

MICROBIOLOGY (MCRO)

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MCRO Courses

MCRO 1100 Introduction to Microbiology Research (2 units)

Term Typically Offered: F

CR/NC

Group research experience in microbiology through participation in a faculty-student research project. Foundations of the scientific method including literature review, design of experiments, common laboratory techniques, data analysis, interpretation of results and scientific communication. Intended for freshmen and sophomores with no research experience. Priority to Microbiology majors. Credit/No Credit grading only. 1 seminar, 1 laboratory. Formerly MCRO 100.

MCRO 2221 Introduction to Microbiology (4 units)

Term Typically Offered: F, SP, SU

2026-28 or later catalog: GE Area 5B

2026-28 or later catalog: GE Area 5C

2020-26 catalogs: GE Area B2

2020-26 catalogs: GE Area B3

Prerequisite: One of the following: CHEM 110, CHEM 124, CHEM 125, CHEM 127, CHEM 1110, CHEM 1120, or CHEM 1122.

Microbial classification and identification, cell structure and function, metabolism, microbial systems and evolutionary processes, with applications to industry, agriculture, food production, environment, and health. Not open to students with credit in MCRO 224 or MCRO 2224. Not for credit for Biology and Microbiology majors. Course may be offered in classroom-based or hybrid format. 3 lectures, 1 laboratory. Fulfills GE Areas 5B and 5C (GE Areas B2 and B3 for students on the 2020-26 catalogs). Formerly MCRO 221.

MCRO 2224 General Microbiology I (4 units)

Term Typically Offered: F, SP

Prerequisite: BIO 161 or BIO 1151; CHEM 124 or CHEM 1120; and CHEM 125 or CHEM 1122.

Fundamental concepts of prokaryotes, eukaryotic microorganisms, and microbiological entities. Microbial classification, structure and function, metabolism, genetics and genomics, growth dynamics and control. Microbial interaction with society and human health. Course may be offered in classroom-based or hybrid format. 3 lectures, 1 laboratory.

MCRO 2227 General Microbiology II (4 units)

Term Typically Offered: SP

Prerequisite: One of the following: MCRO 221, MCRO 224, MCRO 2221, or MCRO 2224.

Microbial diversity, systematics, ecology, and symbiotic relationships. Introduction to host-microorganism interactions including pathogenesis, epidemiology, and immunology. Course may be offered in classroom- or hybrid format. 2 lectures, 2 activities. Formerly MCRO 225.

MCRO 3301 Wine Microbiology (3 units)

Term Typically Offered: SP

Prerequisite: One of the following: MCRO 221, MCRO 224, MCRO 2221, or MCRO 2224. Recommended: WVIT 202 or WVIT 2202.

Wine yeasts, bacteria, and molds: morphology and methods of identification. Successful alcoholic and malolactic fermentations, management and prevention of unwanted microbial growth, micro-organisms and flavor development. 2 lectures, 1 laboratory. Crosslisted as MCRO/WVIT 3301. Formerly MCRO/WVIT 301.

MCRO 3320 Emerging Infectious Diseases (3 units)

Term Typically Offered: F, SU

Prerequisite: BIO 161 or BIO 1151; and one of the following: MCRO 221, MCRO 224, MCRO 2221, or MCRO 2224.

Recent outbreaks of human diseases, interrelationships between infectious disease agents, human biology, and the environment. Infectious agents and disease processes, virulence mechanisms, and host immune response. Clinical approaches and surveillance methods to detect, investigate, and monitor emerging pathogens. Factors involved in the accelerating emergence of diseases. Course may be offered in classroom-based or hybrid format. 3 lectures. Formerly MCRO 320.

MCRO 3321 Microbes, Food, and Microbiome (3 units)

Term Typically Offered: TBD

2026-28 or later: Upper-Div GE Area 2/5

2020-26 catalogs: Upper-Div GE Area B

Prerequisite: Junior standing; completion of GE Area 1 with grades of C- or better (GE Area A for the 2020-26 catalogs); completion of GE Area 2 with a grade of C- or better (GE Area B4 for the 2020-26 catalogs); and completion of GE Area 5 (GE Areas B1 to B3 for the 2020-26 catalogs).

Basic principles of food microbiology, including microbial activities in food production, preservation, spoilage, and poisoning. Common bacteria, fungi, protists, and viruses encountered via food. Analysis of food trends revolving around probiotics, pathogens, and gut health. Not open for major credit in Biological Sciences, Food Science, Microbiology, or Marine Sciences. Not open to students with credit in MCRO 421 or MCRO 4421. Course may be offered in classroom-based, online, or hybrid format. 3 lectures. Fulfills GE Areas Upper-Division 2 or Upper-Division 5 (GE Area Upper-Division B for students on the 2020-26 catalogs).

MCRO 3342 Public Health Microbiology (3 units)

Term Typically Offered: TBD

Prerequisite: One of the following: MCRO 221, MCRO 224, MCRO 2221, or MCRO 2224.

Principles and applications of microbial disease prevention and control. Epidemiology of major water-borne, food-borne, and air-borne microbial pathogens. Host-pathogen interactions and their public health implications and significance. Field trip required. 2 lectures, 1 laboratory. Formerly MCRO 342.

MCRO 3351 Microbial Genetics (3 units)

Term Typically Offered: F

Prerequisite: BIO 161 or BIO 1151; and MCRO 224 or MCRO 2224. Concurrent: MCRO 3352. Recommended: One of the following: CHEM 216, CHEM 312, CHEM 2240, or CHEM 2242.

Principles of prokaryotic DNA replication, transcription, and translation. Emphasis on mutations and repair mechanisms, mechanisms of gene regulation, and horizontal gene transfer in the context of bacteria-host interactions. Not open to students with credit in BIO 351, BIO 3351, CHEM 373, or CHEM 3356. 3 lectures.

MCRO 3352 Microbial Genetics Laboratory (2 units)

Term Typically Offered: F

Prerequisite: BIO 161 or BIO 1151; and MCRO 224 or MCRO 2224. Concurrent: MCRO 3351. Recommended: One of the following: CHEM 216, CHEM 312, CHEM 2240, or CHEM 2242.

Inquiry-based laboratory utilizing current methods to study microbial genetics. Emphasis on a workflow approach including creation of mutant strains of model organisms, genotypic characterization, complementation, and experimentation to reveal phenotypes. Integration of bioinformatics approaches. 2 laboratories.

MCRO 4402 General Virology (3 units)

Term Typically Offered: F

Prerequisite: One of the following: BIO 351, BIO 3351, CHEM 373, CHEM 3356, or MCRO 3351; or graduate standing in Biological Sciences.

Recommended: BIO 452 or BIO 4452.

Introduction to the structure and function of viruses that infect bacteria, animals, and plants. Emphasis on structural diversity, host entry, regulation of gene expression, replication, host immune response, and epidemiology. Course may be offered in classroom-based or hybrid format. 2 lectures, 1 laboratory. Formerly MCRO 402.

MCRO 4421 Food Microbiology (3 units)

Term Typically Offered: F

Prerequisite: One of the following: BRAE 220, BRAE 2220, MCRO 221, MCRO 224, MCRO 2221, MCRO 2224, or graduate standing.

Physiological activities of microbes related to the preparation, production, preservation, deterioration, and safety of foods. Identification, detection, and quantification of food microbes and their metabolites. Course may be offered in classroom-based or hybrid format. 2 lectures, 1 laboratory. Formerly MCRO 421.

MCRO 4423 Medical Microbiology (4 units)

Term Typically Offered: F

Prerequisite: Junior standing; one of the following: CHEM 216, CHEM 312, CHEM 2240, or CHEM 2242; and MCRO 224 or MCRO 2224. Recommended: MCRO 225 or MCRO 2227.

Microorganisms as agents of disease in humans. Epidemiology, host-parasite relationships, and chemotherapy. The compromised host and opportunistic disease. Laboratory safety. Procedures for laboratory diagnosis of human diseases. Rapid miniaturized methods of identification. 2 lectures, 2 laboratories. Formerly MCRO 423.

MCRO 4424 Microbial Physiology and Biochemistry (4 units)

Term Typically Offered: TBD

Prerequisite: One of the following: CHEM 216, CHEM 312, CHEM 2240, or CHEM 2242; and MCRO 224 or MCRO 2224; or graduate standing in Biological Sciences. Recommended: One of the following: CHEM 314, CHEM 369, CHEM 3350, or CHEM 3352.

Cellular structure and life processes of bacteria; chemical composition, growth, principles of gene regulation, and metabolism. Relationships between microbes, the environment, and host tissue. 3 lectures, 1 laboratory. Formerly MCRO 424.

MCRO 4433 Microbial Biotechnology (3 units)

Term Typically Offered: F

Prerequisite: One of the following: BIO 302, BIO 303, BIO 351, BIO 3312, BIO 3351, CHEM 373, CHEM 3356, or MCRO 3351; one of the following: CHEM 216, CHEM 312, CHEM 2240, or CHEM 2242; and one of the following: MCRO 221, MCRO 224, MCRO 2221, or MCRO 2224.

Principles and methods used for production of enzymes, pharmaceuticals, chemicals, and food additives using micro-organisms. Screening and strain improvement, regulation of metabolite production, genetic engineering, heterologous gene expression systems, large-scale production, and intellectual property. Course may be offered in classroom-based, online, or hybrid format. 3 lectures. Formerly MCRO 433.

MCRO 4436 Microbial Ecology (4 units)

Term Typically Offered: SP

Prerequisite: BIO 150 or BIO 1150; BIO 161 or BIO 1151; BIO 263 or BIO 2253; and one of the following: MCRO 221, MCRO 224, MCRO 2221, or MCRO 2224; or graduate standing in Biological Sciences.

The ecology and diversity of microorganisms and their interactions in natural environments. Contribution of microorganisms to ecosystem functioning, including nutrient cycling, symbiotic relationships, and their responses to environmental change. Hands-on experience with research techniques, particularly culture-independent approaches, in microbial ecology. 3 lectures, 1 laboratory. Formerly MCRO 436.