



EFFECTIVE: SEPTEMBER 2007
CURRICULUM GUIDELINES

A. Division: **Education**

Effective Date: **September 2007**

B. Department /
Program Area: **Science and Technology**
Biology

Revision New Course

If Revision, Section(s)

M: Course Objectives / Learning Outcomes

Upon completion of this course, students will:

1. Understand the range of prokaryotic and eukaryotic organisms that are considered to be microorganisms and understand the historical context of microbiological science.
2. Be able to explain the chemical components and cellular structure of bacterial cells.
3. Understand the principles of classification as they are applied to prokaryotic organisms and be able to explain the classification of bacter

N: Course Content:

The topics in the course include the following:

1. INTRODUCTION
 - 1.1. Introduction to microorganisms
 - 1.2. Historical overview of microbiology
 - 1.3. Prokaryotic and eukaryotic microorganisms
 - 1.4. Introduction to bacteria
2. CELLULAR BIOCHEMISTRY
 - 2.1. Chemical components of cells
 - 2.2. Bacterial cell structure
3. PROKARYOTIC DIVERSITY
 - 3.1. Principles of classification
 - 3.2. Phylogeny of bacteria
4. BACTERIAL METABOLISM
 - 4.1. Principles of nutrition
 - 4.2. Major catabolic and anabolic pathways
 - 4.3. Regulation of metabolism
5. MICROBIAL GROWTH AND REPRODUCTION
 - 5.1. Bacterial cell division
 - 5.2. Growth of bacterial populations
 - 5.3. Control of bacterial growth
6. MICROBIAL GENETICS
 - 6.1. Bacterial genomes
 - 6.2. Gene expression and regulation
 - 6.3. Transformation and recombination
 - 6.4. Drug resistance
 - 6.5. Genetic engineering
7. INTRODUCTION TO VIROLOGY
 - 7.1. Taxonomy of viruses
 - 7.2. Viral replication
 - 7.3. Viruses and cancer
 - 7.4. Viroids and prions
8. IMMUNOLOGY
 - 8.1. Innate and acquired immunity
 - 8.2. Humoral and cell-mediated responses
 - 8.3. Receptors and immune recognition
 - 8.4. Immunization
9. MICROBIAL ECOLOGY
 - 9.1. Populations and communities
 - 9.2. Microbial habitats
 - 9.3. Symbiosis
10. EPIDEMIOLOGY AND PUBLIC HEALTH
 - 10.1. Transmission and infection
 - 10.2. Disease case histories
 - 10.3. Disease management
11. TOPICS IN APPLIED MICROBIOLOGY
 - 11.1. Examples: food microbiology, industrial microbiology, forensic microbiology, environmental bioremediation

12. LABORATORY TOPICS

12.1. Basic Techniques in Microbiology

- 12.1.1. Laboratory operations and safety
- 12.1.2. Laboratory reporting techniques
- 12.1.3. Microscopy

12.2. Bacteria: Transfer, culture and isolation techniques

- 12.2.1. Aseptic techniques
 - 12.2.1.1. Preparation of media and plates
 - 12.2.1.2. Tube transfers
 - 12.2.1.3. Streak plate and spread plate techniques

12.3. Colony and Cellular Morphology

- 12.3.1. Agar plate colonial characteristic and agar slant growth
- 12.3.2. Individual cell characteristics (coccus, bacillus and spirillum microscopic recognition)

12.4. Differential Staining

- 12.4.1. Negative staining
- 12.4.2. Gram Stain
- 12.4.3. Acid fast staining

12.5. Bacterial Growth

- 12.5.1. Serial dilution
- 12.5.2. Growth rate determination (direct/plate counts)

12.6. Bacterial Transformation

- 12.6.1. Introduction of plasmid with antibiotic resistance
- 12.6.2. Plating and isolation of antibiotic resistant bacteria

12.7. Bacteriophages

- 12.7.1. Serial dilutions of bacteriophage inoculum
- 12.7.2. Inoculation and infection of bacterial lawns with bacteriophage lambda
- 12.7.3. Quantification of bacteriophage by plaque counts

12.8. Macrophages and Phagocytosis

- 12.8.1. Stimulation of macrophages with zymosan particles
- 12.8.2. Determination of kinetics of phagocytosis of zymosan by macrophages

12.9. Antibody-Antigen reactions

- 12.9.1.

P: Textbooks and Materials to be Purchased by Students

M.T. Madigan & J.M. Martinko (2005) Brock Biology of Microorganisms or a comparable current microbiology textbook.

Q: Means of Assessment

Class tests and assignments	15-20%
Laboratory	15-20%
Exams	
- Term exam(s)	15-30%
- Final exam	35%

TOTAL 100%

R: Prior Learning Assessment and Recognition: specify whether course is open for PLAR