Microbiology (MIC) - Graduate Courses

Courses

MIC 500 Cr.2
Orientation to Clinical Microbiology
This course will explore career opportunities within clinical microbiology including public health, diagnostic testing, basic and industrial research and development, and pharmaceutical sales. Discussion will focus on academic and professional requirements for each career track. The course will also cover clinical laboratory management, infection control, diagnostic techniques, and communication skills. Offered by resident faculty and visiting lecturers. Prerequisite: MIC 230 or equivalent; admission to the Clinical Microbiology Program. Offered Fall.

MIC 407/507 Cr.4
Pathogenic Bacteriology
The study of pathogenic bacteria and their relationships to disease; principles of infection and pathogenesis, and unique properties of pathogens. Laboratory emphasis is on techniques for isolation and identification of pathogenic bacteria. Lect. 2, Lab 4. Prerequisite: MIC 230. Offered Fall, Spring.

MIC 410/510 Cr.2
Immunology Laboratory
Designed as an introduction to immunology techniques used in clinical and research laboratories. Includes antibody-based diagnostic tests such as ELISA and Western blot. Cell-based techniques include lymphocyte culture and flow cytometry. Prerequisite: MIC 310 or concurrent enrollment. Offered Fall, Spring.

MIC 416/516 Cr.3
Microbial Genetics
An in-depth study of the bacterial and bacteriophage genome with emphasis on the central dogma. Specific topics include DNA replication, transcription and translation, DNA mutation and repair, regulation of gene expression, mechanisms of genetic exchange, plasmid structure and function, transposition, gene mapping and recombinant DNA technology. Laboratory emphasis is on the techniques used in bacterial mutagenesis, genetic exchange, gene mapping, and gene cloning. Lect. 2, Lab. 6. Prerequisite: MIC 230; three semesters of college chemistry including organic. Offered Fall.

MIC 420/520 Cr.3
Introductory Virology
An introduction to viruses and their interactions with host organisms. Special emphasis is placed on the structure and replication cycles of virus families with medical importance. Prerequisite: MIC 230; MIC 416/516 or BIO 306 or BIO 435/535 and three semesters of college chemistry to include organic chemistry. Offered Spring.

MIC 421/521 Cr.2
Virology Laboratory
A laboratory course designed to introduce fundamental techniques used to study viruses in medicine, biotechnology and research. Emphasis is on procedures used to safely handle viruses, grow them in tissue culture, and the molecular biological, biochemical and immunological techniques used to detect and analyze viruses. Lab. 4. Prerequisite: MIC 230; MIC 416/516 or BIO 306 or BIO 435/535 and three semesters of college chemistry to include organic chemistry. Offered Fall.

MIC 425/525 Cr.5
Bacterial Physiology
An in-depth study of bacterial structure and function, catabolic and anabolic pathways, regulation, and macromolecular synthesis. Laboratory emphasis is on current techniques used to examine bacterial structure and metabolism such as macromolecular separations and quantification, use of radioisotopic tracers and quantification of enzyme activity. Lect. 2, Lab. 6. Prerequisite: MIC 230; MTH 145 or higher; CHM 300 or CHM 303. Offered Spring.

MIC 427/527 Cr.3
Industrial and Fermentation Microbiology
A study of microbiology and biochemistry of food fermentations; bioconversions; production of antibiotics, vitamins, amino acids and organic acids. Prerequisite: MIC 230 and two semesters of college chemistry. Offered Fall - Odd Numbered Years.

MIC 428/528 Cr.2
Fermentation Microbiology Laboratory
Principles of fermentation science and biotechnology with emphasis on industrial and food fermentation processes. Laboratory emphasis is on the use of various fermentation systems that generate useful products including fermented food and beverages, pharmaceuticals, chemicals and other gene products. Prerequisite: MIC 230 and two semesters of college chemistry. Offered Occasionally.

MIC 434/534 Cr.3
Aquatic Microbial Ecology
An ecological study of bacteria, cyanobacteria and algae of aquatic ecosystems. Topics include microbial strategies for survival under various environmental conditions, the role of microorganisms in biogeochemical cycling of elements, interactions of microorganisms with other aquatic biota, the role of microorganisms in pollution problems, and applications of microbial ecology to biotechnology. Laboratory emphasis is on experimental design and sampling techniques, quantification of microbial biomass, and measurement of microbial activities in aquatic habitats. One weekend field trip required. Lect. 2, Lab. 3. Prerequisite: MIC 230 and three semesters of college chemistry; BIO 341 strongly recommended. Offered Fall - Even Numbered Years.

BIO/MIC 440/540 Cr.2
Bioinformatics
In this course, students will use computers to study and compare the sequence of nucleotides in DNA or RNA, or the amino acids in a protein. Computers also are used to examine the three dimensional structure of protein. Being able to manipulate and study this information is the basis for the current revolution in biotechnology. Topics include evolution, taxonomy, genomics and understanding disease. This course provides students an opportunity to explore the relationships between biology, microbiology, chemistry, and computer science. Lect. 2, Lab 1. Prerequisite: BIO 306 or MIC 416/516. (Cross-listed with BIO/MIC; may only earn credit in one department.) Offered Spring, Winter.

BIO/MIC 442/542 Cr.3
Plant Microbe Interactions
This course will explore in-depth various ways that plants interact with microbes in the environment, at the macroscopic, cellular, and molecular levels. Case studies will include both parasitic and mutualistic (symbiotic) interactions. Microbes include fungi, bacteria, nematodes, and viruses. Includes plant pathology and studies of the beneficial relationships between plants and microbes. Inquiry-based labs are integrated into the lecture and discussion sessions. Lect. 2, Lab 2. Prerequisite: BIO 203 or BIO 304; MIC 230; BIO 306 or MIC 416. (Cross-listed with BIO/MIC; may only earn credit in one department.) Offered Spring - Even Numbered Years.
MIC 454/554 Cr.2
Mechanisms of Microbial Pathogenicity
The study of mechanisms of microbial pathogenicity including both overt microbial factors and complex interactions with the host that produce symptoms of disease. The cellular, biochemical, molecular, and genetic bases for modern understanding of microbial disease will be included. Prerequisite: MIC 310 or equivalent; MIC 407/507 or equivalent. Offered Spring - Odd Numbered Years.

MIC 455/555 Cr.3
Field and Laboratory Methods in Vector-Borne and Zoonotic Disease Research
This course will explore methods used in vector-borne and zoonotic disease research. Students will learn current field and laboratory techniques used to understand the epidemiology, spread, and transmission of vector-borne, infectious diseases (VBID’s) and other zoonotic diseases. Emphasis will be placed on sample collection in the field from birds, mammals, and vectors as well as processing and testing samples from the causative agents of West Nile encephalitis, Eastern equine encephalitis, Lyme disease, Human granulocytic ehrlichiosis (HGE), and others. Attention will focus on experimental design and computer methods used in study design and application. Lecture/Lab full-time three weeks. Course offered off campus. Prerequisite: MIC 230 or equivalent. Offered Occasionally.

MIC 460/560 Cr.1-3
Symposium in Microbiology
Varying topics in microbiology with a specific title assigned to each. Offered by resident faculty or visiting lecturers. Repeatable for credit - maximum six. Prerequisite: MIC 230. Offered Occasionally.

BIO/MIC 714 Cr.3
Advanced Genetics
The application of molecular-genetic analysis to problems in modern biology. The course will cover the fundamentals of genetic analysis in both procaryotic and eucaryotic systems. Assigned readings from current literature will be discussed and evaluated. A variety of topic areas will be considered including ecology, biotechnology, bioremediation, food science, medicine and basic research. Prerequisite: a previous course in genetics, microbial genetics, or molecular biology. (Cross-listed with BIO/MIC; may only earn credit in one department.) Offered Spring - Odd Numbered Years.

MIC 470 Cr.1-2
Directed Studies
Directed readings or presentation of material not available in formal departmental courses. Repeatable for credit - maximum four between BIO and MIC. (Cross-listed with BIO/MIC.) Offered Fall, Spring.

MIC 730 Cr.2
Biodegradation and Bioremediation of Environmental Contaminants
Microbes are able to breakdown, or biodegrade, a wide variety of compounds including some considered hazardous to human health and/or the environment. The use of microbes as biological agents to reclaim polluted soils and waters is called bioremediation. This course will explore some of the better-studied mechanisms used by microbes to degrade and detoxify contaminants. Practical aspects for the use of microbes in bioremediation and some specific examples will also be covered. In addition, the students will present and discuss a series of special topics such as nuclear waste bioremediation or current clean-up efforts in the news. Prerequisite: one semester organic chemistry; MIC 230 or equivalent microbiology course. Offered Fall - Odd Numbered Years.

MIC 753 Cr.2
Epidemiology of Infectious Disease
This course examines the causes, distribution, control, and prevention of infectious disease in human populations. Basic epidemiological concepts, including study design, analysis and modeling of infectious disease data, establishing causal relationships, detecting confounding factors, and assessing risk will be presented. Emphasis will be placed on issues of special interest to the clinical epidemiologist including laboratory diagnosis used in outbreak investigations by microbiological, serological and molecular techniques. In addition, methods to evaluate the accuracy and usefulness of diagnostic tests will be examined. Prerequisite: MIC 407/507 or equivalent course. MTH 145 or PH 755. Offered Spring - Even Numbered Years.

MIC 755 Cr.2
Advanced Immunology
An in-depth study of advanced topics in immunology, primarily focusing on the genetics, mechanisms, and regulation of the immune system. Aspects of the immune response in a variety of disease conditions (infectious and non-infectious) will be discussed. Prerequisite: MIC 310 and MIC 410/510, or equivalent. Offered Fall - Odd Numbered Years.

MIC 761 Cr.2
Research and Seminar in Microbiology
In-depth literature review of a current research topic in microbiology. As part of the requirements for this course and for the degree each student must complete an acceptable seminar paper under the direction of an assigned faculty member. Not applicable to students pursuing a Plan A thesis. Offered Fall, Winter, Spring, Summer.

MIC 770 Cr.5
Clinical Microbiology Practicum I
Students spend at least 8 full-time weeks (40 hrs/wk) in the clinical laboratories at Gunderson Lutheran Medical Center where they receive training and hands-on experience in clinical microbiology, immunology, parasitology, mycology, and virology. In addition, students will actively participate with physicians, residents, and medical students in weekly infectious disease rounds and journal club. A special course fee applies. Prerequisite: acceptance into Biology: Clinical Microbiology MS Program. Offered Fall, Spring, Summer.

MIC 780 Cr.4
Clinical Microbiology Practicum II
Students spend at least 6 full-time weeks (40 hrs/wk) in the clinical laboratories at Marshfield Laboratories/St. Joseph’s Hospital/Marshfield Clinic. Training will include hands-on experience with state-of-the-art molecular biology techniques. Specific exercises involving molecular epidemiology and infection control will be emphasized. Students will participate in weekly infectious disease rounds and journal club. A special course fee applies. Prerequisite: acceptance into Biology: Clinical Microbiology MS Program. Offered Fall, Spring, Summer.

MIC 790 Cr.2
Clinical Microbiology Practicum III
Students will spend 2 full-time weeks (40 hrs/wk) at the Wisconsin State Laboratory of Hygiene for public health training in mycobacteriology, sexually transmitted diseases, food-and water-borne diseases, and community respiratory illness surveillance. Emphasis will be on prevention and control programs and outbreak responses currently in place at the Wisconsin Department of Health. Prerequisite: MIC 770 and MIC 780. Offered Fall, Winter, Spring, Summer.

MIC 799 Cr.1-15
Research: Master’s Thesis
Independent research in microbiology on a problem selected for a thesis under the direction of an assigned faculty major adviser. For students following Plan A. Repeatable for credit - maximum 15; maximum six applicable to degree. Offered Fall, Winter, Spring, Summer.