

# Inver Hills Community College

## BIOL 2305: Principles of Microbiology

### A. COURSE DESCRIPTION

Credits: 5

Lecture Hours/Week: 3

Lab Hours/Week: 4

OJT Hours/Week: \*.\*

Prerequisites:

This course requires either of these prerequisite categories

1. BIOL 1154 - Principles of Biology I (Minimum grade: 1.67 GPA Equivalent)

Or

2. BIOL 1120 - Exploring Biology (Minimum grade: 1.67 GPA Equivalent)

Corequisites: None

MnTC Goals: Goal 02 - Critical Thinking, Goal 03 - Natural Science, Goal 02 - Critical Thinking, Goal 03 - Natural Science

Introduces the fundamental principles of microbiology with a survey of prokaryotic, eukaryotic, and viral microorganisms. Lecture covers microbial cell structure, nutrition, growth, control of growth, metabolism, genetics, evolution, epidemiology, infection, transmission and pathogenesis, and interactions with host organisms. Antimicrobial resistance and other relevant current issues will be discussed, as well as real-world applications, including food and beverage production. Experiments in lab will develop student competence in microscopy, aseptic technique, as well as in culturing, staining, enumeration, identification, isolation, safe handling and biochemical testing of microorganisms. This course is intended for students majoring in biology & the sciences, including professional (pre-med, pre-pharm, pre-vet, pre-grad, etc). This course aligns with American Microbiology Society curriculum guidelines.

**B. COURSE EFFECTIVE DATES:** 08/25/2005 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Biology of Microorganisms 35%
2. Culturing and Identification of Microorganisms 10%
3. Environmental and Food Microbiology 5%
4. History of microbiology 5%
5. Microbes and Humans 20%
6. Microbial ecology 5%
7. Survey of Microorganisms 20%

#### **D. LEARNING OUTCOMES (General)**

1. 1.) Explain and apply fundamental concepts related to the taxonomy, structure, function and ecology of microbes including bacteria, viruses, fungi and Protista
- 2.) Use critical thinking skills to understand, evaluate, and analyze processes related to microbes:
  - a) Microbial pathogenesis
  - b) The response of the mammalian immune system to microbial infection
  - c) Microbial metabolic diversity
  - d) Microbial biotechnology
  - e) Nature of exponential growth
- 3.) Demonstrate intermediate competence in microscopy & lab instrumentation, identify microbes, and perform several staining techniques
2. 4.) Explain the major techniques for the physical and chemical control of microbes
- 5.) Understand and apply techniques for the isolation of microbes from the environment, food and water
- 6.) Formulate a hypothesis, conduct experiments and analyze results to establish the identity of an unknown culture
3. 7.) Organize, draft, edit, and revise formal scientific writing, including interpreting, incorporating and citing information and ideas from primary literature
- 8.) Explain applications of microbiology in food and beverage production and safety.
- 9.) Explain the role of microbes in the environment
- 10.) Demonstrate current standard lab safety practices and procedures

## **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

### Goal 02 - Critical Thinking

1. Recognize and articulate the value assumptions which underlie and affect decisions, interpretations, analyses, and evaluations made by ourselves and others.

### Goal 03 - Natural Science

1. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

### Goal 02 - Critical Thinking

1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
2. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives which can give alternative meanings or solutions to given situations or problems.
3. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.

### Goal 03 - Natural Science

1. Demonstrate understanding of scientific theories.
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.

## **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

## **G. SPECIAL INFORMATION**

None noted