

Introduction to Microbiology 11:680:201

Course Description: Introduction to Microbiology is a 3 credit course with two 1 hour 20 min lectures per week offered each spring semester. Introduction to Microbiology is appropriate for students with some background in biology and chemistry whose career path intersects the study of microbes or simply have an interest in microbiology. This course introduces the basic principles of microbiology examining the microbes that inhabit our planet and their effect on the biosphere. Lecture topics explore the basic principles of microbiology and examine the microbes that inhabit our planet and their effect on the biosphere. Students will analyze the influence of microbiology and 21st century challenges and opportunities that arise from our changing relationship with and understanding of microbes.

Class participation using an electronic device with internet-connection will be a component of the course grade and used in every lecture to encourage participation and interaction.

Prerequisites and Registration Restrictions:

1 semester of biology & 1 semester of chemistry

Faculty:

Department of Biochemistry & Microbiology

Text: There is no required text. Access to one of the following is recommended; they will be on reserve in Chang Library. The first text listed is useful for studying the chemistry of biological systems. The others are comprehensive reference texts.

1. Hofkin, Bruce V. (2011). *Living in a microbial world*. New York, NY: Garland Science.
2. Sherwood, L., Willey, J., Woolverton, C. (201?). *Prescott's Microbiology, 10th Edition*. New York, NY: McGraw Hill
3. Charles, T., Dupont, C., Wessner, C. (2013). *Microbiology*. Hoboken, NJ: John Wiley & Sons.

Course Learning Goals:

After completion this course, successful students will be able to:

1. Outline the structural and functional differences among all microbes.
2. Apply the fundamentals of the chemistry of life to microbial metabolism and physiology.
3. Assess the influence of microbes in their natural environments on maintenance of the biosphere.
4. Compare and contrast microbial interactions with hosts in health and disease.
5. Identify major microbial interactions and illustrate how these interactions affect the well-being of plants and animals.
6. Explain the underlying principles of the methods used to control microbial growth.
7. Describe the flow and control of genetic information and its influence on the evolution of life on earth.
8. Examine the application of microbes to water safety and food production.

Grading:

The course grade will be based on exams, in-class participation & group work and homework assignments as follows:

4 Unit exams + Cumulative final exam – 12 % each	60 %
In-class participation & group work	20 %
Homework assignments	20 %

Lecture Topics
Introduction: The Power of Microbes
The Origin of Life & Evolution; The Chemistry of Biological Systems
Cellular Microbes: Structure and Function of <i>Bacteria</i>, <i>Achaea</i> and <i>Eukarya</i>
Microbial Growth
Microbial Metabolism
Introduction to Genetics
Genetic Control
Viruses
Genetic Exchange
Studying the Microbial Genome; Recombinant DNA Technology
Classification & Taxonomy
Microbial Diversity
Ecology & Ecosystems
Maintaining the Biosphere
Microbial Symbioses
The Human Microbiome in Health and Disease
Host Pathogen Interactions
Immunity & Host Defenses: A Brief Introduction
Practical Aspects of Epidemiology
Infectious Human Disease
Water & Food as Vehicles of Disease
Clinical Microbiology
Wastewater; Bioremediation; Food Fermentations