# Microbiology (A&S) (MICRO)

**MICRO 1500: The Microbial World**
This is a course for students who are not science majors. It is designed to acquaint students with some microbial activities which affect their lives. It includes the historical development of microbiology, structures of bacteria, viruses, and fungi, the basic principles of microbial growth, disinfection and sterilization, antibiotics and antibiotic resistance, infection, and immunity, probiotics and microbiomes, public health, and commercial, agricultural, and industrial uses of microorganisms. The lab covers basics of microscopy, culture and identification of bacteria, microbial ecology, and antibiotic resistance. Not open to students with any credit in microbiology.

**Credit Hours**: 5
**Recommended:** High School biology

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**MICRO 2010: Fundamentals of Microbiology**
This course, which is designed for microbiology or life sciences majors, provides an overview of the classification, structure, metabolism, genetics, and isolation and identification of the principal groups of bacteria. Additional topics to be covered include an introduction to viruses, protozoa, and fungi, the nature of infectious diseases, and the immune response. Graded on A-F basis only.

**Credit Hours**: 3
**Recommended:** BIO_SC 1500 or equivalent

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**MICRO 2011: Fundamentals of Microbiology Laboratory**
This laboratory course, which is designed for microbiology or life sciences majors, provides an overview of the procedures used for isolation, characterization, and identification of microbes. This laboratory course is intended to provide students with a broad background in microbiology laboratory practice and theory. Students will learn fundamentals of light microscopy, bacterial culture techniques, and methods to isolate and identify microorganisms. Graded on A-F basis only.

**Credit Hours**: 2
**Prerequisites or Corequisites:** MICRO 2010 or equivalent

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**MICRO 2950: Undergraduate Research in Microbiology**
Research for students in which independent research is less than 50% of total. Graded on S/U basis only.

**Credit Hour**: 1-3
**Prerequisites:** Departmental consent

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**MICRO 2950H: Honors Undergraduate Research in Microbiology**
Honors Laboratory research for students in which independent research is less than 50% of total. Graded on A-F basis only. May be repeated for credit.

**Credit Hour**: 1-3
**Prerequisites:** Consent of instructor; Microbiology major; Honors eligibility required; course in Microbiology

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**MICRO 3345: Fundamentals of Parasitology**
This course will provide a basic understanding of protozoan and metazoan parasites as well as the vectors that transmit these parasites. Special emphasis will be placed on those parasites and vectors of major medical/veterinary consequence throughout the world. Because parasites cause significant morbidity and mortality throughout the world, the main focus of lectures will be on the biology and epidemiology of parasitic diseases and on the parasite-host association. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** BIO_SC 1030 or BIO_SC 1500 or consent of instructor

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**MICRO 3345H: Fundamentals of Parasitology - Honors**
This course will provide a basic understanding of protozoan and metazoan parasites as well as the vectors that transmit these parasites. Special emphasis will be placed on those parasites and vectors of major medical/veterinary consequence throughout the world. Because parasites cause significant morbidity and mortality throughout the world, the main focus of lectures will be on the biology and epidemiology of parasitic diseases and on the parasite-host association. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** BIO_SC 1030 or BIO_SC 1500 or consent of instructor; Honors eligibility required

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**MICRO 3500HW: Issues in Vector-borne and Emerging Infectious Diseases - Honors/Writing Intensive**
This writing intensive course will focus on vector-borne and emerging infectious diseases, with an emphasis on recent infectious diseases in the news and current issues related to this subject area. The lectures will include pathogen life cycles, ecology, and epidemiology along with discussion of such topics as vaccines, insecticide usage, novel vector control technologies, public health responses and other relevant issues. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** V_PBIO 2001 and MICRO 2010 or instructor's consent required. Honors eligibility required

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**MICRO 3500W: Issues in Vector-borne and Emerging Infectious Diseases - Writing Intensive**
This writing intensive course will focus on vector-borne and emerging infectious diseases, with an emphasis on recent infectious diseases in the news and current issues related to this subject area. The lectures

will include pathogen life cycles, ecology, and epidemiology along with discussion of such topics as vaccines, insecticide usage, novel vector control technologies, public health responses and other relevant issues. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** V_PBIO 2001 and MICRO 2010 or instructor consent required

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**MICRO 3551: Introduction to Immunology I**
Comprehensive introduction to the basic principles of immunology. The course is designed for undergraduates majoring in biology, biochemistry or health professions. Introduction to cells and organs of the immune system, innate and adaptive immunity, development, activation and effector functions of lymphocytes, hypersensitivity, host response to infection and vaccination, autoimmunity and tumor immunology. Introduction to Immunology 1. Graded on A-F basis only.

**Credit Hours**: 3
**Recommended:** BIO_SC 2200 and BIO_SC 2300

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**MICRO 3554: Introduction to Virology**
Comprehensive introduction to the basic principles of virology. The course is designed for undergraduates majoring in biology, biochemistry, or health professions. The course covers general virology including the molecular structure of viruses, the multiplication strategies of the major virus families, and viral latency, persistence, and oncology. The major families of the bacterial, plant, and animal viruses are discussed. Human viruses and infectious diseases are emphasized. Viral immunology, viral defenses, viral vaccines and antiviral compounds will also be addressed. Graded on A-F basis only.

**Credit Hours**: 3
**Recommended:** BIO_SC 3750 or V_PBIO 2001, BIO_SC 2300

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**MICRO 3557: Microbial Pathogenesis I**
This course examines the relationships between microbes and their hosts that lead to human disease. Select bacterial, viral, parasitic and fungal pathogens will be discussed. Emphasis will be placed on the basic mechanisms of pathogenesis that lead to disease. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** V_PBIO 2001, MICRO 2010 or BIO_SC 3750, or Instructor consent required

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**MICRO 3560: Microbial Physiology**
The course will focus on introducing the basic principles of the functions and activities of microorganisms and we will discuss on the normal cellular mechanisms associated with growth, metabolism, reproduction and survival. The course will cover our understanding and knowledge about the way in which a living microorganism functions including all physical and chemical processes. We will also focus on anatomy i.e., physical characteristics, growth and living, metabolism, chemical processes and control functions and functional entities. Graded on A-F basis only.

**Credit Hours**: 3
**Recommended:** A course in microbiology or biochemistry or permission of the instructor

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**MICRO 3600: Bacterial Genetics and Genomics**
This course will provide undergraduate students with an understanding of bacterial genes, genomes and genetic systems that will serve as both a "stand-alone" course as well as one that synergizes with courses taken by students pursuing degrees in Microbiology, Biochemistry, Biological Sciences, Food Science, Animal Sciences, Health Professions or students interested in the "One Health" paradigm. The course covers diverse aspects of bacterial genetics and genomics, beginning with asking "what is a gene?" through understanding how this genetic information is stored and processed into biological function in a highly regulated manner. The course will also familiarize students with the discoveries that have powered the field of molecular biology (e.g. cloning, DNA sequencing and CRISPR-mediated gene editing) to current cutting-edge research that is driving advances at the interface of microbial science and engineering, as well as microbiomes. Knowledge gained by completion of this course will be of value to those interested in basic microbiology, bacterial pathogenesis, environmental and food microbiology. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** V_PBIO 2001, MICRO 2010 or BIO_SC 3750 or equivalent

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**MICRO 3650: Applied Microbiology and Biotechnology**
Introduction to the basic principles of molecular microbiology in relation to the industrial applicability. The course will focus on microorganisms commonly used in industrial microbiology and biotechnology with an emphasis on the biological and molecular basis of productivity. We will also focus on nutrition of industrial organisms and metabolic pathways for the biosynthesis of industrial microbiology products such as engineered or designer proteins, antibiotics and products of medical importance. Manipulation of the genome of industrial organisms will be discussed in the context of making beneficial products. Graded on A-F basis only.

**Credit Hours**: 3
**Recommended:** BIO_SC 3750 or V_PBIO 2001 or a course in microbiology

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**MICRO 3658: Public Health Microbiology**
Epidemiology of transmissible diseases including pathogenic characteristics of the infectious organism, modes of transmission, mechanism of infection, diagnostic aids, effective treatments, immunizing procedures, and methods of preventing infection. Subjects covered will include emerging infectious diseases, vector borne diseases, control of infectious human disease, water and food borne disease, zoonotic diseases, sexually transmitted diseases and antibiotic resistance. Graded

on A-F basis only. Recommended: One of the following courses: V_PBIO 2001, BIO_SC 3750, MICROB 2800, or MICROB 3200.

**Credit Hours**: 3
**Prerequisites:** BIO_SC 1500 or equivalent

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**MICRO 3700: Medical and Veterinary Entomology**
Ecology and systematics of arthropods that affect the health of animals and people, including insect and tick vectors of pathogens causing tropical and temperate diseases such as African sleeping sickness, anaplasmosis, babesiosis, bartonellosis, Chagas' disease, chikungunya, dengue, ehrlichiosis, filariasis and heartworm disease, leishmaniasis, Lyme disease, malaria, mosquito-borne encephalitis, plague, rickettsiosis, theileriosis, tick-borne encephalitis and yellow fever. Emphasis will be placed on arthropod identification and effects of arthropods and arthropod-borne pathogens on vertebrate hosts. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** BIO_SC 1030 or BIO_SC 1500 or consent of instructor
**Recommended:** MICRO 3345 or PLNT_SCI 3710

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**MICRO 3700H: Medical and Veterinary Entomology - Honors**
Ecology and systematics of arthropods that affect the health of animals and people, including insect and tick vectors of pathogens causing tropical and temperate diseases such as African sleeping sickness, anaplasmosis, babesiosis, bartonellosis, Chagas' disease, chikungunya, dengue, ehrlichiosis, filariasis and heartworm disease, leishmaniasis, Lyme disease, malaria, mosquito-borne encephalitis, plague, rickettsiosis, theileriosis, tick-borne encephalitis and yellow fever. Emphasis will be placed on arthropod identification and effects of arthropods and arthropod-borne pathogens on vertebrate hosts. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** BIO_SC 1030 or BIO_SC 1500 or consent of instructor; Honors eligibility required
**Recommended:** MICRO 3345 or PLNT_SCI 3710

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**MICRO 3900: Beneficial Microbes**
This course will bring together topics in environmental microbiology (such as microbial photosynthesis and nutrient cycling, bioremediation), human and animal health (for example, the role of the microbiome in health and disease prevention, probiotics, vaccines), food preservation and flavoring, biofuel production, plant growth/disease protection and utilization of microbe-derived tools in molecular genetics (for example, restriction enzymes and CRISPR/Cas editing). Knowledge gained by completion of this course will be of value to those interested in basic microbiology, human and animal health and disease, environmental, industrial and food microbiology. Graded on A-F basis only.

**Credit Hours**: 3
**Recommended:** MICRO 2010 or BIO_SC 3750 or equivalent Microbiology Course

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**MICRO 3900W: Beneficial Microbes - Writing Intensive**
This course will bring together topics in environmental microbiology (such as microbial photosynthesis and nutrient cycling, bioremediation), human and animal health (for example, the role of the microbiome in health and disease prevention, probiotics, vaccines), food preservation and flavoring, biofuel production, plant growth/disease protection and utilization of microbe-derived tools in molecular genetics (for example, restriction enzymes and CRISPR/Cas editing). Knowledge gained by completion of this course will be of value to those interested in basic microbiology, human and animal health and disease, environmental, industrial and food microbiology. Graded on A-F basis only.

**Credit Hours**: 3
**Recommended:** MICRO 2010 or BIO_SC 3750 or equivalent Microbiology Course

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**MICRO 4500: Fundamentals of High-Containment Microbiology Operations and Research**
This course is designed to provide a basic understanding of microbiological research conducted in high-containment microbiology laboratories. Special emphasis will be placed on topics in microbiological research of major medical/veterinary infectious diseases of high consequence throughout the world. Because these infectious diseases cause significant morbidity and mortality worldwide and have zoonotic potential, they must be handled with special precautions in biosafety level three facilities. The focus will be on the biology and epidemiology of paradigm diseases and on the special procedures, facilities and equipment used to conduct infectious disease research. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** V_PBIO 2001 or MICRO 2010 or BIO SC 3750 and MICROB 2800 or MICROB 3200 or MICRO 3658 or Instructor consent required
**Recommended:** A separate 1-hour laboratory course is offered and highly encouraged but not required

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**MICRO 4510: Fundamentals of High-Containment Microbiology Operations and Research Laboratory**
This laboratory course is designed to provide a hands-on experience of practices used in microbiological research conducted in high-containment microbiology laboratory. Because medical/veterinary infectious diseases can cause significant morbidity and mortality, they must be handled with special precautions within biosafety level three facilities. The focus of this laboratory is on the special procedures and equipment used to conduct infectious disease research at the Laboratory for Infectious Disease Research (LIDR), a biosafety level three laboratory on campus. Because students will be working in a biosafety level three facility, an expectation of medical fitness is expected; generally healthy persons with a current medical condition must disclose this information to determine if they need a medical evaluation prior to participating in the laboratory. This laboratory course is a prerequisite for obtaining a certificate in High Containment Microbiology Operations and Research. Graded on A-F basis only.

**Credit Hour**: 1
**Prerequisites or Corequisites:** MICRO 4500

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**MICRO 4600: Host-Associated Microbiomes in Health and Disease**
(cross-leveled with PIBS 7600). This course will provide a broad and comprehensive background on host-associated microbial communities such as the gut, dermal, and respiratory microbiotas. Course content will focus primarily, but not completely, on bacterial communities colonizing human and animal hosts, and each week will focus on a different topic within microbiome research. This course will also focus on the physiological role of host-associated microbial communities in health and disease-associated changes in composition and function, rather than the methodology used to characterize these communities or analyze the data. Nonetheless, students will gain a strong familiarity with sequencing platforms, methods, and common outcomes measures during this course. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** Introductory undergraduate course on basic medical microbiology (e.g., MICROB 3200 or equivalent)

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**MICRO 4600W: Host-Associated Microbiomes in Health and Disease - Writing Intensive**
(cross-leveled with PIBS 7600). This course will provide a broad and comprehensive background on host-associated microbial communities such as the gut, dermal, and respiratory microbiotas. Course content will focus primarily, but not completely, on bacterial communities colonizing human and animal hosts, and each week will focus on a different topic within microbiome research. This course will also focus on the physiological role of host-associated microbial communities in health and disease-associated changes in composition and function, rather than the methodology used to characterize these communities or analyze the data. Nonetheless, students will gain a strong familiarity with sequencing platforms, methods, and common outcomes measures during this course. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** Introductory undergraduate course on basic medical microbiology (e.g., MICROB 3200 or equivalent)

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**MICRO 4950: Advanced Undergraduate Research in Microbiology**
Research credit for students doing an independent microbiology research project under the guidance of a faculty member. Project must be arranged by student and faculty member prior to registration. May be repeated to a maximum of 6 hours. Student may choose the S/U grading option only if not using course to fulfill microbiology degree capstone and/or honors program requirements.

**Credit Hour**: 1-3
**Prerequisites:** Departmental consent
**Recommended:** Overall GPA of at least 2.75; 20 hours of Microbiology/Biological Sciences and/or Chemistry

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**MICRO 4950H: Honors Advanced Undergraduate Research in Microbiology**
Honors research credit for students doing an independent microbiology research project under the guidance of a faculty member. Project must be arranged by student and faculty member prior to registration. Graded on A-F basis only.

**Credit Hour**: 1-3
**Prerequisites:** instructor's consent; microbiology major; Honors eligibility required

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**MICRO 4970: Capstone Undergraduate Research in Microbiology**
Capstone research course for students doing an independent microbiology research project under the guidance of a faculty member. Project must be arranged by student and faculty member prior to registration. Includes presentation of the research as an oral presentation or poster at a scientific meeting OR writing up the research project in a scientific journal article format. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** 3 credit hours of MICRO 4950

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**MICRO 4970H: Honors Capstone Undergraduate Research in Microbiology**
Three credit Capstone research course for students from the Honors College to conduct an independent microbiology research project under the guidance of a faculty member. Project must be arranged by student and faculty member prior to registration. Includes presentation of the research as an oral presentation or poster at a scientific meeting OR writing up the research project in a scientific journal article format. A research training plan and research project must be agreed to by the student and faculty mentor prior to the start of the semester. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** Honors eligibility required, be a Microbiology major, have completed 3 credit hours of MICRO 4950, and have the approval of the faculty instructor

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**MICRO 4980: Capstone Senior Seminar**
Readings and critical evaluation of selected problems and theories in microbiology. Integrates perspectives, methods, and topics from undergraduate courses. Requires written and oral presentations. Graded on A-F basis only.

**Credit Hours**: 3
**Prerequisites:** Microbiology major, senior standing, or instructor's consent

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