

MICROBIOLOGY & MOLECULAR GENETICS

College of Biological Sciences

Wolf-Dietrich Heyer, Ph.D., Chairperson of the Department; term ends June 30, 2026

Department Office

357 Briggs Hall; 530-752-2626; Microbiology Graduate Group (<https://mmg.ucdavis.edu/>); Faculty (<https://mmg.ucdavis.edu/people/faculty/>)

- Molecular & Medical Microbiology, Bachelor of Arts (<https://catalog.ucdavis.edu/departments-programs-degrees/molecular-medical-microbiology/molecular-medical-microbiology-ab/>)
- Molecular & Medical Microbiology, Bachelor of Science (<https://catalog.ucdavis.edu/departments-programs-degrees/molecular-medical-microbiology/molecular-medical-microbiology-bs/>)

Microbiology (MIC)

MIC 010 – Natural History of Infectious Diseases (3 units)

Course Description: Topics in the natural history of infectious diseases principally affecting humans. Introduction to infectious microbial agents, ecology, epidemiology, and induction of disease. Focus on diseases of a contemporary nature.

Learning Activities: Lecture 3 hour(s).

Credit Limitation(s): Not open for credit to students who have completed MIC 101, MIC 102, or MIC 104.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 091 – Introduction to Research (1 unit)

Course Description: Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members.

Prerequisite(s): BIS 002A; or equivalent.

Learning Activities: Seminar 1 hour(s).

Enrollment Restriction(s): Restricted to lower division standing.

Repeat Credit: May be repeated 3 time(s).

Grade Mode: Pass/No Pass only.

General Education: Science & Engineering (SE).

MIC 098 – Directed Group Study (1-5 units)

Course Description: Primarily for lower division students.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Pass/No Pass only.

MIC 099 – Special Study for Undergraduates (1-5 units)

Course Description: Special study for undergraduates.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Repeat Credit: May be repeated.

Grade Mode: Pass/No Pass only.

MIC 101 – Introductory Microbiology (5 units)

Starting Spring Quarter 2024, this course is no longer offered.

Course Description: Survey of microorganisms emphasizing their interactions with humans and diseases. Topics include microscopy, survey of various microbes, the immune system, food microbiology, microbial pathogens, and mechanisms of disease transmission. Designed for students requiring microbiology for professional schools.

Prerequisite(s): (BIS 001A or BIS 002A); CHE 002B (can be concurrent).

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s), Laboratory 3 hour(s).

Credit Limitation(s): Not open for credit to students who have completed MIC 102, MIC 102L, MIC 104, or MIC 104L.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

MIC 102 – Introductory Microbiology (3 units)

Course Description: Essentials of microbial biology, emphasizing phylogeny, physiology, genetics, ecology, and pathogenesis. Interactions with other microbes, humans, and the biosphere. Uses of microbes in agriculture and biotechnology. May be taught abroad.

Prerequisite(s): (BIS 001A or BIS 002A); CHE 002B (can be concurrent).

Learning Activities: Lecture 3 hour(s).

Credit Limitation(s): Not open for credit to students who have completed MIC 101 or MIC 104.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL).

MIC 103L – Introductory Microbiology Laboratory (2 units)

Course Description: Introduction to principles and laboratory methods employed in working with microorganisms. Designed for students requiring microbiology for professional school admission. May be taught abroad.

Prerequisite(s): MIC 102 C- or better; CHE 002B.

Learning Activities: Lecture 1 hour(s), Laboratory 3 hour(s).

Credit Limitation(s): Not open to students who completed MIC 101 before spring 2016, or who have completed MIC 102L or MIC 104L.

Grade Mode: Letter.

MIC 104L – General Microbiology Laboratory (3 units)

Course Description: Principles and laboratory methods employed in working with microorganisms. Designed for students continuing in microbiology, genetics, or biochemistry.

Prerequisite(s): MIC 102 C or better; (CHE 008B or CHE 118B or CHE 129A); and consent of instructor.

Learning Activities: Lecture 1 hour(s), Laboratory 6 hour(s).

Enrollment Restriction(s): Students must complete a petition for consideration of enrollment; petition available on department of Microbiology and Molecular Genetics website.

Credit Limitation(s): Only 2 units of credit for students who completed MIC 101 before spring 2016, or who have completed MIC 103L; not open to students who have completed MIC 102L.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Writing Experience (WE).

MIC 105 – Microbial Diversity (3 units)

Course Description: Survey of the major groups of microorganisms emphasizing diversity of energy metabolism, morphology, evolution, and natural history.

Prerequisite(s): MIC 102 or MIC 104; BIS 101; BIS 103 or BIS 105 strongly recommended.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 105L – Microbial Diversity Laboratory (3 units)

Course Description: Classical enrichments for the isolation of metabolically diverse microbes; modern molecular methods for the identification of isolates; cultivation independent analysis of microbial communities from local environmental samples.

Prerequisite(s): (MIC 102 or MIC 104); (MIC 102L or MIC 104L); MIC 105 (can be concurrent).

Learning Activities: Lecture 1 hour(s), Laboratory 6 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Writing Experience (WE).

MIC 111 – Human Microbiology (3 units)

Course Description: Biology of microorganisms that form commensal, mutualistic, and pathogenic relationships with human beings, emphasizing their phylogeny, physiology, genetics, and ecology. Effects on human nutrition, development and physiology. Mechanisms of pathogenesis, immune response evasion, antibiotic action, and antibiotic resistance.

Prerequisite(s): MIC 102; BIS 101.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 115 – Recombinant DNA Cloning & Analysis (3 units)

Course Description: Cloning and analysis of recombinant DNA, with emphasis on Escherichia coli host-vector systems. DNA-modifying enzymes; vectors and their use; manipulation and expression of insert DNA; polymerase chain reaction; and sequence annotation. Graduate students see MIC 215.

Prerequisite(s): BIS 101; or the equivalent.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 117 – Analysis of Molecular Genetic Circuits (4 units)

Starting Spring Quarter 2024, this course is no longer offered.

Course Description: Project-based course focused on problem-solving strategies in biology and medicine. Testing hypotheses by translating real-world problems into an appropriate mathematical model and translating the results into real-world understanding.

Prerequisite(s): BIS 002A; MAT 017A; MAT 017B; MAT 017C; or consent of instructor.

Learning Activities: Lecture 4 hour(s).

Credit Limitation(s): Not open for credit to students who have taken BIM 117.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL).

MIC 120 – Microbial Ecology (3 units)

Course Description: Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats.

Prerequisite(s): MIC 105; (BIS 102 or BIS 105).

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 140 – Bacterial Physiology (3 units)

Starting Spring Quarter 2024, this course is no longer offered.

Course Description: Fundamentals of bacterial growth and bacterial responses to environmental stresses. Topics will include carbon and nitrogen regulation, growth rate control, post-exponential growth, and motility and chemotaxis.

Prerequisite(s): (BIS 101, BIS 102, BIS 103 (can be concurrent)) or (BIS 101, BIS 105); MIC 102 recommended.

Learning Activities: Lecture 3 hour(s).

Credit Limitation(s): Not open for credit to students who have completed MIC 130A.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 150 – Genomes of Pathogenic Bacteria (3 units)

Course Description: Molecular genetics and comparative genomics of representative pathogenic bacteria. Roles of mobile genetic elements, lateral gene transfer, and genome rearrangements in pathogen evolution. Mutation, recombination, and complementation as tools for genetic analysis. Content includes close examination of primary research articles.

Prerequisite(s): MIC 102; BIS 101.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 155L – Bacterial Physiology Lab (4 units)

Starting Spring Quarter 2024, this course is no longer offered.

Course Description: Physiology and genetics of bacteria. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction studies of control of enzyme synthesis by induction, repression, and catabolite repression.

Prerequisite(s): (MIC 140 or MIC 150); MIC 120L; and consent of instructor.

Learning Activities: Lecture/Discussion 1 hour(s), Laboratory 8 hour(s).

Grade Mode: Letter.

MIC 162 – General Virology (3 units)

Course Description: Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics.

Prerequisite(s): BIS 101; BIS 102 or BIS 105 recommended.

Learning Activities: Lecture 3 hour(s).

Credit Limitation(s): Only 2 units of credit for students who have taken PMI 128.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 170 – Yeast Molecular Genetics (3 units)

Course Description: Survey of the genetics, cell biology and technologies in yeasts and related lower eukaryotes. Topics include diversity of yeasts; cell structure; metabolism; cell cycle; genetic approaches and genomics; gene expression; yeasts as models to study higher eukaryotes; and contemporary techniques.

Prerequisite(s): BIS 101; MIC 102 or MIC 105 strongly recommended.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

MIC 172 – Host-Parasite Interactions (3 units)

Course Description: Exploration of host-parasite interactions at multiple levels, with an emphasis on global health and medically important human parasites.

Prerequisite(s): MIC 102 or MIC 101 or MIC 104; BIS 101; Biological Sciences 102 or 105 strongly recommended.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

MIC 175 – Cancer Biology (3 units)

Course Description: Exploration of the causes and treatments of cancer at multiple levels: molecular/cell biology, clinical manifestations, epidemiology and prevention.

Prerequisite(s): BIS 101; (BIS 102 or BIS 105).

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

MIC 190C – Undergraduates Research Conference (1 unit)

Course Description: Presentation and critical discussion of staff research activities: designed for advanced undergraduate students.

Prerequisite(s): MIC 199 (can be concurrent); and consent of instructor; upper division standing; MIC 199 required concurrently.

Learning Activities: Discussion 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Pass/No Pass only.

MIC 191 – Introduction to Research for Advanced Undergraduates (1 unit)

Course Description: Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members.

Prerequisite(s): BIS 002A; or equivalent.

Learning Activities: Seminar 1 hour(s).

Enrollment Restriction(s): Restricted to upper division standing.

Repeat Credit: May be repeated 3 time(s).

Grade Mode: Pass/No Pass only.

General Education: Science & Engineering (SE).

MIC 192 – Internship (1-12 units)

Course Description: Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty.

Learning Activities: Internship 3-36 hour(s).

Grade Mode: Pass/No Pass only.

MIC 194H – Microbiology Honors Research (2 units)

Course Description: Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director.

Prerequisite(s): Senior standing; eligibility for college honors; completion of 6 units of MIC 199; consent of section.

Learning Activities: Independent Study 6 hour(s).

Grade Mode: Pass/No Pass only.

MIC 197T – Tutoring in Microbiology (1-12 units)

Course Description: Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities.

Prerequisite(s): Consent of instructor; upper division standing.

Learning Activities: Variable 3-36 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Pass/No Pass only.

MIC 198 – Directed Group Study (1-5 units)

Course Description: Directed group study. May be taught abroad.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Pass/No Pass only.

MIC 199 – Special Study for Advanced Undergraduates (1-5 units)

Course Description: Special study for advanced undergraduates.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Pass/No Pass only.

MIC 200B – Advanced Bacteriology (3 units)

Course Description: Intended for first-year graduate students in Microbiology and closely-related fields. Advanced topics in phylogeny, physiology and diversity of bacteria.

Prerequisite(s): MIB 200A.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

MIC 215 – Recombinant DNA (3 units)

Course Description: Application of recombinant DNA technology to modern problems in biology, biochemistry, and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA, and selection procedures.

Prerequisite(s): BIS 101; BIS 102; BIS 103; or the equivalent.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

MIC 217 – Analysis of Molecular Genetic Circuits (4 units)

Course Description: Project-based course focused on problem-solving strategies in biology. Emphasis on testing hypotheses by translating real-world problems into an appropriate mathematical model and translating the results into real-world understanding.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture 4 hour(s).

Credit Limitation(s): Only 2 units of credit for students who have previously taken BIM 117 or MIC 117.

Grade Mode: Letter.

MIC 262 – Advanced General & Molecular Virology (3 units)

Course Description: Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression and replication, and effects on host cells and organisms.

Prerequisite(s): Graduate standing.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

MIC 263 – Principles of Protein-Nucleic Acid Interactions (3 units)

Course Description: Physical basis of protein-nucleic acid interaction.

Topics include nucleic acid recognition by proteins, thermodynamics of protein-nucleic acid stability, and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein-nucleic acid interactions.

Prerequisite(s): Advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

MIC 274 – Seminar in Genetic Recombination (1 unit)

Course Description: Biochemical and genetic aspects of genetic recombination in prokaryotes and eukaryotes. Mechanisms of recombination and biochemical and genetic characteristics of recombination proteins. Proteins include DNA strand exchange, DNA helicases, and Holliday junction resolving proteins.

Prerequisite(s): Consent of instructor; graduate standing.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

MIC 275 – Seminar in DNA Repair & Recombination (1 unit)

Course Description: Review and discussion of current research and literature in DNA repair and recombination with presentations by individual students and invited speakers.

Prerequisite(s): Consent of instructor; graduate standing in Microbiology or closely-related field.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

MIC 276 – Advanced Concepts in DNA Metabolism (3 units)

Course Description: DNA damage checkpoints, homologous recombination, and meiotic recombination. An advanced treatment of the clinical and current literature to discuss emerging principles and current models in these research areas.

Prerequisite(s): MCB 221C or GGG 201C or equivalent course recommended.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

MIC 290C – Advanced Research Conference (1 unit)

Course Description: Presentation and critical discussion of staff research activities. Designed for advanced graduate students.

Prerequisite(s): Graduate standing and/or consent of instructor.

Learning Activities: Discussion 1 hour(s), Conference 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

MIC 291 – Selected Topics in Microbiology (1 unit)

Course Description: Current progress in microbiology and cellular and molecular biology.

Prerequisite(s): Consent of instructor; graduate standing.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

MIC 292 – Seminar in Bacterial Physiology & Genetics (1 unit)

Course Description: Review and discussion of current research and literature in bacterial physiology and genetics, with presentations by individual students.

Prerequisite(s): Consent of instructor; graduate standing in Microbiology or closely-related field.

Learning Activities: Seminar 1 hour(s).

Grade Mode: Satisfactory/Unsatisfactory only.

MIC 298 – Group Study (1-5 units)

Course Description: Group study.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.

MIC 299 – Research (1-12 units)

Course Description: Research.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.

MIC 396 – Teaching Assistant Training Practicum (1-4 units)

Course Description: Teaching assistant training.

Prerequisite(s): Graduate standing.

Learning Activities: Variable.

Repeat Credit: May be repeated.

Grade Mode: Pass/No Pass only.