

DEPARTMENT OF MEDICAL MICROBIOLOGY & IMMUNOLOGY

Z. Kevin Pan, Ph.D., Chair

Z. Kevin Pan, Ph.D., Co-Track Director

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The Medical Microbiology and Immunology (MMIM) (formerly Infection, Immunity and Transplantation) training program at the University of Toledo on the Health Science Campus offers the PhD, MD/PhD, and MSBS degrees through the interdisciplinary degree programs in Biomedical Sciences. The primary goal of the doctoral program in Medical Microbiology and Immunology is to train students for independent, creative careers in research and/or teaching.

MMIM PhD students enroll in a 1st year core curriculum that provides a comprehensive overview of biochemistry/protein biology, molecular and cellular biology, molecular basis of diseases, research methodology, ethics, and statistical analyses. PhD students complete three laboratory rotations during their 1st year and join a MMIM laboratory during the spring semester of their 1st year. In the 2nd year and beyond, MMIM PhD students take advanced and elective courses, including advanced immunology, advanced microbiology, current topics in MMIM (journal club and departmental seminar series), and dissertation research. Other training activities include formal research presentations at annual Medical Microbiology and Immunology Departmental retreats, Council for Biomedical Graduate Student research forums, and presentations at regional, national, and international conferences. All PhD students in good academic standing (GPA > 3.0) may be supported by a tuition scholarship and stipend during their academic training. This financial assistance does not require the student to be a Teaching Assistant for undergraduates, thus enabling the student to concentrate on his/her graduate research. Teaching experiences can be arranged if a student desires this training as well. All PhD students are required to complete a written dissertation and defend his/her research project at a final oral defense before the degree will be conferred.

MMIM students are strongly encouraged to join laboratories of MMIM primary faculty. Other faculty in the College of Medicine and Life Sciences may have joint appointments in MMIM or may serve on graduate advisory committees. After joining a laboratory, a graduate advisory committee is jointly chosen by the student and advisor to promote academic progress toward completion of the PhD degree. The MMIM Department occupies recently-renovated space and maintains state-of-the-art equipment to answer complex microbiology and immunology questions, including studies on host-pathogen interactions and immune-mediated diseases.

Degrees Offered

- MSBS in Medical Microbiology and Immunology (<http://utoledo-public.courseleaf.com/graduate/medicine-life-sciences/departments-divisions/medical-microbiology-immunology/msbs-medical-microbiology-immunology/>)
- Ph.D in Biomedical Science - Medical Microbiology and Immunology (<http://utoledo-public.courseleaf.com/graduate/medicine-life->

sciences/departments-divisions/medical-microbiology-immunology/phd-biomedical-science-medical-microbiology-immunology/)

BMSP 5320 Statistical Methods I

[3 credit hours]

Introduction to statistical methods with emphasis on problems in the biomedical sciences. Included are descriptive statistics, probability theory, statistical inference, experimental design and simple statistical tests.

Term Offered: Summer

BMSP 6250 Grant Writing Workshop

[2 credit hours]

This is an interdisciplinary course designed to teach students skills in developing a research plan in the form of a grant proposal.

Term Offered: Spring

BMSP 6310 Systems Pathophysiology I

[2.5 credit hours]

The course will cover the fundamentals and current research efforts in biomedical sciences, emphasizing diseases of the cardiovascular, immune, and nervous systems, as well as metabolic and infectious diseases.

Term Offered: Spring

BMSP 6320 Systems Pathophysiology II

[2.5 credit hours]

The course will cover the fundamentals and current research efforts in biomedical sciences, emphasizing diseases of the cardiovascular, immune, and nervous systems, as well as metabolic and infectious diseases.

Term Offered: Spring

BMSP 6330 Current Problems and Research Approaches in Proteins

[2 credit hours]

The course will cover principles of protein structural organization, basics of protein chemistry and structure/function relationships in proteins. Special emphasis will be given to the modern trends in protein science including research in proteomic aspects of system biology and biomedical applications of proteomics.

Term Offered: Fall

BMSP 6340 Curr Prob Res App Genes/Genom

[2 credit hours]

This course provides an introduction to major areas of current research in genetics and molecular biology. Topics include gene structure and regulation, DNA replication, recombination, repair, mutation, and quantitative genetics.

Term Offered: Fall

BMSP 6350 Cell Biology & Signaling

[3 credit hours]

The content of this course will encompass didactic lectures on current knowledge and methodological approaches in the area of fundamental cellular processes and cell communication.

Term Offered: Spring

BMSP 6360 Current Problems and Research Approaches in Cell Membranes

[2 credit hours]

This course will explore vital roles played by plasma and intracellular membranes in communication and homeostasis, and by membrane lipid/protein interactions in defining cytoarchitecture, protein sorting, excitability and synaptic transmission.

Term Offered: Fall

BMSP 6370 Recent Advances in NND Journal

[1 credit hour]

Forum for the presentation, critique, and discussion of recent primary literature important to the development of the field of biomedical science.

Term Offered: Spring

BMSP 6380 Methods in Biomedical Sciences

[2 credit hours]

This course will cover the basic principles and applications, of state-of-the-art technology in molecular biology, protein chemistry, and studies with culture cells, tissue explants and transgenic animal models.

Term Offered: Fall

BMSP 6390 Mentored Research

[1-15 credit hours]

Students will be mentored in biomedical research and will gain familiarity with research projects ongoing in graduate laboratories. May be repeated for credit.

Term Offered: Spring, Summer, Fall

BMSP 6400 BPG Intro to Mthds in Bio Sci

[1 credit hour]

Introduction to biomedical methods. Required for Bioinformatics, Proteomics and Genomics (BPG) MSBS (but not certificate) students. An abbreviated version of BMSP 638, BMSP 640 runs for first 8 weeks of Fall semester.

Term Offered: Fall

BMSP 6470 System Pathophysiology

[4 credit hours]

This course provides an understanding of fundamental processes underlying pathophysiology, which occur at the cellular and organ level and lead to impairment of physiology processes. The course is organized into 6 blocks providing knowledge on the malfunctions of physiological systems, including cardiovascular, renal, skeletal, endocrinology, immunology, neural system, and cancer, and an introduction to pharmacology and applied bioinformatics.

Term Offered: Spring

BMSP 7320 Statistical Methods I

[3 credit hours]

Introduction to statistical methods with emphasis on problems in the biomedical sciences. Included are descriptive statistics, probability theory, statistical inference, experimental design and simple statistical tests.

Term Offered: Summer

BMSP 8250 Grant Writing Workshop

[2 credit hours]

This is an interdisciplinary course designed to teach students skills in developing a research plan in the form of a grant proposal.

Term Offered: Spring

BMSP 8310 Systems Pathophysiology I

[2.5 credit hours]

The course will cover the fundamentals and current research efforts in biomedical sciences, emphasizing diseases of the cardiovascular, immune, and nervous systems, as well as metabolic and infectious diseases.

Term Offered: Spring

BMSP 8320 Systems Pathophysiology II

[2.5 credit hours]

The course will cover the fundamentals and current research efforts in biomedical sciences, emphasizing diseases of the cardiovascular, immune, and nervous systems, as well as metabolic and infectious diseases.

Term Offered: Spring

BMSP 8330 Curr Prob Res App Protein Str

[2.5 credit hours]

The course will cover principles of protein structure/function relationships in proteins, protein folding, ligand-protein interactions and mechanisms of enzyme-catalyzed reactions. Special emphasis will be given to the present-day research.

Term Offered: Fall

BMSP 8340 Curr Prob Res App Genes/Genome

[2 credit hours]

This course provides an introduction to major areas of current research in genetics and molecular biology. Topics include gene structure and regulation, DNA replication, recombination, repair, mutation, and quantitative genetics.

Term Offered: Fall

BMSP 8350 Cell Biology & Signaling

[3 credit hours]

The content of this course will encompass didactic lectures on current knowledge and methodological approaches in the area of fundamental cellular processes and cell communication.

Term Offered: Spring

BMSP 8360 Curr Prob Cell Membranes

[2.5 credit hours]

This course will explore vital roles played by plasma and intracellular membranes in communication and homeostasis, and by membrane lipid/protein interactions in defining cytoarchitecture, protein sorting, excitability and synaptic transmission.

Term Offered: Fall

BMSP 8380 Methods Biomedical Sciences

[2.5 credit hours]

This course will cover the basic principles and applications, of state-of-the-art technology in molecular biology, protein chemistry, and studies with culture cells, tissue explants and transgenic animal models.

Term Offered: Fall

BMSP 8390 Mentored Research

[1-15 credit hours]

Students will be mentored in biomedical research and will gain familiarity with research projects ongoing in graduate laboratories. May be repeated for credit.

Term Offered: Spring, Summer, Fall

BMSP 8470 System Pathophysiology

[4 credit hours]

This course provides an understanding of fundamental processes underlying pathophysiology, which occur at the cellular and organ level and lead to impairment of physiology processes. The course is organized into 6 blocks providing knowledge on the malfunctions of physiological systems, including cardiovascular, renal, skeletal, endocrinology, immunology, neural system, and cancer, and an introduction to pharmacology and applied bioinformatics.

Term Offered: Spring**MICB 5020 Medical Microbiology II**

[5 credit hours]

MICB 6200 Microbiology Human Infections

[3 credit hours]

A series of lectures describing the classification, replication strategies and structural composition of the major families of animal viruses that infect humans.

MICB 6210 Advanced Virology

[3 credit hours]

An in-depth analysis of current research in virology including the reading and analysis of recently published papers on the replication and molecular biology of animal viruses, particularly viruses belonging to the Togaviridae and coronaviridae and the bacterial and plant viruses that are homologous to these two families of animal viruses.

MICB 6220 Laboratory Molecular Virology

[4 credit hours]

A laboratory course in which the students will learn to grow tissue culture cells and grow, quantify, purify, and analyze animal viruses. The student will complete a research project on a problem concerning the molecular biology of animal virus replication.

MICB 6890 Independent Study Microbiology

[0-15 credit hours]

Intensive study in field of interest, including theoretical and experimental work. May be repeated for credit

Term Offered: Spring, Summer, Fall**MICB 8200 Microbiology Human Infections**

[3 credit hours]

A series of lectures describing the classification, replication strategies and structural composition of the major families of animal viruses that infect humans.

MICB 8210 Advanced Virology

[3 credit hours]

An in-depth analysis of current research in virology including the reading and analysis of recently published papers on the replication and molecular biology of animal viruses, particularly viruses belonging to the Togaviridae and coronaviridae and the bacterial and plant viruses that are homologous to these two families of animal viruses.

MICB 8220 Laboratory Molecular Virology

[4 credit hours]

A laboratory course in which the students will learn to grow tissue culture cells and grow, quantify, purify, and analyze animal viruses. The student will complete a research project on a problem concerning the molecular biology of animal virus replication.

MICB 8890 Independent Study Microbiology

[0-15 credit hours]

Intensive study in field of interest, including theoretical and experimental work. May be repeated for credit

Term Offered: Spring, Summer, Fall