

I. COURSE INFORMATION

- A. Biology 271 Microbiology
- B. 5 credit hours
- C. Tolora, Gerard, Berdell Funke, Christine Case. *Microbiology: An Introduction*. 13th ed. New Jersey: Pearson, 2019
- D. Prerequisites: Completion of BIO 102 Principles of Biology or BIO 150 Biology I (Cellular) with a C grade or above

II. COURSE DESCRIPTION

Microbiology is an integrated lecture and laboratory course for biology, pre-medicine, pre-physician's assistant, and pre-veterinary students. The course covers the morphology, anatomy, physiology, growth, cultivation, and classification of microorganisms with an emphasis on their relationship with humans.

III. LEARNING OUTCOMES

- A. Analyze the impact of microorganisms in health, environment, and industry
- B. Connect the basic anatomy of microbes to their physiological needs
- C. Illustrate how the basic structure of microorganisms relates to their susceptibility to antimicrobials
- D. Compare and contrast the processes of replication, transcription, translation in microbes and ways of acquiring new genetic information
- E. Compare and contrast methods of controlling microbial growth
- F. Distinguish among the major types of metabolic processes in microorganisms
- G. Illustrate the concepts and mechanisms of microbial pathogenicity
- H. Explain strategies for identifying and managing infectious diseases
- I. Identify healthcare associated infections and concepts of epidemiology
- J. Distinguish between innate and adaptive immune responses including how vaccines work and are effective methods to prevent disease
- K. Use a bright field light microscope to view and interpret slides, including:
 - Correctly setting up and focusing the image
 - Proper handling, cleaning, and storage of the microscope
 - Correct use of multiple lenses
 - Recording microscopic observations
- L. Properly prepare slides for microbiological examination, including:
 - Cleaning and disposing of slides
 - Preparing smears from solid and liquid cultures
 - Performing wet mount and/or hanging drop preparations
 - Performing simple and differential stains
- M. Properly use aseptic techniques for the transfer and handling of microorganisms and instruments, including:
 - Sterilizing and maintaining sterility of transfer instruments
 - Performing aseptic transfer
 - Obtaining microbial samples
- N. Use appropriate microbiological media and test systems, including:
 - Isolating colonies and/or plaques
 - Maintaining pure cultures
 - Using biochemical test media
 - Accurately recording macroscopic observations
- O. Estimate the number of microbes in a sample using serial dilution techniques, including:
 - Correctly choosing and using pipettes and pipetting devices
 - Correctly spreading diluted samples for counting
 - Estimating appropriate dilutions

- Extrapolating plate counts to obtain the correct CFU or PFU in the starting sample
- P. Use standard microbiology laboratory equipment correctly, including:
 - Using the standard metric system for weights, lengths, diameters, and volumes
 - Lighting and adjusting a laboratory burner
 - Using an incubator
- Q. Practice safe microbiology, using appropriate protective and emergency procedures
- R. Document, interpret, and report on experimental protocols, results and conclusions

IV. MAJOR CONTENT AREAS

- A. The history of microbiology
- B. Cell morphology
- C. Immunity
- D. Laboratory techniques
- E. Survey of microorganisms
- F. Environmental and industrial microbiology

V. ASSIGNMENTS (may include but are not limited to)

- A. Laboratory activities
- B. Quizzes
- C. Exams

VI. EVALUATION METHODS (may include but are not limited to)

- A. Lecture and lab exams
- B. Projects and lab exercises
- C. Assignments
- D. Quizzes and exams