

Course Outline for: BIOL 2044 Introductory Microbiology**A. Course Description:**

1. Number of credits: 3
2. Lecture hours per week: 2
Lab hours per week: 3
3. Prerequisites: BIOL 2041 (C or higher); CHEM 1050 (C or higher)
4. Corequisites: None
5. MnTC Goal: #3 Natural Sciences

A rigorous lab course intended for students pursuing careers in the health sciences, such as nursing and dental hygiene. This course examines the biology of bacteria, protozoa, fungi, helminths, viruses, and prions. Topics include prokaryotic and eukaryotic cell structure and function, microbial metabolism, microbial genetics, physical and chemical methods of control, host defenses, and health care applications. Lab exercises mandate following biosafety level 2 practices for handling microbial pathogens. Lecture 2 credits, 3-hour lab 1 credit.

B. Date last reviewed/updated: January 2023**C. Outline of Major Content Areas:**

Lecture: Subtopics listed under each main topic may vary due to recent developments in the field and current events.

1. Overview of Microorganisms
 - a. Taxonomy and classification
 - b. Bacteria
 - c. Archaea
 - d. Fungi
 - e. Protozoa
 - f. Helminths
 - g. Acellular infectious agents
2. Metabolism, Growth and Nutrition of Microbes
3. Control of Microbial Growth
 - a. Disinfection
 - b. Antisepsis
 - c. Sterilization
 - d. Chemotherapeutic agents
4. Microbial Genetics
 - a. Horizontal gene transfer mechanisms
5. Microbial Pathogenicity and Infectious Disease
 - a. Portals of entry and exit

- b. Modes of transmission
- c. Virulence factors
- d. Epidemiology
- 6. Host Defenses
 - a. Non-specific host defenses
 - b. Specific: human immune system
 - c. Immune disorders
- 7. Bacterial Diseases of Humans
- 8. Viral Diseases of Humans
- 9. Fungal Diseases of Humans
- 10. Protozoal Diseases of Humans

Laboratory: Students will actively participate in lab by completing studies related to:

- 1. Microscopy
- 2. Survey of microorganisms, including the microbiome
- 3. Staining of bacteria
- 4. Aseptic techniques
- 5. Bacterial isolation techniques
- 6. Physical and chemical methods of control
- 7. Immunology
- 8. Molecular techniques
- 9. Identification of unknown bacteria

D. Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- 1. Define basic principles of microbiology. (Goal 3a)
- 2. Perform correct microbiology laboratory skills such as use of microscope, aseptic technique, streak for isolation, staining techniques, and identification of microbes (Goal 2b, 3b)
- 3. Demonstrate a habit of safe laboratory practices including aseptic technique and disposal of biohazard waste. (Goal 2a, 3b)
- 4. Evaluate experimental results and communicate interpretations both orally and in writing. (Goal 2a, 2c, 3b, 3c)
- 5. Integrate learning from both lecture and laboratory in problem solving. (Goal 2a, 2c, 3c)
- 6. Correlate course work with current and practical microbiological issues. (Goal 2d, 3d)
- 7. Evaluate policies and personal choices from the perspective of infectious diseases. (Goal 2d, 3d)

E. Methods for Assessing Student Learning

A variety of evaluation and assessment methods may be used:

- 1. Examinations over lectures, class discussions, and reading assignments (objective, short answer and/or essay questions).
- 2. Home study assignments.
- 3. Examinations over laboratory exercises.
- 4. Laboratory papers and reports.

5. Oral laboratory quizzes and presentations.
6. Case studies
7. Individual technique assessment.

F. Special Information:

Instructors will include the most recent version of the Departmental Expectations document in their course syllabus

When offered on-campus,

- The laboratory portion of the course is delivered in the Biology Learning Center (BLC).
- Instructors will include the most recent version of the Biology Learning Center (BLC) Expectations document in their course syllabus.
- One or more labs require the use of Biosafety Level 2 standards.
- Students are required to wear a lab coat while in the BLC and to tie hair securely back.
- Experiments include sampling the student's microbial flora.