

- MAM 761 Historical Development of Fundamental Doctrine (3)**
Study of some of the Fundamental Christian doctrines- including the meaning and function of faith, One Trinitarian God, Christian Anthropology, and Pneumatology - within the historical context of their development and within the complementarity of revelation and reason.
- MAM 769 Historical Spiritualities in the Christian Tradition (1-3)**
Study of four of the major spiritual “voices” within the Christian Tradition: The course will focus on the historical context of their development, the changes that each tradition has embodied, their influence on lay spiritual development and their continued contribution to living a Gospel spirituality in the 21st Century.
- MAM 772 Canon Law, Catholic Identity and Ecumenism (3)**
Study of Catholic beliefs, values and traditions including various styles and forms of Catholic life and worship. Emphasis on how to interact and appreciate religious beliefs and values shared by different faith communities.
- MAM 780 Christian Prayer and Spirituality (3)**
Study of the major traditions and movements in the history of Christian spirituality. Emphasis on an appreciation of one's call to ministry and Gospel living in all dimensions of life.
- MAM 792 Internship (1-4)**
Immersion in the context of ministry which allows one to witness to Gospel values, articulate one's call to ministry. Emphasis upon identifying, calling forth, affirming and supporting one's gifts and talents within the parish community and society.
- MAM 799 Synthesis in Lay Ecclesial Ministry (2)**
Understanding and application of key concepts of pastoral ministry including appropriate pastoral strategies and pastoral planning. Emphasis upon framing one's internship experience and the knowledge gleaned from previous coursework in a synthetic manner. The work of this course fulfills the Graduate School requirement of a comprehensive examination project.

MEDICAL MICROBIOLOGY AND IMMUNOLOGY(MIC)

Program Director: Philip D. Lister
Program Office: Criss II, Room 514B

GRADUATE STUDY IN MEDICAL MICROBIOLOGY AND IMMUNOLOGY

Within the context of Creighton as a Jesuit, Catholic University, the Graduate School provides value-centered education for students to develop mastery of their chosen field of study. The Medical Microbiology and Immunology programs offer an environment ideal for fostering critical judgment, scholarly initiative, and disciplined inquiry.

Program Goals

At the completion of this graduate program in Medical Microbiology & Immunology, students will:

1. Demonstrate advanced knowledge in the fields of Medical Microbiology and Immunology.
2. Demonstrate independent critical and analytical thinking, both within their field of study, and beyond for the use of their knowledge for service to others.
3. Identify and suggest possible solutions to ethical dilemmas that occur in their work and field of study, and understand the importance of professional ethics in all aspects of scientific communication and laboratory work.
4. Demonstrate competence in the laboratory, including application of the scientific method and appropriate use of basic and state of the art laboratory tools and techniques.
5. Demonstrate written and oral skills necessary for communication of research, knowledge, and ideas to scientists and non-scientists alike.

These five objectives provide a general framework for the development of graduate students as critical and analytical thinkers in their fields of study. Presented below are more specific objectives for the Ph.D. and M.S. programs.

Faculty

Primary Faculty: *Professors:* R. Goering, N. Hanson, F. Knoop, P. Lister, M. Nielsen, K. Thomson, Z. Wang; *Associate Professors:* J. Bartz, E. Chaperon, X. Chen, K. Drescher, P. Swanson; *Assistant Professors:* M. Belshan, *Professor Emeritus:* M. Severin, C. Sanders, E. Sanders.

Secondary Faculty: *Professors:* D. Agrawal, T. Casale, S. Cavalieri, A. Chatterjee, C. Destache, L. Preheim, R. Townley; *Associate Professors:* M. Bittner, G. Gorby, V. Govindarajan, E. Horowitz, A. Kincaid.

Admission Requirements

The student's academic record and performance will be a major factor in acceptance. The undergraduate curriculum must include fundamental courses in both the biological and chemical sciences. For doctoral students, a strong foundation in undergraduate microbiology, immunology, molecular biology and biochemistry are desired. However, lack of advanced courses in some of these areas will not necessarily preclude consideration for admission into the doctoral program. A minimum GPA of 3.0 on a scale of 4.0 is required. The applicant is required to submit results from the Graduate Record Exam (GRE) prior to admission. A minimum combined score of 1000 is required for the verbal and quantitative sections, and a minimum score of 4.0 is required for the analytical writing component.

The Graduate School requires all students from countries in which English is not the native language to demonstrate competence in English by a score of 550 in the TOEFL (Test of English as a Foreign Language) examination or 80 on the Internet-based Test (iBT) at the graduate level.

Doctor of Philosophy (Ph.D.) Program

The objective of the program is to prepare highly qualified students for a broad range of possible careers in research and teaching in medical microbiology and immunology and related health science fields. Study for the Ph.D. degree emphasizes independence in scientific pursuit, with a particular emphasis on research. Course work and dissertation research are designed to bring the student to a high-level of competence in microbiology and immunology with particular expertise in the area chosen for dissertation research. You will be expected to demonstrate a high capacity for original and independent thought, and apply this creativity, educational background, and knowledge of the scientific method to dissertation research.

Master of Science (M.S.) Program

The objectives of the program include preparation of the student for one or more of the following careers: (1) teaching of medical microbiology and immunology at the undergraduate level, and (2) participation in supervised or team research in universities, industry or government. In addition, the program will prepare outstanding students for pursuit of the Ph.D. degree. Study for the Master's degree emphasizes a combination of course work and laboratory experience to familiarize you with microbiology and immunology and to educate you in the scientific method. It can be a time when you identify a primary interest in microbiology and immunology, or a time when you first become introduced to the fields of microbiology and immunology.

General Requirements

The minimum curriculum required for the M.S. degree is thirty (30) semester hours, including formal core coursework and thesis research. For the Ph.D., an additional sixty (60) semester hours are required. Students entering the Ph.D. program having already obtained their M.S. degree may have a maximum of 30 credit hours transferred to the program.

MIC 541 Medical Microbiology and Immunology (4) I, II

Introduction to the field of medical microbiology, focusing on the importance of immunological defenses, bacterial genetics and physiology, bacterial infections, antibacterial chemotherapy, virology, mycology, parasitology, and other related topics associated with infectious diseases in humans. R, L. **P: Second year Pharm.D. student or degree seeking graduate student. Upper level undergraduate or other students require approval from course director.**

MIC 543 Essentials of Immunology (3) II

Lecture course covering the major areas of contemporary immunology including host resistance to infection, the chemistry of antigens and physiology of the immune system, immunogenetics and transplantation immunology, immunological techniques, tumor immunology, and immunopathology. 3 R&L. **P: MIC 541 or IC.**

- MIC 617 Molecular Biology (3) I**
Contemporary concepts and techniques in molecular biology including gene structure, coding, regulation, protein synthesis, mutation, recombination, recombinant DNA technology and transposable elements. **P: BIO 212 or IC.**
- MIC 619 Molecular Biology Laboratory (2) II**
Demonstration of laboratory techniques related to molecular biology. **P or CO: MIC 617.**
- MIC 727 Methods in Medical Microbiology and Immunology (2-4) I, AY**
Study of modern methods and instrumentation used in medical microbiology and immunology. Laboratories and group discussions will cover topics such as assays of bacteria, viruses, bacterial and viral components, bioactive products, etc. In addition, methods of nucleic acid and protein analysis, electron microscopy, and enzymatic analysis will also be discussed.
- MIC 733 Advanced Microbial Pathogenesis (3) II, AY**
Lectures, seminars, literature review, and group discussion concerning mechanisms by which microorganisms cause disease. **P: MIC 617 or IC.**
- MIC 735 Diagnostic Microbiology (4) II, AY**
Laboratory and conferences which deal with selection of clinical specimens for diagnosis, isolation of pathogenic microorganisms and preparation of media for their growth. 4 R. L arr. **P: IC.**
- MIC 737 Recent Developments in Immunopharmacology (3) I, II**
The antigen-antibody reaction with its effects on the mast cell, the release of chemical mediators, and the effect of these mediators on various tissue functions both *in vivo* and *in vitro*. The various therapeutic agents and mechanisms that influence these reactions. **P: IC.**
- MIC 739 Bacterial Physiology (3) II, AY**
Study of molecular, cellular, and genetic processes in bacteria. Includes molecular structure and function, cell division, synthesis of macromolecules, and metabolism.
- MIC 740 Host Defense (3) II**
The student will be provided with the information to have a clear understanding of various subject areas, including antigen recognition, development of B& T cells, constitutive host defenses, immunopathology, inflammation, transplantation, allergy, and tumor immunology. Lecture presentations, assigned reading and computer-aided instruction. **P: MIC 541, MIC 617 or IC.**
- MIC 745 Cellular and Molecular Immunology (3) II**
This course will focus on the basic and clinical aspects of cellular and molecular immunology. 2 R&L arr. **P: MIC 740 or IC.**
- MIC 746 Advanced Immunology (3) I, AY**
Lectures and conferences providing a coordinated and detailed account of current immunology at an advanced level. Students will be expected to familiarize themselves with the original literature, and emphasis will be given to the more rapidly progressing areas. 3 R&L arr. **P: MIC 543 or IC.**
- MIC 747 Cellular and Molecular Mechanisms of Transmembrane Signaling (3) II**
Detailed analysis of how an external signal is transduced into a cell language resulting in a response. Intracellular pathways involved in signal transduction will be examined. Discussions on various cell proteins and cross-talk among intracellular signal transduction pathways. **P: MIC 617 or IC.**
- MIC 749 Molecular Virology (3) I, AY**
Study of the physical, chemical, and biological properties of viruses. Selected topics will include such areas of investigation as cultivation and identification, replication, host-virus interactions, interference, and viral oncogenesis. **P: MIC 617 or IC.**
- MIC 753 Advanced Antimicrobial Agents and Chemotherapy (3) I, AY**
Chemistry, pharmacology, and biology of antibiotic substances and their use in therapy of infectious diseases. **P: MIC 617 or IC.**

- MIC 754 Clinical Infectious Disease** (1-4) I, II, S
Clinical, diagnostic and pathogenic aspects of infectious diseases taught in the hospital setting. Students participate in ward rounds, seminars, discussions and lectures. Problem-solving techniques involving use of clinical and laboratory evidence. **P: IC.**
- MIC 790 Current Topics in Medical Microbiology and Immunology** (2) I
Lectures and literature discussion covering recent advances in the fields of microbiology, immunology, and virology, with roughly a third of the course devoted to each field of study. This course is graded Satisfactory/Unsatisfactory. **P: MIC 541, MIC 617.**
- MIC 791 Department Seminar and Teaching** (1) I, II
The student is required to register each semester of his/her residence. This course is repeatable. The maximum credit applicable toward a degree is two for the M.S.; six for the Ph.D. This course is graded Satisfactory/Unsatisfactory.
- MIC 793 Directed Independent Readings: Selected Topics in Medical Microbiology and Immunology** (1-4) I, II, S
Conferences and reading assignments providing an opportunity for in-depth study of recent developments and associated problems in carefully selected and highly specialized areas of medical microbiology such as parasitology, mycology, clinical microbiology, pathogenesis, immunology, and epidemiology and public health.
- MIC 797 Directed Independent Research for Master's Degree Students** (1-6) I, II, S
Investigative work on selected subject. (Non-thesis research optional). L&R arr.
- MIC 799 Master's Thesis** (1-6) I, II, S
Research, under departmental supervision, in connection with the preparation of the Master's thesis. Student must register for this course in any term when engaged in formal preparation of the Master's thesis; however, six credit hours are the maximum applicable toward the degree.
- MIC 893 Directed Independent Readings: Selected Advanced Topics in Medical Microbiology and Immunology** (1-4) I, II, S
Conferences and reading assignments providing an opportunity for in-depth study of recent developments and associated problems in carefully selected and highly specialized areas of medical microbiology such as parasitology, mycology, clinical microbiology, pathogenesis, immunology, and epidemiology and public health.
- MIC 897 Directed Independent Research for Doctoral Students** (1-6) I, II, S
Investigative work on a selected subject.
- MIC 899 Doctoral Dissertation** (1-6) I, II, S
Research, under departmental supervision, in connection with the preparation of the doctoral dissertation. Student must register for this course in any term when engaged in formal preparation of the doctoral dissertation; however, 20 credit hours are the maximum applicable toward the degree.