

# MICROBIOLOGY (MICR)

## MICR 285 Microbiology 4 Credit Hours

The biology of microorganisms is considered through study of the properties of bacteria, fungi, algae, protozoa, and viruses. Microbial structures are discussed and correlated with their function. Aspects of cellular metabolism pertinent to microorganisms are emphasized. The interaction of microorganisms and their environment, animate and inanimate, is discussed with respect to the beneficial or harmful effects of the different microbial groups. Laboratory exercises introduce the student to basic, practical microbiological techniques and illustrate various principles of microbial life. Three hours lecture, three hours laboratory. (F, W, S).

**Prerequisite(s):** BIOL 140 and (CHEM 134\* or CHEM 144\*)

**Corequisite(s):** MICR 285L

## MICR 380 Epidemiology 3 Credit Hours

Introduces the methods for infectious disease epidemiology (occurrence and spread in population) and case studies of important disease syndromes and entities. Methods include definitions and nomenclature, outbreak investigations, disease surveillance, case-control studies, cohort studies, laboratory diagnosis, molecular epidemiology, dynamics of transmission, and assessment of vaccine field effectiveness. Case-studies focus on acute respiratory infections, diarrheal diseases, hepatitis, HIV, tuberculosis, sexually transmitted diseases, malaria, and other vector-borne diseases. This course emphasizes methods of study that would contribute to understanding diseases etiology. This course will also cover important concepts in social epidemiology, including social inequalities and social capital in health, clinical studies and treatment of diseases. (S).

**Prerequisite(s):** BIOL 140

## MICR 385 Microbiology 4 Credit Hours

The biology of microorganisms is considered through study of the properties of bacteria, fungi, algae, protozoa, and viruses. Microbial structures are discussed and correlated with their function. Aspects of cellular metabolism pertinent to microorganisms are emphasized. The interaction of microorganisms and their environment, animate and inanimate, is discussed with respect to the beneficial or harmful effects of the different microbial groups. Laboratory exercises introduce the student to basic, practical microbiological techniques and illustrate various principles of microbial life. Three hours lecture, four hours laboratory. (F,S).

**Prerequisite(s):** BIOL 140 and (CHEM 134\* or CHEM 144\*)

**Corequisite(s):** MICR 385L

## MICR 390 Topics in Microbiology 1 to 6 Credit Hours

Current topics in microbiology will be presented through a lecture, discussion and/or laboratory format. Topics will vary, as appropriate, and may cover any area of microbiology including studies on bacteria, algae, fungi, protozoa, viruses, biotechnology, mechanisms of pathogenesis and immunology. (OC).

**Prerequisite(s):** BIOL 385 or MICR 385

## MICR 405 Environmental and Public Health Microbiology 4 Credit Hours

The study of the diversity, structure and function of microorganisms as they interact with their environment. Emphasis will be placed on soil microbiology (fungi, bacteria, microalgae) and plant-microbe interactions (pathogens, symbioses). Ecological topics include decomposition, nutrient cycling, bioremediation and agroecosystems. Three hours lecture, four hours laboratory. (W).

**Prerequisite(s):** BIOL 140

**Restriction(s):**

Can enroll if Class is Senior

## MICR 407 Environmental and Public Health Microbiology Laboratory 2 Credit Hours

The Environmental and Public Health Microbiology Laboratory course provides students with hands-on experience in exploring the intricate relationships between microorganisms, the environment, and human health. Through a combination of experiments, analyses, and critical thinking, students will delve into the detection, identification, quantification, and assessment of health-related microorganisms within environmental samples. This immersive laboratory experience spans a broad spectrum of topics, encompassing the assessment of microbial diversity, water quality analysis, airborne microorganism monitoring, and bioremediation studies. Students will detect, identify, and quantify microorganisms within various environmental niches. (F).

**Prerequisite(s):** BIOL 140

## MICR 440 Microbial Genetics & Physiology Laboratory 2 Credit Hours

Microbial Genetics and Physiology Laboratory emphasizes the use of advanced microbiological techniques for understanding the genetics and physiology of microorganisms. Experiments focus on the understanding of general microbial phenomena, such as nutrition, metabolism, and biochemistry; protein and nucleic acid synthesis; energy generation, enzyme regulation, membrane transport, motility, differentiation, cellular communication, and the behavior of populations. The course involves laboratory work, data analysis of molecular data using bioinformatic tools, abstract writing, and poster presentation. (W).

**Prerequisite(s):** BIOL 140\*

**Restriction(s):**

Cannot enroll if Class is Freshman

Can enroll if Level is Undergraduate

## MICR 450 Virology (MICR) 4 Credit Hours

The first half of this course deals with bacterial viruses, with emphasis on classical events in this field. The second half surveys the field of animal viruses, with emphasis on recent discoveries, including replication, pathogenesis, and viral association with cancers. Three hours lecture, four hours laboratory. (AY,W).

**Prerequisite(s):** BIOL 140

**Corequisite(s):** MICR 450L

## MICR 451 Virology Laboratory 2 Credit Hours

This course is a stand-alone laboratory experience designed to enhance the detailed study of virology. Hands-on lab exercises will include common methods used to study viruses including diagnostic techniques. Experiments will include a variety of modern antibody-based clinical approaches. This course is complementary to BIOL/MICR 450 but can be taken without BIOL/MICR 450 for students seeking a molecular and cellular biology laboratory course. (W, AY).

**Prerequisite(s):** BIOL 140

**MICR 455 Immunology 4 Credit Hours**

A detailed study of the field of immunology. Among the topics covered are various aspects of the immunological response, such as humoral or cell-mediated immunity, cell-cell interactions, and immunology as related to the cause and prevention of disease. Three hours lecture, four hours laboratory. (AY,F).

**Prerequisite(s):** BIOL 301

**MICR 458 Pathogenic Microbiology and Immunology Laboratory 2 Credit Hours**

This course is a stand-alone laboratory experience designed to enhance the detailed study of pathogenic microbiology and immunology. Hands-on lab exercises will include common techniques used to study bacterial pathogens, infectious diseases, and measuring immune responses.

Experiments will include gene editing using CRISPR, quantifying pathogen sensitivity to antibiotics and immune defense mechanisms, and a variety of modern antibody-based clinical approaches. (F).

**Prerequisite(s):** BIOL 140

**MICR 459 Pathogenic Microbiology (MICR) 4 Credit Hours**

An introduction to pathogenic microorganisms and mechanisms of microbial pathogenicity. Disease-causing bacteria, fungi, viruses, and protozoa are studied. Laboratories emphasize clinical approaches to isolation, identification, and treatment. Three hours lecture, four hours laboratory. (AY,F).

**Prerequisite(s):** BIOL 140

**MICR 485 Phys & Bchm of Microorg (MICR) 4 Credit Hours**

Physiology of Microorganisms (BIOL/MICR 485) is a lecture-based course that delves deeply into the intricacies of microbial physiology and biochemistry. This intensive course is specifically designed to foster an integrated understanding of the cellular functions of microorganisms, underpinned by the synergistic interaction of biochemistry and genetics. The course takes a holistic approach to unravel the diverse and robust nature of microbial life. The focal points covered within this course encompass various aspects, such as microorganism growth and nutritional patterns, the microbial breakdown of organic compounds, the control of degradation reactions, the production of distinct microbial compounds and secondary metabolites (including antibiotics and toxins), responses to microbial stress, and the phenomenon of bacterial differentiation. (W, YR).

**Prerequisite(s):** BIOL 140 and CHEM 225\*

**MICR 495 Off-Campus Research 1 to 3 Credit Hours**

Participation in ongoing experimental research at an off-campus laboratory (or in the field). Arrangements made between the research laboratory, (director of field study), the student, and the microbiology concentration advisor. No more than 6 hours combined from MICR 495, 498, and 499 may be credited toward the 120 hours required for a degree. Four to twelve hours laboratory. Permission of concentration advisor. (F,W,S).

**MICR 497 Seminar in Microbiology 1 Credit Hour**

Topics of current interest in microbiology will be presented by guest lecturers, faculty members or students. Topics chosen will vary from term to term. Can be elected up to three times. One hour seminar. Permission of instructor. (W).

**MICR 498 Ind Study in Microbiology 1 to 3 Credit Hours**

Library research and independent study performed under the guidance of a faculty member. Four to twelve hours readings. (F,W,S).

**MICR 499 Lab in Micro Research 1 to 3 Credit Hours**

Directed laboratory research performed under the guidance of a faculty member. Four to twelve hours laboratory. Permission of instructor. (F,W,S).

\*An asterisk denotes that a course may be taken concurrently.

## Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally