NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE

COURSE SYLLABUS

Course Title: Microbiology with Lab **Course #: BIO 235**

Course Description: This course focuses on structure, classification and physiology of microorganisms. Infection, immunity and the control of microorganisms are emphasized. The role of microorganisms in the environment and economy are also discussed. Laboratory exercises include an emphasis on sterile techniques, Biochemical analysis, specimen handling and sampling and the identification of unknowns.

Pre-requisite: General Biology 1(BIO 121) or Cell and Organ Systems (BIO 127) with a "C" or better

Objectives:

The goal of this course is to provide an understanding of microorganism and the role they play in health and disease.

Outcomes: Upon completion of this course a student should be able to:

- Compare the theories of spontaneous generation and biogenesis.
- Describe the germ theory of disease and Koch's postulate
- List the major groups of organisms studied in microbiology
- Explain the basic principles of biological chemistry and their relevance to living things
- Compare and contrast prokaryotic and eukaryotic cells in terms of structures , functions and chemistry
- Explain the principle mechanisms of metabolism including aerobic and anaerobic respiration, fermentation as well as the synthesis of macromolecules
- Compare aerobic and anaerobic respiration
- Describe the difference between Gram + and Gram - cells
- Describe the mechanisms of enzyme action and inhibition
- List the chemical and physical requirements for microbial growth and explain how these are used to classify microorganisms
- Describe the actions of antimicrobial agents
- Identify physical and chemical methods of microbial control
- Describe the processes of DNA replication and protein synthesis
- Explain the role of plasmids and genetic transfer in antibiotic and chemical resistance
- Identify medically important groups of microorganisms
- Identify the methods of disease transmission
- Explain the importance of epidemiology and the use of DNA fingerprinting to identify sources of contamination
- Explain the role of normal flora

- Describe the principles of disease and mechanisms of pathogenicity
- Identify and discuss the roles of specific and non specific host defenses
- Identify major diseases caused by microorganisms
- Explain the role of microorganisms in the environment

A student successfully completing the microbiology laboratory should be able to:

1. Use a light microscope to view and interpret slides
2. Properly prepare slides for microbiological examination
3. Perform simple and differential staining techniques including Gram stains
4. Properly use aseptic techniques for the transfer and handling of microorganisms and instruments, including:
    a. Sterilizing and maintaining sterility of transfer instruments
    b. Performing aseptic transfer
    c. Obtaining samples
5. Use appropriate microbiological media and test systems, including

    a. Isolating colonies
    b. Maintaining pure cultures
    c. Using biochemical test media to identify organisms
    d. Accurately recording macroscopic observations
6. Estimate the number of microbes in a sample using serial dilution techniques
7. Use standard microbiology laboratory equipment correctly
8. Perform and analyze biotechnological tests including bacterial transformations and DNA fingerprinting.
9. Perform and analyze immunological tests including ELISA and Western Blot.