Microbiology and Immunology

Chair

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Director, Undergraduate Studies

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Undergraduate major: microbiology (B.S.)
Undergraduate minor: microbiology
Graduate degrees: M.S. in microbiology; Ph.D. in microbiology
Faculty: https://medicine.uiowa.edu/microbiology/people-0
Website: https://medicine.uiowa.edu/microbiology/

Courses

Microbiology and Immunology Courses

**MICR:2157 General Microbiology** 3 s.h.
Principles of bacterial and viral diversity, structure, genetics, physiology, and metabolism in contexts of molecular biology, immunology, infectious disease, and environmental microbiology. Prerequisites: BIOL:1411 and CHEM:1110.

**MICR:2158 General Microbiology Laboratory** 2 s.h.
Practice of basic techniques commonly used today for study of easy-to-grow microorganisms; variety of individual and group lab activities that challenge students to apply observations about bacteria and viruses. Corequisites: MICR:2157, if not taken as a prerequisite.

**MICR:3147 Immunology and Human Disease** 3 s.h.
Important principles and key concepts in immunology with a focus on the involvement of the immune system in disease pathogenesis; overview of innate and adaptive immune systems and their functions at cellular and molecular levels. Prerequisites: BIOL:1411 with a minimum grade of C and BIOL:1412 with a minimum grade of C.

**MICR:3150 Eukaryotic Pathogens and Human Disease** 2 s.h.
Foundational understanding of the lifecycle, epidemiology, pathogenesis, diagnosis, and treatment of major eukaryotic pathogens/parasites that cause human disease. Prerequisites: MICR:2157 with a minimum grade of C. Recommendations: genetics, biochemistry, and immunology.

**MICR:3159 Bacteria and Human Disease** 3 s.h.
Infection and replication strategies of bacteria with an emphasis on human disease; for students interested in microbiology or other biological sciences, epidemiology, and/or health-related occupations. Prerequisites: MICR:2157 with a minimum grade of C.

**MICR:3160 Bacterial Physiology and Cell Biology** 2 s.h.
Bacterial physiology and cell biology with reference to model organisms and adaptations to extreme environments; topics include energy metabolism, growth, cell structure, macromolecular assembly, cell division, microbial development, and microbial interactions; lectures augmented with readings from primary literature to give students a strong foundation in prokaryotic biology and approaches used in modern microbiology research. Prerequisites: (BIOC:3110 or BIOC:3120) and MICR:2157 with a minimum grade of C.

**MICR:3164 Microbiology and Human Health** 4 s.h.
Microbiology for nursing, pharmacy, and pre-health professions. Prerequisites: BIOL:1411 or BIOL:1140 or BIOL:1141.

**MICR:3165 Bacteria and Human Disease Laboratory and Discussion** 3 s.h.
Use of bacterial genetics and molecular biology techniques and methodologies to study bacteria which cause human disease; development of skills in data analysis and presentation, reading scientific literature, and writing scientific abstracts; for students interested in microbiology or other biological sciences, epidemiology, and/or health-related occupations. Prerequisites: MICR:2157 with a minimum grade of C and MICR:2158 with a minimum grade of C. Corequisites: MICR:3159 or MICR:3170, if not taken as a prerequisite.

**MICR:3168 Viruses and Human Disease** 3 s.h.
Infection and replication strategies of viruses with an emphasis on human disease; for microbiology majors as well as students interested in pre-medicine, biological sciences, epidemiology, and/or other health-related occupations. Prerequisites: BIOL:1412 with a minimum grade of C or MICR:2157 with a minimum grade of C. Recommendations: basic understanding of molecular biology and immunology.

**MICR:3170 Microbial Genetics** 2 s.h.
Genetics of bacteria and bacteriophages including classical, molecular, and genome-wide approaches. Prerequisites: BIOL:2512 with a minimum grade of C or MICR:2157 with a minimum grade of C.

**MICR:3177 Virology Discussion** 1 s.h.
Students read and discuss papers from virology literature that address current issues in virology. Prerequisites: MICR:2157 with a minimum grade of C. Corequisites: MICR:3168 (if not taken as a prerequisite).

**MICR:3178 Virology Laboratory** 2 s.h.
Practical approaches to studying viruses; basic techniques in virology including virus detection, virus growth measurement, and virus genetics; introduction to bioinformatic analysis of virus genomes and infections. Prerequisites: MICR:2157 with a minimum grade of C and MICR:2158 with a minimum grade of C. Corequisites: MICR:3168 (if not taken as a prerequisite).

**MICR:4161 Undergraduate Research in Microbiology** 1-4 arr.
Experimental research under faculty supervision. Prerequisites: BIOL:1411.

**MICR:4163 Seminar: Microbiology** 2 s.h.
Current topics in microbiology, immunology, and virology. Prerequisites: 2 of the following are required: MICR:3147 with a minimum grade of C, MICR:3159 with a minimum grade of C, MICR:3160 with a minimum grade of C, MICR:3168 with a minimum grade of C, MICR:3170 with a minimum grade of C. Requirements: senior standing.
MICR:4171 Honors Undergraduate Research in Microbiology  
Experimental research under faculty supervision.  
Prerequisites: BIOL:1411. Requirements: microbiology major,  
junior or senior standing, 3.33 overall g.p.a., and 3.33 g.p.a. in  
microbiology courses.

MICR:4175 Topics in Parasitism  
Molecular and immunologic mechanisms by which bacteria,  
viruses, and protozoa cause human diseases; based on  
manuscript readings and/or student presentations.  
Requirements: junior or higher standing in microbiology  
or related discipline, and current or prior research in a  
microbiology and immunology laboratory.

MICR:5218 Microscopy for Biomedical Research  
Basic microscopy methods for research including optics,  
preparation, and analysis of biomedical specimens; light,  
fluorescence, confocal, transmitting electron, scanning  
electron, atomic force microscopes, elemental analysis;  
imunochemistry and stereochemistry techniques; individualized  
laboratory instruction. Prerequisites: BIOL:2723. Same as  
ACB:5218, BIOL:5218.

MICR:5264 Directed Study in Microbiology  
Advanced-level experimental research or teaching under  
faculty supervision.

MICR:5875 Perspectives in Biocatalysis  
Applied enzymology, protein design, structure-  
activity relationships, biosensor technology, microbial  
transformations, biodegradation of environmental pollutants.  
Requirements: graduate standing in a participating  
department supported by the Predoctoral Training Program  
in Biotechnology. Same as BIOC:5875, CBE:5875, CEE:5875,  
CHEM:5875, PHAR:5875.

MICR:6201 Graduate Immunology  
Ontogeny, activation, and function of T lymphocytes and B  
lymphocytes; innate immune effector mechanisms; major  
histocompatibility complex; antigen presentation; thymocyte  
positive and negative selection; signaling of T lymphocytes, B  
lymphocytes; emphasis on experimental methods for analysis  
of these processes. Prerequisites: MICR:3147. Requirements:  
for IMMU:6201—college biology, general chemistry, and  
introductory immunology courses; for MICR:6201—courses in  
college biology, genetics, general chemistry, and introductory  
immunology. Recommendations: for IMMU:6201—courses in  
biology and genetics; for MICR:6201—biochemistry course.  
Same as IMMU:6201.

MICR:6240 Graduate Eukaryotic Pathogens and Human  
Disease  
Foundational understanding of the lifecycle, epidemiology,  
pathogenesis, diagnosis, and treatment of major  
eukaryotic pathogens/parasites that cause human disease.  
Recommendations: genetics, biochemistry, and immunology.

MICR:6247 Graduate Immunology and Human  
Disease  
Important principles and key concepts in immunology with a  
focus on the involvement of the immune system in disease  
pathogenesis; overview of innate and adaptive immune  
systems and their functions at cellular and molecular levels;  
learning enhanced by case-based, small-group discussion and  
writing exercises. Same as IMMU:6247.

MICR:6250 Mechanisms of Parasitism Journal Club  
Reviews of recent publications in molecular parasitology  
research and thesis research by training grant or journal club  
students. Same as MMED:6250.

MICR:6255 Graduate Experimental Approaches to  
Molecular Microbiology  
Exposure to common experimental approaches through  
examination of primary literature and facilitated discussions  
on application of those approaches to advance scientific  
research. Requirements: microbiology graduate standing.

MICR:6259 Graduate Bacteria and Human Disease  
Infection and replication strategies of bacteria with an  
emphasis on human disease; discussion focuses on  
experimental approaches used to study mechanisms of  
disease.

MICR:6260 Graduate Bacterial Physiology and Cell  
Biology  
Bacterial physiology and cell biology with reference to  
model organisms and adaptations to extreme environments;  
topics include energy metabolism, growth, cell structure,  
macromolecular assembly, cell division, microbial  
development, and microbial interactions; lectures augmented  
with readings from primary literature to give students a strong  
foundation in prokaryotic biology and approaches used in  
modern microbiology research.

MICR:6265 Introduction to Grant Writing  
How to think and write like scientists and become familiar with  
the elements of a research proposal; writing a grant proposal  
modeled on a National Institutes of Health Exploratory/  
Developmental Research Grant Award (NIH R21); students  
critique proposals written by other students; faculty read  
proposals and provide constructive criticism; lectures describe  
elements of a grant proposal and strategies for effective  
writing. Requirements: enrollment in microbiology graduate  
program, or enrollment in a graduate program training in  
a microbiology and immunology department laboratory, or  
enrollment in a biological science graduate program and  
not working in a microbiology and immunology department  
laboratory for thesis project.

MICR:6267 Graduate Viruses and Human Disease  
Infection and replication strategies of viruses with an  
emphasis on human disease; discussion focuses on topics  
and techniques used in primary literature and development of  
specific aims for a mini-proposal.

MICR:6268 Biology and Pathogenesis of Viruses  
Molecular biology of animal DNA and RNA viruses, viral  
immunology and pathogenesis, and interaction of these  
viruses with eucaryotic cells; mechanisms of viral latency,  
persistence, cellular transformation, oncogenesis; virology  
literature. Prerequisites: MICR:3168 or MICR:6267.

MICR:6269 Graduate Virology Discussion  
Discussion of primary virology literature from a range of  
topics, may include techniques used for studying viruses,  
viral entry and replication, evasion of immune responses by  
viruses, vaccines, and viral pathogenesis; short presentations;  
development of specific aims for a mock grant proposal on a  
virology-related topic. Recommendations: completion of a  
virology course.

MICR:6270 Graduate Microbial Genetics  
Genetics of bacteria and bacteriophages including classical,  
molecular, and genome-wide approaches.

MICR:7207 Advanced Topics in Immunology  
In-depth analysis of selected areas. Prerequisites: IMMU:6201  
or MICR:6201. Same as IMMU:7221.

MICR:7261 Graduate Research in Microbiology  
Requirements: microbiology graduate standing.
MICR:7263 Graduate Student Research Seminar 1 s.h.
Presentation of thesis work in progress. Requirements: microbiology graduate standing.

MICR:7265 Topics in Virology Literature 1 s.h.
Papers of current interest in primary virology literature.

MICR:8230 Dental Microbiology 3 s.h.