

Microbiology (MICR)

MICR 2060. Microbiology for Health Professions BB. (3 Credits)

Prerequisite(s): BIOL 1610 and (ENGL 1010 or ENGH 1005) with a C- or higher in each. CHEM 1110 or higher is highly recommended

Corequisite(s): MICR 2065

Studies the history of microbiology. Explores bacterial, fungal, parasitic, and viral diseases and their causes. Discusses the classification, physiology, genetics, and physical and chemical control of microbes. Emphasizes clinical applications. Is designed for those planning a career in the health professions such as nursing, dental hygiene, medicine, pharmacy, and dentistry. Includes weekly laboratory as a corequisite.

MICR 2065. Microbiology for Health Professions Laboratory. (1 Credit)

Prerequisite(s): (BIOL 1010 or BIOL 1610) and (ENGL 1010 or ENGH 1005). CHEM 1110 highly recommended

Corequisite(s): MICR 2060

Studies the history of microbiology focusing on clinical applications through laboratory activities. Explores bacterial, fungal, parasitic, and viral diseases and their causes using common microbiology lab techniques. Designed for those planning a career in the health professions such as nursing, dental hygiene, medicine, pharmacy, and dentistry.

Course Lab fee of \$44 for materials, lab applies.

MICR 3150. Microbial Ecology WE. (4 Credits)

Prerequisite(s): BIOL 1620 and University Advanced Standing

Covers fundamentals of microbial ecology including interactions, major habitats, and factors that dictate microbial community structure consisting of bacteria, archaea, eukaryotes, and viruses. Includes in-depth examination of classic examples as well as additional systems to be selected based on class preferences.

Course fee of \$25 for materials applies.

MICR 3200. Emerging and Re Emerging Diseases and Zoonoses. (3 Credits)

Prerequisite(s): MICR 2060 or MICR 3450 with a C- or higher in each and University Advanced Standing

Utilizes the most current infectious disease entities as examples for new (emerging) or old (re-emerging) diseases currently affecting mankind.

Discusses zoonotic diseases (those transmissible from animals to humans and vice-versa) in detail. Emphasizes the underlying mechanisms of disease, and includes fundamental aspects of virology, bacteriology, and parasitology. Covers fundamental concepts in epidemiology, how the public health system deals with these diseases once they have been identified and instances where the public health system has failed in controlling these diseases along with the reasons for these failures. Investigates historical aspects of infectious diseases.

MICR 3450. General Microbiology. (3 Credits)

Prerequisite(s): BIOL 3400 with a C- or higher and University Advanced Standing; BIOL 3600 recommended

Corequisite(s): MICR 3455

Covers taxonomy, physiology and genetics of bacteria, archaea, viruses and eukaryotic microbes. Introduces industrial microbiology, biotechnology, and immunology and the biochemical basis of infectious diseases. Is designed for biology majors who desire an in-depth coverage of microbiology.

MICR 3455. General Microbiology Laboratory. (1 Credit)

Prerequisite(s): BIOL 3400 and University Advanced Standing; BIOL 3600 recommended

Corequisite(s): MICR 3450

Hands-on laboratory procedures that studies the methods of taxonomy and distinguishes physiology and genetics of prokaryotes (bacteria, Archaea), viruses and eukaryotic pathogens. Introduces methods used in industrial microbiology, biotechnology, and immunology and the biochemical basis of infectious diseases. Designed for biology majors who desire an in-depth coverage of microbiology.

Course Lab fee of \$60 for materials, lab applies.

MICR 3550. Microbial Physiology. (4 Credits)

Prerequisite(s): MICR 3450 and University Advanced Standing

Covers the structure, metabolism, and growth of microorganisms, with an emphasis on bacteria. Examines the diversity of strategies that microbes use for energy metabolism and biosynthesis of macromolecules. Highlights the integration of metabolic processes, regulatory mechanisms, and environmental changes. Explores current research topics in microbial physiology.

Course fee of \$50 for materials applies.

MICR 3650. Microbial Genetics. (4 Credits)

Prerequisite(s): MICR 3450 and University Advanced Standing

Covers the structure, function, expression, and evolution of microbial genes and genomes, with an emphasis on bacteria. Examines microbial genome replication, the flow of information from DNA to functional RNAs and proteins, mechanisms for regulation of genome expression, and microbial gene organization including bacterial genomes, operons, plasmids, and mechanisms of horizontal gene transfer. Discusses experimental methods to construct, map, and examine mutations, measure gene expression, and genetically modify microbes. Examines DNA sequencing, analysis and annotation of microbial genomes.

Course fee of \$62 for materials applies.

MICR 4100. Parasitology. (4 Credits)

Cross-listed with: ZOOL 4100

Prerequisite(s): (BIOL 1620 or MICR 2060) with a C- or higher and University Advanced Standing

Introduces the study of parasites. Emphasizes the biology of principal groups of parasites affecting humans, livestock, and other animals, including their medical economic, and ecological significance. Emphasizes parasites causing zoonotic diseases. Includes weekly laboratory experience involving identification of parasites.

Course Lab fee of \$25 applies.

MICR 4200. Microbiomes. (3 Credits)

Prerequisite(s): BIOL 1620, BIOL 3500, and University Advanced Standing

Explores the historical background, current knowledge and ongoing research on microbiomes and their role in evolution of biodiversity, ecology of diverse species and communities, behavior of individuals, and impact on host development and physiology.

MICR 4300. Pathogenic Microbiology. (4 Credits)

Cross-listed with: BIOL 4300

Prerequisite(s): MICR 3450 or MICR 2060 and University Advanced Standing

Discusses fundamentals of microbial pathogenesis, replication, infection, and immune mechanisms. Explores the biology of bacterial, viral, fungal, protozoan, and helminth pathogens. Discusses identification, control, and treatments of various microbial pathogens. Includes weekly laboratory.

Course Lab fee of \$25 applies.

MICR 4450. Immunology. (3 Credits)

Cross-listed with: BIOL 4450

Prerequisite(s): (MICR 2060 or MICR 3450 or ZOOL 2420) and University Advanced Standing

Explores the macromolecules, cells and organs involved in innate and adaptive immunity. Examines the development of lymphocyte repertoire, positive and negative selection of lymphocytes and the production of effector lymphocytes. Studies properties of antigens, vaccines, antigen presenting cells and the mechanisms of antigen presentation. Reviews major immunological methods for medical diagnostics and other applications. Examines causes and consequences of autoimmune and lymphoproliferative diseases and immunodeficiencies. Probes how immune response could be manipulated for cancer therapy and transplantation medicine.

MICR 4500. Virology. (3 Credits)

Prerequisite(s): BIOL 3400, or BIOL 3550 or MICR 3450 or MICR 2060 and University Advanced Standing.

Examines the fundamentals of virology. Covers viral structure, biochemistry, genomics, viral multiplication cycles in prokaryotic and eukaryotic cells, and techniques used in viral studies. Discusses viral diseases, transmission, therapy, evolution, and epidemiology.

MICR 4505. Applied Virological Methods. (3 Credits)

Cross-listed with: BOT 4505

Prerequisite(s): MICR 2065 or MICR 3455; University Advanced Standing

Covers techniques commonly used in virology to identify viruses in plant samples that the students will collect including nucleic acid extraction, RT-PCR, cloning, virus inoculation, plaque assays, sequencing and bioinformatics. Instructs students on the impacts of plant virus infection on plant physiology and the genetic differences leading to a plant host being susceptible or not using plants as a model system to teach these techniques and interactions. Includes a structured research experience for students. Requires students to learn and employ lab notebook etiquette and prepare a scientific report describing their findings.

MICR 4600. Arthropod-Borne Pathogens. (3 Credits)

Prerequisite(s): BIOL 3400 and (MICR 2060 or MICR 3450); University Advanced Standing

Covers the cellular and organismal interactions of arthropod-borne pathogens with their vectors that lead to transmission. Examines the cell biology related to the interactions that allow arthropods to transmit pathogens of animals, humans, insects and plants. Discusses methods for control of these pathogens in the context of Integrated Pest Management.

MICR 489R. Student Research. (1-4 Credits)

Prerequisite(s): BIOL 1620, CHEM 1210, instructor permission, and University Advanced Standing

Provides guided research studies in microbiology under the direction of a Biology Department faculty mentor. Includes any combination of literature reviews, original research, and/or participation in ongoing departmental projects. Involves students in the methodology of original microbiology research. Requires preparation and presentation of oral and/or written reports. May culminate in results that will form the basis of the senior thesis in the major, if thesis option is chosen. May be repeated for 9 credits toward graduation.

MICR 490R. Special Topics in Microbiology. (1-4 Credits)

Prerequisite(s): BIOL 1620 and University Advanced Standing

Explores and examines special topics relating to the field of microbiology. Emphasizes areas of rapid growth in microbiology or current importance to society. May be repeated for a total of 9 credits toward graduation.

MICR 494R. Student Seminar WE. (2 Credits)

Prerequisite(s): BIOL 1620 with a C- or higher, junior or senior standing, and University Advanced Standing

Requires students to research scientific literature, give oral presentations, write a research paper, and lead discussions on assigned microbiology topics in specific areas of current research in microbiology. May be repeated for up to 4 credits toward graduation.