

Course Abstract

If you need accommodations due to a disability, contact Disability Services in Edison Hall Room 100, 732.906.2546.

To foster a productive learning environment, the College requires that all students adhere to the Code of Student Conduct which is published in the college catalog and website.

Course ID and Name: BIO 104 Mysteries of the Microbial World

Department: Natural Sciences

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Prerequisites: N/A **Co-requisites:** N/A

Course Description:

This course, designed for the non-major, uses scientific principles to investigate the diversity of microbial life. Laboratory-based modules use the scientific method to explore the cellular, ecological, epidemiological and commercial roles of microorganisms. The interdependence of microorganisms to life on Earth is examined. Laboratory exercises introduce students to principles of light microscopy, aseptic methods of handling and cultivating microorganisms, fermentation and DNA isolation. The historical and social impact of infectious diseases is explored using case studies, current events and webquests to encourage critical thinking skills. Examination of contemporary topics, including the development of antibiotic resistance, bioterrorism and genetic engineering are designed to foster scientific literacy. A research paper is required. *Recommended for nonscience majors.*

General Education Status: Science

Credits: 3 **Lecture Hours:** 2 **Lab Hours:** 2

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Apply the scientific method to develop and test hypotheses and draw valid conclusions from the data.
2. Recognize the importance of microorganisms to everyday life by examining their specific roles in ecology, industry, and medicine using appropriate laboratory techniques.

3. Examine the historical and current role of microbes in disease, including the effect of prejudicial attitudes and discriminatory actions against people having particular microbial diseases such as AIDS or syphilis.
4. Identify and debate the social and cultural impact of microbial events, including emerging diseases, bioterrorism, biotechnology and genetic engineering.
5. Communicate and collaborate with others in a clear and logical manner regarding current biomedical issues and their impact on society.

Course Content Areas:

Unit I: Microbes In & Around Us

- Microbial Safari – Microbial diversity; role of microbes in the biosphere.
- Winogradsky's Window – Microorganisms in terrestrial and aquatic cycles
- Fungus Among Us – Common molds, yeast, and lichens
- Oceans of Microbes – Microorganisms in marine and freshwater habitats

Unit II: Friends and Foes

- Microbial Giants – Historical and current microbial diseases (Black Death, smallpox, mad cow disease, anthrax and emerging food-borne pathogens); social and cultural impact of microbial events; emerging diseases and world health issues; prejudicial attitudes and discriminatory actions against people with particular diseases
- Here to Stay or Just Passing Through? - Microorganisms in and on the body; bacterial identification and Gram staining
- Night on the Town – Epidemiology; methods and roles of disease transmission.
- Picnic in the Park – Food-borne illness; past and current food-borne outbreaks; examination of government agencies and morbidity/mortality statistics

Unit III: Caution - Microbes at Work

- War & Peace – Nonspecific host defense mechanisms; specific immunity
- It's a Hard-Knock Life – Bacterial growth and death; antimicrobial agents; food irradiation; emergence of antibiotic resistance, handwashing
- Back to the Future – Biotechnology; genetic engineering; bioterrorism.
- Caution: Microbes at Work! – Uses of microorganisms in industry (vaccines, foods, pharmaceuticals, etc.); fermentation processes
- Student Presentations – Students prepare a paper, poster and presentation on a particular microorganism or related topic