MICROBIOLOGY AND IMMUNOLOGY (MIC)

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: Fall.

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: Fall & Spring.

MIC 304. Introduction to Microbes and the Immune System (Lab). 3 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 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 Biology and Pathogenesis. 3 Credit Hours.
Fundamental properties of microbes as well as host-microbe relationships at the molecular and cellular levels.
Prerequisite: MIC 301.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 444. Lab Techniques and Experimental Design. 3 Credit Hours.
In this course, students will learn both microbiological and immunological methodologies including colony-forming unit assays, cell culture- and mouse-based infection systems, mouse genotyping, and flow cytometry. Experimental design will be emphasized by directly participating in ongoing research projects. Students will become certified to handle experimental animals and attend department research seminars by faculty and graduate students. In addition to laboratory-based activities, students will be reading and discussing research findings from the primary literature.
Must be a MIC major; can only count once for MIC major elective credits. Cannot be counted toward MIC minor. Pre-requisite: MIC 304 and permission of instructor.
Components: LAB.
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 relating to immunology.
Pre-requisite: MIC 304 completed with a B grade or higher.
Components: THI.
Grading: GRD.
Typically Offered: Fall & Spring.

MIC 452. Special Projects in Microbiology. 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 relating to microbes.
Pre-requisite: MIC 304 completed with a B grade or higher.
Components: THI.
Grading: GRD.
Typically Offered: Fall & Spring.

MIC 453. Special Projects in Parasitology. 3 Credit Hours.
Microscopy based analysis with a parasitology faculty member in the Microbiology and Immunology Department.
Requisite: MIC 304 with a B+ or higher.
Components: IND.
Grading: GRD.
Typically Offered: Fall & Spring.

MIC 460. Advanced Topics in Microbiology and Immunology (A). 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, HIV vaccine development, cancer immunotherapy, SARS-CoV-2 and the immune system, autoimmunity in the CNS, and immune-based metabolic diseases.
Prerequisite: MIC 301 and MIC 321.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 470. Advanced Topics in Microbiology and Immunology (B). 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.
Prerequisite: MIC 321, and MIC 323.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MIC 506. Mycotic Agents of Disease. 4 Credit Hours.

Components: LEC.
Grading: GRD.

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

MIC 623. 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 (1 credit) 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 (1 credit) 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 one exam per module.
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: Offered by Announcement Only.

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: Offered by Announcement Only.

MIC 716. Advanced Molecular Biology. 3 Credit Hours.
The molecular basis of cellular function and regulation in both procaryotic 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: Offered by Announcement Only.

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: Offered by Announcement Only.

MIC 728. Principles of Immunology. 3 Credit Hours.
This team-taught course will present core concepts in immunology and scientific reasoning in immunological research. The course is offered with seven weekly modules. Each module has a common theme and consists of three lectures on fundamental 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 the use of disease models as a portal to understand the function of immune system in health and disease. The module topics are: (1) Molecular basis of immune recognition, (2) Innate immunity, (3) Lymphoid cell development, (4) Initiation of immune responses, (5) T cell differentiation and interaction with other immune cells, (6) B cell immunity and tolerance, and (7) T cell tolerance. There will be one exam following the first four modules and the second exam after the remaining three modules. One credit can be awarded for completion of any three modules and their related exam questions. On credit can also be awarded for completion of any two modules, their related exam questions, and a self study of a current research article on immunology or immune-based therapy using a self-designed question list in a format similar to that used in the paper discussion sessions.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MIC 731. Special Work. 1-5 Credit Hours.
With the guidance of a faculty advisor, students will choose a focused topic in the area of immune-related diseases and/or immune therapy. Students may choose clinical rotations to gain a first-hand experience related to issues that patients' encounter with an immune-related disease and/or while undergoing immunotherapy. Students may also participate as a facilitator with medical students in their problem-based learning of pathophysiology and clinical sciences. Student may also survey the research findings from the literature, write a review article and design a translation or clinical study that can be integrated as an Aim or a sub-Aim into their thesis proposal.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MIC 751. Advance Topics in Microbiology and Virology. 1-3 Credit Hours.
This advanced level course is intended to explore complex interactions of microbial pathogens and hosts at the systemic, cellular, subcellular and molecular levels. This course consists of three modules focusing on the following topics: (1) Ubiquitin molecules at the host/pathogen interface and inflammasomes (1 credit); (2) Microbes, emergency hematopoiesis and autoimmunity (1 credit); and (3) The role of microbes in cancer initiation, progression and therapy (1 credit).
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MIC 755. Microbiology and Immunology Research- Career Skills and Proficiencies. 1-6 Credit Hours.
This is a longitudinal training course delivered throughout all years of training. Students start taking it upon joining the Microbiology and Immunology Program to perform research under the mentorship of participating faculty. Up to six credits may be awarded commensurate with attendance and participation in the four modules. The four modules include: Teaching assistance (TA) experience (3 credits); Attendance and participation in the weekly departmental seminars and completing written assignments on the seminars topics (1 credit); Attendance, participation and presentation in Journal Clubs (1 credit); Research Forums on Responsible Conduct of Research (RCR) and career skills (1 credit).
Components: LEC.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

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) v iral genome transcription, replication, and virus assembly; (ii) viral pathogen esis; (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 Topics in Immunology. 1-3 Credit Hours.
This course will explore in depth the current and advanced concepts and topics in selected areas of Immunology. We will cover recent advances and cutting edge experimental approaches in cellular and molecular immunology and also expose students to concepts and themes that link the various cell types into an effective immune system. The classes will consist of a mixture of lectures and discussions of recent papers and be divided into three modules: (1) Cellular and molecular networks of Immune System (1 credit); (2) Molecular regulation of Adaptive Immunity (1 credit); (3) Immunopathologies and Immunotherapies (1 credit).
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MIC 780. Research Ethics. 1 Credit Hour.
The focus of this course will be on the principles of scientific integrity, in particular how to optimize rigor and reproducibility in study designs, experimentations / trials, data collection, data management, and reporting. The class will discuss how biological variables such as sex and age impact the interpretation of research outcomes, and how those variables should be considered in experimental model systems as well as in human subject recruitment and protections in clinical trials. The course will be offered in a mixed format of lectures, seminars, small group discussion and / or workshops.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MIC 799. Advanced Topics. 1-3 Credit Hours.
This team-taught course will present core concepts in immune therapy and scientific reasoning underlying the therapeutic approaches. The focus the course will be two-fold. One goal will be the mechanistic understanding of the mode of action (MOA) for the major types of immune-based therapeutic agents in autoimmune diseases, cancer and infectious diseases. The types of immune therapy discussed in this class will include molecular targeting with antibodies, fusion proteins or aptamers, cell therapy and gene therapy. The other goal will be to provide a better understanding of human immune-related diseases and current strategies for their treatment as a portal to understand human immunology. This course will be offered in a mixed format of lectures, seminars, problem-based learning in small groups, student-led discussion of a research and/or clinical trial article on immune-based therapy and mechanisms, with the guidance of faculty facilitator.
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.
Required for all PhD candidates. The student will enroll for credits as determined by their advisor/ Office of Graduate and Postdoctoral Studies but not less than a total of 24. No more than 12 hours of research may be taken in a regular semester, and no more than six in a summer session.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

MIC 850. Research in Residence. 1 Credit Hour.
Used to establish research in residence for the Ph.D., after the student has been enrolled for the permissible cumulative total in appropriate doctoral research. Credit not granted. May be regarded as full-time residence as determined by the Dean of the Graduate School.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.