

Coffeyville Community College

#BIOL-204

COURSE SYLLABUS

FOR

MICROBIOLOGY

Don Barker

Instructor

COURSE NUMBER: BIOL-204 **COURSE TITLE:** Microbiology

CREDIT HOURS: 5

INSTRUCTOR: Don Barker

OFFICE LOCATION: Math/Science Area, Arts and Sciences Building

PHONE: 620-251-7700 ext. 2079

OFFICE HOURS: See schedule posted on office door

PREREQUISITE(S): Biology

**REQUIRED TEXT
AND MATERIALS:**

More of Microbiology by Don Barker
Permanent marker
Microscopic slides

**COURSE
DESCRIPTION:**

This is a beginning course in the study of microorganisms, designed to acquaint the student with various forms of bacteria, fungi, protozoa and algae. Morphology, life cycles, metabolism and economic importance of microorganisms are stressed.

**EXPECTED LEARNER
OUTCOMES:**

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

1. Identify a microorganism, using both gross and microscopic examination.
2. Understand metabolism and how it effects growth, reproduction, and genetics.
3. Understand various aspects of fungi, algae, protozoans, and viruses, along with various methods to control microbial populations.
4. Relate various factors of virulence to the immune system of the human body.
5. Be familiar with various diseases caused by different microorganisms.

**LEARNING TASKS
& ACTIVITIES:**

UNIT I

Scope and Evaluation of Microbiology
Characterization and Classification of Microbes
Microscopic Observations of Microorganisms

Test #1

UNIT II

Morphology and Fine Structure of Microbes

Cultivation of Bacteria

Reproduction and Growth

Pure Cultures and Cultural Characteristics

Enzymes and Their Regulation

Bacterial Metabolism

Genetics

Test #2

UNIT III

Fungi: The Molds and Yeasts

Algae and Protozoans

Viruses

Fundamentals of Control

Test #3

UNIT IV

Host-Microbe Interactions

Resistance and Immunity

The Immune Response in Theory and Practice

Test #4

**ASSESSMENT OF
OUTCOMES:**

Cognitive: Knowledge and understanding of the material will be assessed through tests which are mainly objective in nature (True/False, Multiple Choice, and Matching questions), with the lab test being totally a recall type test. 70%

Metacognitive: Each student will be required to show how they can incorporate the cognitive aspects of this material attained from the lectures and labs by writing laboratory reports. 10%

Affective: Attendance and participation in classroom discussions will be indirectly graded by pop quizzes. 10%

Performance and Skills: The performance and skills learned in this course will be evaluated in the lab test. 10%

**GRADING
POLICY:**

Grades of A (100-91%), B (90-81%), C (80-71%), D (70-61%), and F (60-0%) are given in this course. Incompletes given at the

semester end will only be given if previously agreed upon by the student and instructor with the specific time designated for the completion of the incomplete work. Please note the college's policy on incompletes as stated in the college catalog.

At all times the student must do his/her own work. Do not cheat in any form. Any student found cheating on any test will forfeit the total possible on the event.

Tests must be taken on the scheduled day. **Only** if arrangements are made with the instructor prior to the original test date will a student be allowed to take a test at a different time, and then it must be taken **before** the scheduled test. There will be **no** early or late testing for pop quizzes or lab test.

Requirements and final evaluation: A student's final grade will be based on the following (761 points)

1. 4 Lecture Tests @ 100 points each 400 pts.
2. 1 Lab Test 100 pts.
3. Lab Notebook @ 3 points. per lab 111 pts.
(0 points per lab for absence)
4. 10 Pop Quizzes @ 10 points each 100 pts.
5. Unknowns 50 pts.

**ATTENDANCE
POLICY:**

Each student is expected to attend all classes. It is the responsibility of the student to make definite arrangements with the instructor for make-up work **before** going on a field trip or another college-sponsored event. Class periods, assignments, and tests that are missed without prior arrangements with the instructor may not be made-up unless unusual circumstances prevail and at the instructor's prerogative.

**LECTURE
SCHEDULE:**

Instructor will distribute in class.

**LAB
SCHEDULE:**

Instructor will distribute in class.

COMPETENCIES: Upon completion of this course, the following should be accomplished by the student

IDENTIFICATION OF A MICROORGANISM BY GROSS AND MICROSCOPIC EXAMINATION

1. List the characteristics possessed by all forms of life.
2. Contrast transformation and transduction.
3. Explain the experiment of Avery, McLeod, and McCarty.
4. Diagram, label, and explain the growth curve.
5. List three reasons why bacteria are useful research tools.
6. Explain the significance of each of the following individuals to the field of microbiology: Koch, Lister, Pasteur, Metchnikoff, Enders-Robbins-Weller, Salk, and Sabin.
7. List ten major characteristics for identifying organisms.
8. Explain the scientific name.
9. Given examples of certain bacteria, provide various characteristics of each one.
10. Describe the types of microscopes.
11. Define and be able to calculate the resolving power.
12. Differentiate between the wet mount/hanging drop technique vs. fixed stained smears.
13. Differentiate between simple vs. differential staining procedures.

METABOLISM AND ITS EFFECTS UPON GROWTH, REPRODUCTION, AND GENETICS

14. Differentiate between types of media.
15. Describe ways to determine pH changes within a media type.
16. Explain physical conditions for bacterial growth, such as:
 - A. Temperature
 - B. Gaseous requirements
 - C. pH
 - D. Nutrient and trace elements
17. List and describe ways to provide an anaerobic atmosphere for bacterial growth.
18. List and explain common means to measure bacterial growth.
19. Be able to calculate generation time.
20. List and describe culture preservation methods.
21. Describe the following men who were associated with enzymes: Pasteur, Liebig, Buchner.
22. Differentiate between intracellular and extracellular enzymes.
23. List and state the composition of a holoenzyme, including the apoenzyme and coenzyme.
24. Expand upon enzyme stability and specificity.
25. State and diagram conditions affecting enzyme activity, including enzyme/substrate concentration, pH, and temperature.
26. Differentiate between competitive and noncompetitive inhibition.

27. Define metabolism.
28. Contrast anabolic (endergonic) and catabolic (exergonic) reactions.
29. Diagram and explain glycolysis and Krebs's Cycle
30. Describe the various products able to be produced from pyruvic acid and the organism capable of producing it.
31. Diagram a DNA molecule, given the chemical components.
32. Explain complimentary base pairing in DNA.
33. Describe the composition of a nucleotide.
34. Differentiate between transcription and translation processes.
35. Diagram small sections of proteins, given DNA, m-RNA, or t-RNA triplets.
36. Work problems dealing with DNA triplets and or triplets of m-RNA and t-RNA.
37. Explain the experiment of Hershey and Chase.
38. Define mutation.
39. Contrast genotype and phenotype.
40. Diagram a dihybrid and monohybrid cross.
41. Differentiate between spontaneous and induced mutations.
42. List two important factors to consider when antibiotics are administered.

<p>ASPECTS OF FUNGI, ALGAE, PROTOZOANS, AND VIRUSES WITH MICROBIAL CONTROL</p>
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43. List characteristics of molds.
44. List and describe the types of mold hyphae.
45. Distinguish between asexual and sexual reproduction in molds.
46. Contrast liabilities versus assets of molds.
47. List the growing conditions of molds.
48. Contrast superficial versus deep mycotic infections.
49. List characteristics of yeasts.
50. List assets of yeasts.
51. Describe yeast as a symbiote.
52. List characteristics of algae.
53. List and distinguish between algal divisions.
54. List characteristics of the Protozoan phylum of the Animal Kingdom.
55. Give characteristics of an example of each of the four classes of the Protozoan phylum.
56. List general characteristics of viruses.
57. List and describe methods of inactivate viruses.
58. Expand upon the stages of the viral infection cycle.
59. Expand upon the treatment of virus infections.
60. Describe viral infection results in animals, plants, and bacteria.
61. List the individuals who discovered bacteriophages.
62. Give an important use of bacteriophages today.
63. Define the following terms:
 - A. Disinfectant

- B. Germicide
 - C. Antiseptic
 - D. Sterilize
64. List and explain the characteristics of an ideal disinfectant.
 65. Describe methods of sterilization to control the growth of microorganisms.
 66. Contrast the assets and liabilities of antibiotics.
 67. List which organisms produce antibiotics.
 68. Explain how antibiotics effect bacteria.
 69. Identify the year and by whom the first antibiotic was discovered.
 70. Explain how soap/disinfectant, alcohol, halogens, and heavy metals chemically destroy bacteria.

VIRULENCE AND THE IMMUNE SYSTEM
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71. Define the term virulence.
72. Differentiate between exotoxins and endotoxins.
73. Relate virulence to invasiveness and toxicity.
74. List and describe virulence factors.
75. List and describe the types of white blood cells.
76. List and describe the types of antibodies.
77. Explain the “Clonal Selection Theory.”
78. Diagram the secondary response as contrasted to the primary response.
79. Describe various blood cell abnormalities.
80. Explain various factors which influence phagocytosis.
81. List various characteristics of antigens.
82. Explain the various types of immunity.
83. Describe various methods of immunosuppression.
84. Describe various details of cancer.
85. List causes, sensitivity levels, and two types of allergic reactions.
86. Describe various aspects of tuberculosis.

This syllabus is subject to revision with prior notification to the student by the instructor.