

EXAMPLE COURSE OUTLINE

Course Information for 2004 - 2005

COURSE NAME & NUMBER: Microbiology BL1130

DESCRIPTIVE TITLE: Microbiology

CALENDAR ENTRY:

Type & Purpose: This is an introductory microbiology course designed to introduce students to the diversity of microorganisms, their relationship to environmental technology and the basic lab techniques used to identify and enumerate them. This course prepares students to apply microbiological techniques to monitor water and air quality, domestic and industrial water and wastewater treatment systems and site remediation projects.

Major Topics: Cell Biology; Classification of Microorganisms; Control of Bacteria; Culturing Bacteria; Algae as Indicators of Contamination; Microorganisms and Disease; Microorganisms in Industrial and Pollution Biology; Microorganisms in wastewater treatment

PREREQUISITES: None

CO-REQUISITES: None

CREDIT VALUE: Four (4)

SCHEDULE:

Duration:	15	weeks
Lectures:	3	hours/week
Labs:	3	hours/week
Total Hrs (Including Testing):	90	hours

**SUGGESTED TEXT/
LEARNING RESOURCES:**

Textbook(s):

COURSE AIMS:

MAJOR TOPICS/TASKS:

- 1.0 Cell Biology
- 2.0 Classification of Microorganisms
- 3.0 Control of Bacteria
- 4.0 Culturing Bacteria
- 5.0 Algae as Indicators of Contamination
- 6.0 Microorganisms and Disease
- 7.0 Microorganisms in Industrial and Pollution Biology
- 8.0 Microorganisms in wastewater treatment

COURSE OUTLINE / LEARNING OBJECTIVES:

1.0 Cell Biology

- 1.1 Compare the structure and function of prokaryotic and eukaryotic cells
- 1.2 Discuss the role of organic molecules in cell operation

2.0 Classification of Microorganisms

- 2.1 Perform biochemical tests to identify bacteria
- 2.2 Use the microscope to describe the morphology and structure of bacteria
- 2.3 Compare the results of the various tests and observations to Bergey's manual
- 2.4 Describe the classification of fungi
- 2.5 Use the algae classification system to identify algae
- 2.6 Describe the classification of Protozoa

3.0 Control of Bacteria

- 3.1 Describe microbial metabolism and growth
- 3.2 Discuss the standard growth curve for a bacterial population
- 3.3 Compare the use of heat and chemical agents in controlling bacteria
- 3.4 Select appropriate techniques for sterilizing microbiological materials

4.0 Culturing Bacteria

- 4.1 Prepare media to culture microorganisms
- 4.2 Select appropriate media to culture bacteria
- 4.3 Test samples for sewage contamination

5.0 Algae as Indicators of Contamination

- 5.1 Identify the common algae species in freshwater
- 5.2 Select appropriate equipment to collect plankton samples

5.3 Calculate pollution indices based on plankton identification and abundance

6.0 Microorganisms and Disease

6.1 Describe the microbial flora of a healthy host

6.2 Discuss the infection process

6.3 Apply the principles of epidemiology to disease transmission

7.0 Microorganisms in Industrial and Pollution Biology

7.1 Describe the microbial influences on biogeochemical cycles

7.2 Apply the biogeochemical cycles to pollution biology

7.3 Apply microbiological principles to air quality

7.4 Describe the microbiology of soils

7.5 Evaluate the effectiveness of various microorganisms in detoxifying soils

8.0 Microorganisms in wastewater treatment

8.1 Describe the composition of domestic wastewater

8.2 Sample and identify the microscopic flora that grows in industrial and domestic wastewater treatment facilities

LABORATORIES:

Lab 1 The Compound Microscope and Observing Microorganisms

Lab 2 Preparing a Smear and Staining Techniques

Lab 3 Techniques for Growing Microorganisms

Lab 4 Techniques for Quantifying Bacteria

Lab 5 Determining the number of Fecal Coliforms in a Sample

Lab 6 Using Selective and Differential Media

Lab 7 Using Microbial Enzymes (Multi-Test Media) to Identify Bacteria

Lab 8 Exploring the Microbiology of Soil

Lab 9 Algal Identification using a Taxonomic Key

Lab 10 Identifying Microorganisms in an Effluent Treatment Plant

Lab 11 Determining the Number of Microbes in Indoor Air

Lab 12 Lab Exam

LEARNING RESOURCES:

Microbiology, Principles and Explorations, 4th edition by Jacquelyn Black, Prentice Hall, 1999.

Lab Manual: Microbiology Lab Manual 1101

RECOMMENDED EVALUATION:

Final Exam	45%
Midterm	20%
Lab	35% (lab exam(s) 20%, technique 5%, write up 5%, and prelab quiz 5%)

Lab components will be incorporated into the midterm and final exams. Attendance in all laboratory classes is mandatory. Failure to attend without a satisfactory documented reason, for example a medical certificate issued by a doctor, will mean that the maximum grade possible for this course will be 45%.

A minimum average mark of 10/20 marks for the laboratory component of the course is required in addition to achieving an overall pass mark.

DEVELOPMENT HISTORY:

Date Designed/Revised: February 22, 2000