South Central College

BIOL 270 Microbiology

Common Course Outline

Course Information

Description This course is an introduction to the general principles and methods used in the study of microorganisms. It includes a survey of prokaryotic and eukaryotic microorganisms emphasizing bacteria as well as viruses. Topics include microbial cell structure and function, metabolism, microbial genetics, and the role of microorganisms in disease, immunity, and other selected applied areas. Laboratory techniques include isolating, culturing, and identifying microorganisms. This course contains a three hour per week laboratory component. (Prerequisites: A grade of C or higher in BIOL115 OR BIOL225 OR BIOL220 AND CHEM108 OR CHEM110 OR CHEM120) (MNTC Goal Area 3)

Total Credits 4

Total Hours 96

Types of Instruction

Instruction Type	Credits/Hours
Lecture	3/48
Lab	1/48

Pre/Corequisites

Prerequisite A grade of C or higher in BIOL115 OR BIOL225 OR BIOL220 AND CHEM108 OR CHEM110 OR CHEM120

Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Distinguish between the major classes of microorganisms based on their respective characteristics.

Linked Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a

creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Linked External Standards

Goal 3: Natural Sciences - To improve students' understanding of natural science principles and of the methods of scientific inquiry, i.e., the ways in which scientists investigate natural science phenomena. As a basis for lifelong learning, students need to know the vocabulary of science and to realize that while a set of principles has been developed through the work of previous scientists, ongoing scientific inquiry and new knowledge will bring changes in some of the ways scientists view the world. By studying the problems that engage today's scientists, students learn to appreciate the importance of science in their lives and to understand the value of a scientific perspective. Students should be encouraged to study both the biological and physical sciences.

Learning Objectives

Distinguish between bacteria, viruses, protozoa, algae, and fungi based on their structure and function.
Recall the general properties of bacteria, viruses, protozoa, algae, and fungi.
Compare and contrast the major categories of microbes.
Identify which types of microbes are most medically relevant and provide examples of these organisms.
Explain how microbes are assigned to different taxonomic groups.

2. Use the terminology of cell structure and function, cell reproduction, and microbial taxonomy.

Linked External Standards

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Learning Objectives

Explain the steps involved in DNA replication.
Describe the replication of DNA as a semiconservative process.
Distinguish the leading and lagging strands and how their synthesis differs.

5. Explain mutations including their potential causes, consequences, and uses.

Linked External Standards

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Learning Objectives

Distinguish between the forms of point mutations.
Differentiate between a point and frameshift mutation.
Discuss properties of mutagens and materials within the category.
Describe the Ames test for testing for mutagenic properties of a chemical.
Describe light and dark repair of pyrimidine dimers.

Define biotechnology and genetic engineering.
Explain various applications of microbial biotechnology being used in contemporary society.
Evaluate genetic engineering from a natural science perspective and ask questions about evidence to determine the pros and cons of a specific example of genetic engineering.

8. Describe horizontal gene transfer in bacteria.

Linked External Standards

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Learning Objectives

Explain the process of transformation.
Explain the process of transduction.
Differentiate specialized and generalized transduction.
Explain the process of conjugation.
Contrast the major forms of horizontal gene transfer.
Compare the major forms of horizontal gene transfer.

9. Describe means of controlling microbial growth.

Linked External Standards

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Learning Objectives

Describe chemical means of microbial control in the environment.
Describe physical means of microbial control in the environment.
Describe methods of evaluating the effectiveness of a disinfectant or antiseptic including the phenol coefficient and the use-dilution test.
Describe means of controlling microbial growth within the body using antimicrobial drugs.
Describe methods of evaluating the effectiveness of an antimicrobial including the Kirby-Bauer test and the Minimum Inhibitory Concentration test.

10. Explain the modes of action of antimicrobial drugs including identifying the major types of antimicrobial drugs which work via each mode of action.

Linked External Standards

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Learning Objectives

Identify groups of antibiotics which disrupt cell membrane function.
Identify groups of antibiotics which act as antimetabolites.
Identify groups of antibiotics which inhibit nucleic acid synthesis.

11. Explain processes related to microbial pathogenesis.

Identify diseases of the nervous system caused by microbes.
Integrate course themes as they relate to infectious diseases.

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of its sources of error and uncertainty.

Learning Objectives

Describe the Kirby Bauer method of determining microbial sensitivities.
Perform a Kirby Bauer test.
Interpret zones of inhibition and determine the level of microbial sensitivity.

Formulate a hypothes4s, and conduct and analyze an experiment with a model organism.

23. Formulate a hypothesis, and conduct and analyze an experiment with a model organism.

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