

Microbiology Department (MIC)

College of Science and Health
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www.uwlax.edu/academics/department/microbiology (<https://www.uwlax.edu/academics/department/microbiology/>)

Microbiology is the study of microscopic organisms, their activities, and applications. Although small in size, microorganisms play an enormous role in many areas of society including human health and disease, food, pharmaceutical and biotechnology industries, agriculture, and the environment. As a result of the widespread importance and application of microbiology, career opportunities are almost limitless. There are more microbiologists than any other type of biologist and the American Society for Microbiology is the oldest and largest single life science membership organization in the world.

The Department of Microbiology, located in Cowley Hall, supports undergraduate and graduate programs in microbiology. The **microbiology major** has been in existence since 1984 and the program has been recognized by the Universities of Wisconsin a Center of Excellence since 1988. The program is nationally known for excellence in undergraduate education and emphasizes laboratory competence in microbiology and related disciplines. A microbiology major provides a foundation for the abundant employment opportunities in microbiology and is also excellent preparation for graduate school or professional schools. Microbiology is cited as the major that best prepares pre-med students for the rigors of medical school.

The curriculum is based on the recommendations from the American Society for Microbiology, and is designed to ensure that graduates gain excellent, state-of-the-art experience in microbiology. After completing a core of microbiology courses, students may choose electives that allow them to specialize in specific areas. A large number of electives are available in areas of virology, parasitology, mycology, molecular biology, bioinformatics, food and industrial microbiology, environmental microbiology, plant microbiology, and research. Students may also elect a medical microbiology and immunology, environmental science, or business concentration with slightly different curricula. A particular emphasis of the UW-La Crosse microbiology major is laboratory competence. Faculty have received more than one million dollars in educational grants to ensure that teaching laboratories are equipped with the latest equipment. Microbiology majors receive more laboratory instruction than any other major on campus, which results in exceptionally high employability.

Center of Excellence in Microbiology

The Universities of Wisconsin and the University of Wisconsin System Board of Regents have identified the microbiology program at UWL as a Center of Excellence based on the exceptional quality of the undergraduate laboratory science education. The microbiology program has been nationally recognized for the overall quality of the program and prepares its graduates for a diversity of professional opportunities at the baccalaureate level. Since the inception of a major in 1984, more than 95 percent of the microbiology graduates interested in employment have obtained positions in hospitals, clinics, private laboratories, food

and fermentation industries, biotechnology companies, pharmaceutical industries, universities, and government agencies.

Microbiology is also an excellent curricular track to prepare students for graduate or professional schools (medical, dental, veterinary, optometry).

The microbiology major is housed within the Department of Microbiology and provides students an extensive curriculum with a strong laboratory emphasis. The Department of Microbiology faculty have obtained over one million dollars in grant funding within the past decade to ensure that students gain experience in the latest state-of-the-art techniques. Students may choose from an extensive list of microbiology electives and tailor their major to meet their career goals. In addition to the microbiology major, the department also offers microbiology majors with concentrations in business, environmental science, and medical microbiology and immunology for students wishing to focus in these areas.

All microbiology majors receive individual counseling throughout their undergraduate years. The faculty have active research programs providing abundant opportunities for undergraduate research. In addition, numerous internships are available with local and regional laboratories for microbiology majors. An active microbiology club affiliated with the American Society for Microbiology enhances the educational experience. For additional information regarding the Center of Excellence in Microbiology, contact the microbiology department chair, Cowley Hall, University of Wisconsin-La Crosse, La Crosse, WI 54601 USA.

2025-26 Faculty/Staff

The following is the department's faculty and staff as of the publication date of this catalog. This list will not be updated again until the next catalog is published in July.

Professor

Michael Hoffman

Xinhui Li

William Schwan

Associate Professor

Bonita Bratina

Paul Schweiger

Peter Wilker

Assistant Professor

Daniel Bretl

Zachariah Tritz

Teaching Professor

Marisa Barbknecht

Assistant Teaching Professor

Jennifer Gallagher

Clinical Professor

Michael Lazzari (Director Clinical Lab Science)

Clinical Associate Professor

Kari Johnson

Laboratory Supervisor

Rebecca Polanowski

Jessica Osborn

Administrative Support

Susan Hall

Majors

- Microbiology - BS (<https://catalog.uwlax.edu/undergraduate/microbiology/microbiology-bs/>)
- Microbiology major: business concentration - BS (<https://catalog.uwlax.edu/undergraduate/microbiology/business-bs/>)
- Microbiology major: environmental science concentration - BS (<https://catalog.uwlax.edu/undergraduate/microbiology/environmental-science-bs/>)
- Microbiology major: medical microbiology and immunology concentration - BS (<https://catalog.uwlax.edu/undergraduate/microbiology/medical-microbiology-and-immunology-bs/>)

Minor

- Microbiology minor (<https://catalog.uwlax.edu/undergraduate/microbiology/microbiologyminor/>)

Certificates

- Environmental microbiology certificate (<https://catalog.uwlax.edu/undergraduate/microbiology/environmental-microbiology-certificate/>)
- Food microbiology certificate (<https://catalog.uwlax.edu/undergraduate/microbiology/food-microbiology-certificate/>)
- Medical microbiology and immunology certificate (<https://catalog.uwlax.edu/undergraduate/microbiology/medical-microbiology-and-immunology-certificate/>)

Honors

- Microbiology honors program (<https://catalog.uwlax.edu/undergraduate/microbiology/honors-program/>)
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Courses

MIC 100 Cr.4

Microbes and Society

Microbiology plays an integral role in human affairs and our daily lives. Some microorganisms have caused tremendous suffering throughout history, however many microbes have also provided countless benefits to humans and play vital roles in essential global cycles. This course examines the science of microbiology and the impact of microbiology on human affairs. The principles of microbial diversity, cell structure, growth and reproduction, global processes, disease, and prevention of disease are covered. Each topic provides a basis for discussion of current issues where microorganisms play a role. The laboratory provides an inquiry based approach to examining the diversity of microorganisms and their role in disease, spoilage, genetic engineering, food and antibiotic production, agriculture, and the environment. Lect. 3, Lab 2. Offered Fall, Spring.

MIC 130 Cr.3

Global Impact of Infectious Disease

A multifaceted examination of issues related to infectious disease throughout the world. The course will begin with historical examples of how infectious disease has impacted society, from plagues of centuries past to recent emerging diseases. After defining the types of pathogens and methods for their control, the interplay between infectious disease and global economics, health and politics will be evaluated. Additionally, the impact of public perceptions and misconceptions on the spread of infectious disease will be analyzed. Finally, the role of current human activities in shaping disease patterns of the future will be explored. Offered Fall, Spring, Summer.

MIC 150 Cr.3

Discovery Microbiology

This research-embedded course is part of the Tiny Earth program's initiative to have students across the world participating in the shared scientific discovery of new antibiotic-producing bacteria. Labs provide the opportunity to carry out authentic, basic scientific research, including formulating hypotheses, designing and refining experiments to test hypotheses, and interpreting and communicating results. Data from the research are entered into a public database for use by other scientists. Lectures cover soil as an environment and a source of antibiotic-producing bacteria and basic information about bacteria, their growth, and identification. Lect. 1, Lab 4. Prerequisite: to be taken by students with less than 45 credits. Offered Fall.

MIC 230 Cr.4

Fundamentals of Microbiology

An introduction to the fundamental principles and applications of microbiology with an emphasis on the role of microorganisms, especially bacteria, in human affairs. Lecture topics include microbial diversity, cell structure and function, growth and metabolism, genetics, genetic engineering, control of microbial growth, host-parasite interactions, immunology, microbial ecology and applied microbiology. Laboratory emphasis is on methods used to cultivate and identify bacteria, genetic techniques, and on standard techniques used in applications of microbiology (clinical, food, industrial, and aquatic). Lect. 2, Lab 4. Prerequisite: BIO 105; CHM 103 or concurrent enrollment. Offered Fall, Spring.

MIC 260 Cr.1-3

Topics 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.

MIC 299 Cr.1-2

Introduction to Microbiology Research

An opportunity to participate in laboratory or field research experience under the direction of a faculty member. Depending on the nature of the research project, study will involve participation in laboratory or theoretical work in addition to selected readings and instruction. A written report to the supervising faculty member is an expected outcome. Completion of safety training required prior to beginning research. Admission with instructor and department approval. Repeatable for credit - maximum four. Consent of instructor. Offered Fall, Winter, Spring, Summer.

MIC 310 Cr.3

Immunology

Fundamentals of immune system structure and function. Includes response to infectious agents, as well as vaccination, allergy, autoimmune disease, cancer, organ transplantation, immune deficiency and related public health issues. Prerequisite: MIC 100 or BIO 105 with a grade of "C" or better; one 200 level or higher biology or microbiology course. Offered Fall, Spring.

MIC 350 Cr.3

Bacterial Diversity

A survey of the bacteria. Lectures will cover bacterial classification and the structure, physiology, ecology, and applications of various groups of bacteria. Special emphasis will be on the more unique species and those of industrial, ecological and environmental importance. The laboratory will involve enrichment and isolation procedures for selective groups of bacteria. Lect. 2, Lab 3. Prerequisite: MIC 230. Offered Spring, Fall-Odd # Years.

MIC 380 Cr.4

Food Microbiology

A study of environmental factors affecting the growth, activity, and destruction of microorganisms in food; principles of food spoilage; preservation of foods, including basic methods and their application to foods; food-borne intoxications and infections; indicator organisms; sanitation and microbiological standards in foods. Laboratory instruction includes quality control methods, sampling methods, techniques to identify important microorganisms in foods, and data interpretation and analysis. Lect. 2, Lab 4. Prerequisite: MIC 230. Offered Spring.

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. Not applicable to biology major; may be applied to the microbiology, clinical laboratory science major and/or degree as well as an elective for the biology biomedical concentration. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Lect. 2, Lab 4. Prerequisite: MIC 230; junior standing. 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. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Lab 4. Prerequisite: MIC 310 or concurrent enrollment; junior standing. Offered Fall, Spring.

MIC 416/516 Cr.4

Prokaryotic Molecular Genetics

This course provides an in-depth study of the Central Dogma including DNA replication, transcription, and translation. In addition, specific focus is on mechanisms of gene exchange in prokaryotes including transformation (natural and artificial), conjugation, and transduction (including bacteriophage biology). Other topics covered include genetic terminology, recombination and transposition, mutagenesis and repair, and gene regulation. Laboratory emphasis is on bacterial mutagenesis, genetic exchange and cloning techniques. This course is taught largely at an undergraduate level. Graduate students have additional course requirements/expectations. Lect. 2, Dis. 1, Lab 3. Prerequisite: MIC 230; additional 300 or higher level MIC, BIO, or CHM course with a lab; junior standing. Consent of instructor. 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. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Prerequisite: MIC 230; MIC 416 or BIO 306 or BIO 435; junior standing; 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. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Lab 4. Prerequisite: MIC 230; MIC 416 or concurrent enrollment, or BIO 306; three semesters of college chemistry to include organic chemistry; junior standing. Offered Fall.

MIC 425/525 Cr.4

Bacterial Physiology

An in-depth study of bacterial structure and function, catabolic and anabolic pathways, regulation, and macromolecular synthesis. Laboratory emphasizes techniques used to examine bacterial structure and metabolism, such as macromolecular separations and quantification, use of radioisotopic tracers and quantification of enzyme activity. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Lect. 2, Lab 3, Disc. 1. Prerequisite: MIC 230; additional level 300 or higher MIC course with a lab; CHM 300 or CHM 303; junior standing. 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. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Prerequisite: MIC 230, CHM 104; junior standing. 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. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Lab. 4. Prerequisite: MIC 230, CHM 104; junior standing. Offered Alternate Years.

MIC 434/534 Cr.3

Aquatic Microbial Ecology

This course is 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. This course is taught largely at an undergraduate level. Graduate students have additional course requirements/expectations. Lect. 2, Lab 3. Prerequisite: MIC 230; three semesters of college chemistry; junior standing. Offered Fall - Even Numbered Years.

MIC/BIO 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 are also 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. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Lect. 1, Lab 2. Prerequisite: BIO 306 or MIC 416; junior standing. (Cross-listed with BIO/MIC, may only earn credit in one department.) Offered Spring, Winter.

MIC/BIO 442/542 Cr.3

Plant Microbe Interactions

This course explores in depth various ways that plants interact with microbes in the environment, at the macroscopic, cellular, and molecular levels. Case studies 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. This course is taught largely at an undergraduate level. Graduate students have additional course requirements/expectations. Lect. 2, Lab 2. Prerequisite: BIO 203 or MIC 230; junior standing. (Cross-listed with BIO/MIC, may only earn credit in one department.) Offered Fall - Odd Numbered Years.

MIC 450 Cr.1-3

Internship in Microbiology

An academically relevant field experience in government, industry, business or community agencies. Students must have their internships approved and be advised by the department. Students must be on their internship work site during the semester for which they are registered for academic credit. Repeatable for credit - maximum eight. Maximum of two credits applicable to major. Consent of department. Pass/Fail grading. Offered Fall, Winter, Spring, Summer.

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. This course is taught largely at a graduate level. Prerequisite: MIC 310 or equivalent; MIC 407 or equivalent; junior standing. Offered Spring - Odd Numbered Years.

MIC 458/558 Cr.2

Research Deconstruction

This course is an in-depth investigation of current and impactful biomedical, microbiology, or related research. Students listen to a high-level professional research seminar provided by an esteemed investigator. In the weeks following that seminar, students "deconstruct" the research and presentation, exploring topics such as important background information, hypotheses and controls, experimental methodology, and the results and conclusions from that work. Other topics may include discussion of presentation quality and style, graduate school and research experience, and career paths for MS and PhD graduates. All students interested in better understanding how research is performed are welcome and no prior research experience is required. This course is taught largely at an undergraduate level. Graduate students have additional course requirements/expectations. Prerequisite: MIC 230; junior standing. Offered Spring.

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. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Repeatable for credit - maximum six. Prerequisite: MIC 230; junior standing. Offered Occasionally.

MIC 461 Cr.1

Capstone in Microbiology

A seminar-style course designed for students to review and discuss basic concepts necessary for a career in microbiology and to assess their major. This course will cover basic concepts of quantitative skills, computer literacy, and current topics microbiology. Students are expected to actively participate in an assessment of their major, and participate in discussions on major issues and developments in the microbiological sciences. Students will present a seminar on a contemporary microbiological topic incorporating primary literature. Prerequisite: senior standing; must have completed all core microbiology classes by the end of the semester for which one is enrolling. Offered Fall, Spring.

MIC 479 Cr.1-2

Microbiology Laboratory Assistant

An opportunity to assist in the preparation and instruction of a microbiology laboratory. Students will be expected to assist in preparation of course materials, demonstrate proper techniques, and evaluate student performance. Completion of safety training required. Repeatable for credit - maximum four. Consent of instructor. Pass/Fail grading. Offered Fall, Spring, Summer.

MIC 489 Cr.1-2

Independent Study in Microbiology

A directed reading/project course covering a standard body of knowledge within the discipline but outside that offered through regularly scheduled courses. Under the direction of the supervising faculty member, study may involve a review of current literature. A written report or project is an expected outcome. Completion of safety training required prior to beginning a laboratory or field-based project. Admission with instructor and department approval. Repeatable for credit - maximum four. Consent of department. Offered Fall, Winter, Spring, Summer.

MIC 499 Cr.1-10

Independent Research in Microbiology

An opportunity to pursue individual research topics under the direction of a faculty member. Depending on the nature of the research project, study is expected to involve substantial laboratory or theoretical work in addition to literature review and instruction. Students are expected to develop research skills related to microbiology. In addition to a written report to the supervising faculty member, expected outcomes may include: laboratory notebooks, experimental devices, software, papers and presentations to departments and regional meetings. Completion of safety training required prior to beginning research. Admission with instructor and department approval. Repeatable for credit - maximum 10. Two credits apply to the major. Consent of department. Offered Fall, Winter, Spring, Summer.