Department of Microbiology, Molecular Genetics, and Immunology

The mission of the Department of Microbiology, Molecular Genetics and Immunology is to conduct high impact research that is relevant to human health and train the next generation of biomedical scientists and physicians who will advance our understanding of infection and immunity in ways that benefit humankind.

Our nationally recognized research programs, highly supported by NIH research funding (http://www.brjm.org/NIH_Awards/2010/NIH_Awards_2010.htm), cover a variety of topics within the following themes:

- microbial physiology and pathogenesis
- virology
- immunology and host defense

Funding also provides support for pre- and postdoctoral trainees and visiting scientists, as well as for hosting national and international researchers in the Microbiology seminar series.

Courses

MICR 801. Principles of Immunology. 1 Hour.
An introductory course in immunology; cells and tissues of the immune system; B and T cells and their receptors; major histocompatibility complex; antigen presentation; regulation of immune responses; immunity and vaccination. Prerequisite: IGPBS courses or permission of instructor. LEC.

MICR 802. Principles of Virology. 1 Hour.
An introductory course in virology; replication of RNA and DNA viruses; viral RNA processing and translation; reverse transcription; virus assembly; viral pathogenesis; viruses as vectors. Prerequisite: MICR 801 or permission of instructor. LEC.

MICR 803. Principles of Bacterial Genetics and Pathogenesis. 1 Hour.
An introductory course in bacteriology; cell structure and function; chromosome and plasmid replication; genetic engineering; bacteriophage; gene regulation; quorum sensing; antibiotics; protein secretion; bacterial pathogenesis. Prerequisite: MICR 801 MICR 802 or permission of instructor. LEC.

MICR 805. Teaching in Higher Education. 3 Hours.
Theoretical and practical aspects of teaching in a graduate degree program with emphasis on program and curriculum design, learner assessment, communicating learning expectations, selecting optimal teaching methods aligned with educational intentions, understanding diverse learning styles, use of educational technology, developing as a professional teacher and applying educational scholarship and best teaching practices to the classroom. Both theory and small group practical exercises characterize class time. Prerequisite: Any graduate or professional degree and permission of instructor. LEC.

MICR 808. Immunology. 3 Hours.
Molecular and cellular aspects of immunity. Specific topics will include immunoglobulin and receptor structure/function, attributes of antigenicity, antigen-antibody reactions, immunocompetent cells, cellular interactions, soluble mediators of immune responses and normal and abnormal immune regulation. Prerequisite: Permission of course director. LEC.

MICR 809. Tumor Immunology. 3 Hours.
Immuve system and tumor growth; tumor immunotherapy. Analysis and applications of experimental systems and discussion of contemporary as well as classical primary literature in the field. Collaborative learning and communication skills emphasized. Prerequisite: IGPBS core curriculum or equivalent, or permission of instructor. LEC.

MICR 810. Fundamentals of Immunology. 2 Hours.
Immunology and soluble mediators of the innate and adaptive systems, antigen and pattern recognition, lymphocyte development and activation, immune effector mechanisms, mechanisms of immune-based diseases. Analysis and applications of experimental systems and discussion of contemporary as well as classical primary literature in the field. Collaborative learning and communication skills emphasized. Prerequisite: Introductory course work in cell and molecular biology; biochemistry and genetics. LEC.

MICR 811. Molecular Genetics of Bacteria and Phages. 2 Hours.
This 2-credit course is designed for students pursuing a graduate degree in a biomedical field. The goal of the course is to introduce the fundamental concepts of modern microbial genetics and to expose the students to commonly used experimental procedures in microbial and molecular genetics. Students will study both textbook and literature sources and will learn to apply research methods to understand the problems associated with the bacterial physiology and genetics. Active learning approaches in the classroom will require that students work collaboratively with others. Both written and oral communication will be emphasized as important learning outcomes in this course. Prerequisite: An introductory course in biology, genetics, chemistry or biochemistry. LEC.

MICR 812. Molecular Virology and Pathogenesis. 2 Hours.
This Virology course is aimed at graduate students who are pursuing a graduate degree in a biomedical field. It provides a contemporary understanding of how viruses are built, how they infect and replicate in host cells, how they spread and evolve, how they interact with host cells, how they eventually cause diseases, and how infection of a host can be prevented. Prerequisite: Introductory course work in cell and molecular biology, biochemistry and genetics. LEC.

MICR 820. Bacterial Genetics and Pathogenesis. 3 Hours.
Genetics of bacteria with emphasis on bacterial pathogens. Topics include: gene regulation, recombination, bacteriophages, transposons, genetic exchange, plasmids, genetics of virulence, bacterial adherence and colonization, immune evasion mechanisms, bacterial toxins, vaccines and antimicrobials, re-emerging bacterial diseases. Prerequisite: Introductory course work in cell and molecular biology, biochemistry and genetics or permission of instructor. LEC.
MICR 825. Virology. 3 Hours.
Molecular biology of animal viruses. Aspects of various virus groups to be covered include structure, replication, and host cell responses. Lectures and student seminars. Prerequisite: Permission of the course director. LEC.

MICR 826. Oncogenesis Associated with Viral Infections. 3 Hours.
The course is designed primarily for students pursuing a graduate degree in a biomedical field. The course will evaluate current understanding of the various mechanisms that mediate carcinogenesis that is linked to viral infections. It will also consider strategies of circumventing virus infections as a potential way of preventing the development of tumors. Prerequisites: Course MICR 812 or permission of instructor. LEC.

MICR 830. Seminar in Microbiology. 1 Hour.
Reports on research and literature. LEC.

MICR 835. Research in Microbiology. 1-6 Hours.
This course is specifically designed to provide supervised research experience in various laboratories in the department. LEC.

MICR 855. Host-Pathogen Interactions. 3 Hours.
This course is designed for students pursuing a graduate degree in a biomedical field. Topics include host-pathogen interactions; pathogen adhesion; invasion and intracellular survival; cell death pathways; innate immunity; role of extracellular matrices. The course will cover various bacterial and viral pathogens as well as eukaryotic pathogens such as fungus. Prerequisite: Introductory course work in cell and molecular biology, biochemistry and genetics or permission of instructor. LEC.

MICR 890. Master's Research in Microbiology. 1-10 Hours.
This course is designated for research leading to the master's degree. LEC.

MICR 899. Master's Thesis in Microbiology. 1-10 Hours.
This course is designated for thesis writing leading to a master's degree in Microbiology. THE.

MICR 930. Advanced Topics in Microbiology. 1-8 Hours.
An advanced approach to selected topics in any of the major disciplines in microbiology. Readings and conferences, or advanced laboratory techniques. LEC.

MICR 990. Research for Ph.D. in Microbiology. 1-10 Hours.
This course is restricted entirely to dissertation research. RSH.

MICR 999. Dissertation for Ph.D. in Microbiology. 1-10 Hours.
Restricted to actual writing of dissertation. THE.