

Course Outline **Microbiology**

Course Description

BI250. Microbiology. 5 hours credit. It is recommended that the student has taken BI105 prior to enrolling in this course. Three hours of lecture/discussion and four hours of laboratory per week. Students will study the characteristics and activities of microorganisms and their influences on man and his environment. Includes principles of microbial cell structure, genetics, metabolism, and control. Also includes the disease process, immunity, and a survey of the major disease causing microorganisms. Laboratory portion includes basic microbiology laboratory techniques used in inoculation, isolation, incubation, inspection and identification of bacteria. Also includes the examination of fungi, protists, and parasitic worms.

Required Textbook

Alcamo, I. E. (2001). *Fundamentals of Microbiology* (6th Ed.). Sudbury, MA: Jones and Bartlett Publishers.

LeBoffe & Pierce. *Laboratory Atlas for Microbiology* (2nd Ed.). Morton Publishers.

Lab Manual (Required):Darren Francisco. *Lab Manual-Microbiology*. Local Publishers

Course Objectives

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

1. Explain the scope, development, and the basic concepts of microbiology
 - a. Explain the areas, applications, and importance of microbiology
 - b. Describe the historical development of microbiology
 - c. Apply basic principles of chemistry to the organization of microbes at the molecular and cellular levels
 - d. Compare and contrast eukaryotic and prokaryotic organisms
 - e. Apply the various classification systems to microorganisms
 - f. Describe the various techniques for inspection of microbes.
2. Apply the basic anatomy of microbes to the physiological needs of bacteria
 - a. Compare and contrast the anatomy of gram positive and gram negative bacteria
 - b. Apply the requirements for bacterial growth to reproduction and the various microbial interactions that influence population growth
 - c. Apply the biochemistry of bacterial metabolism to bacterial needs
 - d. Apply the basic principles of bacterial genetics as they relate to the bacterial chromosome, mutation, recombination, and genetic engineering.

3. Apply the control of microorganisms and the use of antibiotics to the disease process
 - a. Apply the physical control of microbes to practices in clinical, laboratory, and general hygiene
 - b. Apply the chemical control of microbes to practices in clinical, laboratory, and general hygiene
 - c. Describe the development of chemotherapeutics and antibiotics
 - d. Apply the mode of action to effectiveness of the major groups of antibiotics
 - e. Apply the interactions between microbe and host to the disease process.
4. Evaluate the major pathogenic bacteria and the diseases they cause
 - a. Investigate the airborne bacteria and the diseases of the respiratory system
 - b. Investigate the intoxications of and infections caused by foodborne and waterborne bacteria
 - c. Investigate the soilborne, arthropodborne, and rickettsial bacterial diseases
 - d. Investigate the sexually transmitted bacterial diseases.
5. Apply the processes of immunity to the prevention and elimination of disease
 - a. Differentiate between non-specific and specific immunity
 - b. Explain immunity to disease and serological reactions
 - c. Classify the various types of hypersensitivity.
6. Evaluate the major pathogenic viruses, fungi, protists, and parasitic worms and the diseases they cause
 - a. Describe the structure, replication and characteristics of viruses and subviral particles
 - b. Investigate the various viral diseases
 - c. Classify the pathogenic fungi
 - d. Investigate diseases caused by fungi
 - e. Classify the pathogenic protozoans
 - f. Investigate the diseases caused by protozoans
 - g. Classify the parasitic worms
 - h. Investigate the diseases caused by parasitic worms.
7. Apply the standard laboratory techniques of microbiology
 - a. Apply incubation techniques used in the laboratory
 - b. Apply inoculation techniques used in the laboratory
 - c. Apply isolation techniques used in the laboratory
 - d. Apply inspection techniques used in the laboratory
 - e. Apply identification techniques used in the laboratory.

Topical Outline of Units

- I. The scope, development, and the basic concepts of microbiology
 - a. Areas, applications, and importance of microbiology
 - b. History of microbiology
 - c. Organization of organisms

- d. Eukaryotic and prokaryotic organisms
 - e. Classification of microbes
 - f. Microscopy.
- II. Growth, metabolism and genetics of Bacteria
- a. Bacterial cell structure
 - b. Growth and reproduction of bacteria
 - c. Bacterial metabolism
 - d. Bacterial genetics.
- III. The control of microorganisms and disease
- a. Physical control of microbes
 - b. Chemical control of microbes
 - c. Chemotherapeutics and antibiotics
 - d. The mode of action and effectiveness of antibiotics
 - e. The interactions between microbe and host in the disease process.
- IV. Pathogenic bacteria and disease
- a. Airborne bacterial diseases
 - b. Foodborne bacteria, waterborne bacterial diseases
 - c. Soilborne, arthropodborne, and rickettsial bacterial diseases
 - d. Sexually transmitted bacterial diseases.
- V. Immunity
- a. Non-specific and specific immunity
 - b. Immunity to disease and serological reactions
 - c. Hypersensitivity reactions.
- VI. Pathogenic viruses, fungi, protists, and parasitic worms
- a. Viruses and subviral particles
 - b. Viral diseases
 - c. Fungi and disease
 - d. Protozoans and disease
 - e. Parasitic worms and disease.
- VII. Processes of microbiology
- a. Incubation techniques
 - b. Inoculation techniques
 - c. Isolation techniques
 - d. Inspection techniques
 - e. Identification techniques.

Methods of Instruction

The following teaching/learning activities will assist students to achieve course objectives: lecture, lab, class discussion, group activities, a written paper, class presentation, and textbook reading assignments.

Methods of Evaluation

A series of examinations as follows: 4-5 lecture exams will be given and 2-3 lab exams will be given. Grade determination will be dependent upon total points from: tests, quizzes, assignments, lab reports, and or attendance.