

BIOL 230

Microbiology

4 Credits: 3 credits lecture and 1 credit lab

Community College of Baltimore County Common Course Outline

Description

BIOL 230 – Microbiology: Students survey concepts related to the study of bacteria, viruses, protozoa, and fungi. These microorganisms maintain both beneficial and pathogenic relationships with humans, and concepts related to both types of relationships will be examined. Basic laboratory techniques such as microscopy, staining, and aseptic techniques are emphasized.

Pre-requisites: BIOL 110 with a final grade of C or higher; MATH 073 or MATH 083

Overall Course Objectives

Upon completion of this course, students will be able to:

1. classify organisms using appropriate terminology related to their structure, metabolism, genetics, and ecology;
2. explain the functions of key microbial structures in the prokaryote cell and their contribution to disease development;
3. explain the differences among Gram negative cell walls, Gram positive cell walls, and atypical cell walls, and their effects on differential staining in the Gram stain;
4. differentiate the metabolic processes of aerobic respiration, anaerobic respiration, and fermentation;
5. differentiate gene regulation through quorum sensing and gene regulation via an operon;
6. delineate the processes of the three different types of horizontal gene transfer and the different mechanisms that allow bacteria to generate diversity and acquire resistance elements;
7. discuss the differences between opportunistic and pathogenic microorganisms and host-pathogen interactions that result in infection and/or disease;
8. use proper terminology to describe various types of infectious disease, the stages of a disease, and means of transmission;
9. describe the general steps in a productive and a latent viral replication cycle using proper terminology to identify key viral structures in those cycles;
10. explain innate immune responses such as phagocytosis, complement, and inflammation as they apply to the infectious disease process;
11. explain which cells and cytokines are involved in adaptive responses and how their interactions lead to a primary response;
12. describe the concept of memory and how it allows for the acquisition of immunity, both natural and artificial;

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13. explain the principles of certain physical and chemical methods used in the control of microorganisms;
14. describe the modes of action that enable antibiotics to inhibit or kill bacteria, as well as the common mechanisms that enable bacteria to resist these antibiotics;
15. demonstrate appropriate laboratory skills and techniques related to the isolation and staining of microorganisms;
16. demonstrate proper use and care of the compound light microscope;
17. identify an unknown microorganism using phenotypic methods; and
18. develop the ability to work both independently and with others in the laboratory and draw appropriate conclusions from laboratory results.

Major Topics

- I. Introduction to microbiology
- II. Prokaryote cell anatomy
- III. Classification of microorganisms: bacteria, viruses, protozoans, and fungi
- IV. Microbial growth and reproduction
- V. Microbial metabolism
- VI. Microbial genetics
- VII. Microbial mechanisms of pathogenicity
- VIII. Innate and adaptive immune responses
- IX. Control of microorganisms
- X. Microorganisms and human diseases
- XI. Laboratory techniques
 - a. Microscopy
 - b. Aseptic technique
 - c. Staining of microorganisms
 - d. Identification of bacteria and viruses
 - e. Control of microorganisms

Course Requirements

Grading will be determined by the individual faculty member, but shall include the following, at minimum:

- 3 lecture exams
- 2 methods of laboratory assessment, one of which must be a skills assessment such as a lab practical

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