a free elective. May be repeated for credit, but no more than 6 semester credit hours of MMI 4911-3 will apply to a bachelor's degree regardless of discipline. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: IUB2 \$10.

**MMI 4923. Laboratory Research. (0-9) 3 Credit Hours.**

Prerequisite: Permission in writing (form available in the MMI Department Office) from the faculty mentor, the student's advisor, the Department Chair, and the Dean of the College. Supervised laboratory research mentored by a faculty member engaged in active research within the student's designated area of concentration. May be repeated for credit, but no more than 6 semester credit hours will apply to a bachelor's degree. Only 6 semester credit hours of MMI 4911-3, MMI 4923, and MMI 4993, in any combination, can be taken as MMI upper-division electives. Additional research hours of these courses (excluding Independent Study) may be taken as free electives for a maximum of 12 research hours being applied to the bachelor's degree. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: L001 \$30; IUB2 \$10.

**MMI 4953. Special Studies. (3-0) 3 Credit Hours.**

An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when the topics vary, but no more than 6 semester credit hours will apply to a bachelor's degree regardless of discipline. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: IUB2 \$10.

**MMI 4993. Directed Research. (0-0) 3 Credit Hours.**

Prerequisite: Approval from the instructor, the Department Chair, and the Associate Dean of Undergraduate Studies in the College for which this course is offered; form available on the College of Sciences website. Supervised research mentored by a faculty member engaged in active research within the student's designated area of concentration. Students may produce a thesis in addition to active research. This course can also be used for students pursuing the COS Undergraduate Thesis Option. May be repeated for credit with approval, but no more than 6 semester credit hours will apply to a bachelor's degree regardless of discipline. Only 6 semester credit hours of MMI 4911-3, MMI 4923, and MMI 4993, in any combination, can be taken as MMI upper-division electives. Additional research hours of these courses (excluding Independent Study) may be taken as free electives for a maximum of 12 research hours being applied to the bachelor's degree. Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: IUB2 \$10; DL01 \$75.