

MICROBIOLOGY AND IMMUNOLOGY

mic.as.miami.edu

Dept. Code: MIC

Introduction

The University of Miami is one of only four institutions in the United States that offers a four-year combined undergraduate program in Microbiology and Immunology. You will study, a) microorganisms (which can be good and bad for your health, found in food, and in our environments) and b) how your body's immune defense system defeats and controls harmful microorganisms. Our major provides you with courses of general interest as well as a solid preparation for future scientists or medical professionals. To apply this knowledge to health policy, we partnered with the School of Nursing Public Health program to offer an optional dual degree and double major track opportunity for our students.

Microorganisms: You will learn about bacteria that cause serious infections including the plague, meningitis, and tuberculosis; not so serious infections like staphylococci causing a boil; and those that inhabit your bodies in symbiotic relationships (your microbiome). Regarding viruses, you will learn about emerging viruses like SARS-CoV-2 (causative agent of COVID-19) and Zika, endemic and pandemic viruses like the flu, and those causing chronic infections like HIV/AIDS. Parasites such as those cause malaria and fungi round out the breadth and depth of our offered coursework.

Immune system: You will study its mechanisms to avoid microbial infections in the first place; how it will cause the body's resistance to them either by natural infection or vaccination; how pathogens like HIV and tumors are able to overcome the multiple barriers of the immune system to cause AIDS and cancer, and their up-to-date virological and, respectively, immunological therapies. Finally, you will understand how a mistuned immune system can cause allergies such as asthma or autoimmune diseases such as type I diabetes.

Our program provides you with:

- a broad knowledge base
- laboratory experiences and the opportunity to conduct research in one of our laboratories at the Miller School of Medicine
- the ability to attend a broad spectrum of seminars offered through our home department at the Miller School of Medicine
- opportunities to communicate and write in a scientific manner
- exposure to critical thinking within our field

Students that have finished our program have gone on to careers at other prestigious institutions which include research, medicine, dentistry, physician assistant, pharmacy, optometry, epidemiology, law and many more.

Educational Objectives

1. To expose students to the various disciplines within the field of Microbiology and Immunology, including virology, parasitology, microbial genetics, immunology and medical bacteriology.
2. To introduce students to special projects and/or research opportunities in laboratories at the School of Medicine.
3. To provide laboratory experience for the development of skills required for the conduct of research.
4. To make students aware of current cutting edge research in the field of Microbiology and Immunology by attending seminars of speakers from within and outside the University.

Degree Programs

- A Bachelor's of Science degree is awarded to all microbiology and immunology majors upon completion of the requirements. All MIC majors are required to have a minor (science or non-science). Students will receive a CHM minor provided that they earn a C- or better in every course of the minor while in residence at UM. A total of 19 credits are required for the CHM minor. All students should declare their CHM minor when they begin our program in ASHE 200 by filling out a change of major form. On this form, you can declare also additional majors/minors as well as cognates., a student's choice of minor may be science or non-science.

Advanced Writing and Communication

To satisfy the College of Arts and Sciences writing requirement in the discipline, students majoring in Microbiology and Immunology should take at least one course from the following: MIC 280, MIC 304

Departmental Honors

Students that wish to gain a deeper understanding of Microbiology and Immunology can choose to write a thesis. The following program constitutes receiving Departmental Honors in Microbiology and Immunology.

1. Overall GPA 3.0 or higher
2. Six credit hours of Special Projects (MIC 451, MIC 452, MIC 453, MIC 454, MIC 455 or MIC 456) carried out under supervision of a member of the Microbiology and Immunology faculty, culminating in a senior thesis that includes 15 references. Once the mentor and student have revised and finalized the document a hard copy must be turned in to the Program Director.

MIC 100. Microbiology as it Relates to Humans (EXP). 3 Credit Hours.

An introductory microbiology course for the summer scholars program. Microorganisms are in every facet of our lives and make up a microscopic world. Right now, your body is inhabited by over 40 trillion bacteria. Due to the evolution of our immune systems, we have been able to coexist with this world. It is when our immune systems weaken or when our otherwise healthy immune system encounters a particularly nasty pathogen that we become vulnerable. This course will cover the topics of how our immune system works, how microbial pathogens cause disease, how beneficial microbes protect us from disease, and some of the other activities perform that impact our world. The laboratory will provide you with invaluable experience in growing, staining, viewing and identifying microorganisms through the use of practical techniques and procedures. An in lab presentation of your "unknown organism" will culminate what you have learned.

Components: LAB.

Grading: GRD.

Typically Offered: Summer.

MIC 201. Modern Plagues and Society. 3 Credit Hours.

An examination of four infectious diseases (AIDS, tuberculosis, malaria, and COVID-19) that currently impact a significant fraction of the human population. This course will examine the infectious microbes themselves, efforts of researchers to contain these diseases, and how politics, infrastructure, and geographical factors determine individual and public health outcomes. A special emphasis is placed on the unique role the University of Miami physicians and scientists played during the early phases of the AIDS epidemic.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

MIC 202. Your Health and Immune System/ Microbiome. 3 Credit Hours.

Recent advances in the prevention and treatment of diseases that we and loved ones' experience. Many of these advances in prevention, diagnosis, and treatment strategies are our based on immunological principles. The course will examine how advances in our understanding of the immune system are having unprecedented effects on both health care and society. The immune system must shield us from bacterial, fungal, and viral invasion while harmoniously co-existing with beneficial microbes in our Microbiotas. The immune system is also a surveillance system that recognizes and kills the emerging enemies within: cancer cells. The course will discuss recent advances in immunology, genetic manipulation, and the Microbiota; their consequences on emerging notions of personalized health and medications; the creation of tailored biological therapies against cancer and other maladies; and what all this means for the cost healthcare, the difficult choices, and the politics of medicine. We will critically examine popular of representations of these medical advances, being careful to distinguish fact from fiction and accurate representation from exaggerated claims. Requisite: Not for Microbiology and Immunology Majors or Minors.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

MIC 280. UMiami Scientifica Magazine - Writer. 0 Credit Hours.

UMiami Scientifica is a premier scientific publication at the University of Miami. The magazine, focuses on the STEM fields and publishes quarterly. Students who write for the magazine will learn to write clearly, concisely and in a manner that can be understood by the layperson. Successfully completing an article does not mean that an article will be published.

Components: THI.

Grading: GRD.

Typically Offered: Fall, Spring, & Summer.

MIC 301. Introduction to Microbes and the Immune System. 3 Credit Hours.

Basic principles of microbiology and immunology; the microbiology component will include basic properties of bacteria, viruses, and parasites and how microbes interact with multicellular organisms in both disease and non-disease settings. The immunology component presents the players and basic concepts of immune responses as they apply to combat infectious pathogens, autoimmunity, allergy and transplantation. Course is required for microbiology and immunology majors; recommended for biology, chemistry and biochemistry majors and those considering the health sciences

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

MIC 304. Introduction to Microbes and the Immune System (Lab). 2 Credit Hours.

Basic laboratory principles of microbiology and immunology. Students are instructed on how to handle, culture, and identify microorganisms. Microscope care/use, various staining techniques, ELISA, blood typing, bacterial transformation, and more. This laboratory is required of all microbiology and immunology majors.

Components: LAB.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 319. Innate Immunity. 3 Credit Hours.

The innate immune system provides the first line of defense against infectious microorganisms and is a very important disease-preventing mechanism. In this course the students will learn the molecular and cellular processes mediating innate immune responses to microbial pathogens, including intra- and extra- cellular bacteria and viruses.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

MIC 320. Introduction to Microbes and the Immune System for Nurses. 3 Credit Hours.

Course covers the basic principles of microbiology and immunology. Course cannot be used for MIC major or minor credit.

Requisite: School of Nursing Health Studies.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

MIC 321. Immunobiology. 3 Credit Hours.

Mechanisms underlying the cooperation between T-cells, B-cells, and antigens leading to humoral and cell mediated responses. The significance of immune cells and their products pertaining to autoimmunity, transplantation, and the surveillance of neoplastic cells is covered.

Prerequisite: MIC 301 or MIC 303.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

MIC 322. Medical Parasitology. 3 Credit Hours.

Course discusses the biochemistry, physiology, pathogenicity, immunology, and mechanism of drug action and resistance of medically important parasitic protozoa, trematodes, nematodes, and cestodes.

Prerequisite: MIC 301 or MIC 303.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

MIC 323. Microbial Pathogenesis and Physiology. 3 Credit Hours.

Fundamental properties of microbes as well as host-microbe relationships at the molecular and cellular levels.

Prerequisite: MIC 301. Or MIC 303.

Components: LEC.

Grading: GRD.

Typically Offered: Fall.

MIC 436. Fundamental and Medical Virology. 3 Credit Hours.

The study of viruses as biological entities and etiological agents of disease. Virus-cell and virus-host interactions are also discussed.

Prerequisite: MIC 301 or MIC 303.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.

MIC 441. Microbiology and Immunology Colloquium. 1 Credit Hour.

External and internal faculty presentations as well as graduate presentations of recent advances in research. Course meets one hour per week.

Prerequisite: MIC 301. Or MIC 303.

Components: SEM.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 451. Special Projects in Immunobiology. 2-6 Credit Hours.

Wet bench laboratory research with faculty in the Microbiology and Immunology (M&I) Department at the Miller School of Medicine. Students will be actively participating in all aspects of hypothesis-driven scientific research ranging from familiarity with the literature to conducting and analyzing experiments.

Requisite: at least 17 credits in MIC and MIN GPA 3.0.

Components: THI.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 452. Special Projects in Parasitology. 2-6 Credit Hours.

Wet bench laboratory research with faculty in the Microbiology and Immunology (M&I) Department at the Miller School of Medicine. Students will be actively participating in all aspects of hypothesis-driven scientific research ranging from familiarity with the literature to conducting and analyzing experiments.

Requisite: at least 17 credits in MIC and MIN GPA 3.0.

Components: THI.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 453. Special Projects in Pathogenic Bacteriology. 2-6 Credit Hours.

Wet bench laboratory research with faculty in the Microbiology and Immunology (M&I) Department at the Miller School of Medicine. Students will be actively participating in all aspects of hypothesis-driven scientific research ranging from familiarity with the literature to conducting and analyzing experiments.

Requisite: at least 17 credits in MIC and MIN GPA 3.0.

Components: THI.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 454. Special Projects in Microbial Genetics. 2-6 Credit Hours.

Wet bench laboratory research with faculty in the Microbiology and Immunology (M&I) Department at the Miller School of Medicine. Students will be actively participating in all aspects of hypothesis-driven scientific research ranging from familiarity with the literature to conducting and analyzing experiments.

Requisite: at least 17 credits in MIC and MIN GPA 3.0.

Components: THI.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 455. Special Projects in Immunogenetics. 2-6 Credit Hours.

Wet bench laboratory research with faculty in the Microbiology and Immunology (M&I) Department at the Miller School of Medicine. Students will be actively participating in all aspects of hypothesis-driven scientific research ranging from familiarity with the literature to conducting and analyzing experiments.

Requisite: at least 17 credits in MIC and MIN GPA 3.0.

Components: THI.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 456. Special Projects in Virology. 2-6 Credit Hours.

Wet bench laboratory research with faculty in the Microbiology and Immunology (M&I) Department at the Miller School of Medicine. Students will be actively participating in all aspects of hypothesis-driven scientific research ranging from familiarity with the literature to conducting and analyzing experiments.

Requisite: at least 17 credits in MIC and MIN GPA 3.0.

Components: THI.

Grading: GRD.

Typically Offered: Fall & Spring.

MIC 460. Advanced Topics in Microbiology and Immunology. 3 Credit Hours.

An extensive and detailed examination of a number of topics covered in the core courses of the major. The goal is for upper-division undergraduate students to take the knowledge base they acquired in their major core courses into 'cutting edge' research areas. Each topic (of a total of 6 to 8) will be presented by a Faculty member with expertise in the area. Topics may include reproductive immunology, microbes and beer, HIV vaccine development, cancer immunotherapy, SARS-CoV-2 and the immune system, autoimmunity in the CNS, immune-based metabolic diseases, and Yersinia pestis and the Black Death.

Prerequisite: MIC 301 and MIC 304 and MIC 319 or MIC 321.

Components: LEC.

Grading: GRD.

Typically Offered: Spring.