

JEFFERSON COLLEGE
COURSE SYLLABUS

BIO215
GENERAL MICROBIOLOGY

5 Credit Hours

Prepared by:
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Revised by
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Minor Revision or Update by: Fran Moore
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BIO215 General Microbiology

I. CATALOG DESCRIPTION

- A. Course pre-requisites:
- High school biology and chemistry or equivalent (BIO101), with a grade of “C” or better within the previous five years of registration date
 - Reading proficiency
- B. 5 semester credit hours
- C. General Microbiology examines fundamental concepts concerning microorganisms. This course encompasses a wide variety of topics, which illustrate the impact that microbes have on human life. Laboratory time is required. Students cannot apply both BIO113 and BIO215 toward graduation. (D)
- D. Curricular alignment:
- Elective course applies toward AA or AAT degree.
 - Fulfills AAS – Veterinary Technology degree requirement.

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

Expected Learning Outcomes	Assessment Measures
Describe the scope of microbiology and its role in modern technology	Homework Quizzes/exams
Summarize the early history of microbiology	Homework Quizzes/exams
Cite major events in the development of infectious disease, immunology, hemotherapeutics and microbial biotechnology	Homework Quizzes/exams
Understand basic features of various types of microscopy	Homework Quizzes/exams
Describe characteristics, structure, function and of classifications of viruses, bacteria, archea, protozoa, algae and fungi	Homework Quizzes/exams
Understand basic mechanisms of enzyme action, control and formation	Homework Quizzes/exams
Understand fundamentals of microbial metabolism	Homework Quizzes/exams
Explain microbial growth, cultivation and methods of control	Homework Quizzes/exams
Understand basic microbial genetics	Homework Quizzes/exams
Understand basic concepts of immunology and epidemiology	Homework Quizzes/exams
List and characterize the microbiology of common microbial diseases	Homework Quizzes/exams

III. OUTLINE OF TOPICS

- A. History and scope of microbiology
 1. Describe the scope of microbiology, the variety of microbes and the kinds of work that microbiologists do
 2. Summarize the early history of microbiology, especially the development of the microscope
 3. Cite major events in the development of immunology and the germ theory

- B. Prokaryotic and eukaryotic microbes
 1. List the characteristics of prokaryotic and eukaryotic cells
 2. Describe the structure and function of microbial cell components
 3. List representative examples of microbes that make-up these two groups

- C. Microbial metabolism
 1. List and describe characteristics of enzymes
 2. List the basic steps of glycolysis and the Krebs cycle
 3. List several characteristics of fermentation
 4. Describe beta oxidation
 5. Describe how microbes metabolize protein for energy
 6. Explain the step of protein synthesis
 7. Explain mechanisms of control at both the enzyme level and gene level

- D. Molecular microbiology
 1. Explain how nucleic acids function in storage and transfer of information
 2. Summarize the steps of DNA and RNA replication
 3. Explain the role of plasmids and rescue experiments in genetic
 4. Describe de nova synthesis
 5. Explain the process of restriction endonucleases in genetic engineering
 6. Describe the process of chromatography, electrophoresis, and ultracentrifugation for purification

- E. Cultivation of microbes
 1. List and describe the four phases of the growth curve
 2. List and describe three methods for measuring bacterial growth
 3. List several types of culture media and explain how they provide microbial nutritional requirements for growth
 4. Explain the importance of selective and differential media
 5. Describe how a pure culture could be obtained in a laboratory from a mixed sample

- F. Microbial control
 1. Describe how dry heat, moist heat and pasteurization are used to control microorganisms
 2. List common disinfectants and antiseptics
 3. Discuss mechanisms of antibiotic activity
 4. List common antibiotics and tell how they work
 5. Describe mechanisms of antibiotic resistances and the role of transposons and plasmids

- G. Taxonomy
1. Discuss how and why microorganisms are named
 2. Describe how a dichotomous key is used
 3. List the five kingdoms and give at least two characteristics of each.
 4. Explain the significance of *Bergy's Manuals*
 5. Give major structure of viruses and tell how they are characterized and cultured
 6. Give major structure, function, characteristics and importance of: bacteria, rickettsial, protozoa, algae and fungi
- H. Immunology and epidemiology
1. Define the following: immune, immunity, susceptibility, non-specific immunity, specific immunity, immunology, and immune system
 2. List properties of antigens and antibodies
 3. Describe how recognition of self-specificity, and memory functions in the immune system
 4. Describe the role of T and B cells
 5. Describe how cell-mediated immunity differs from humeral immunity
 6. Explain differences between delayed and immediate hypersensitivity
 7. Discuss how and why organ transplants are sometimes rejected
 8. Describe how antigens and antibodies can be detected and measured
 9. Define the following: epidemiology, incidence, prevalence, CDC, and carrier
 10. Describe several methods used in the prevention of disease and nosocomial infections
- I. Microbial disease
- List the most important pathogens and explain characteristics, microbe, epidemiology, prevention and treatment of diseases associated with the skin, respiratory system, gastrointestinal system, blood and lymphatic system, nervous system, urogenital system
- J. Environmental microbiology
1. Describe the importance of recycling, and note how water and carbon are recycled
 2. Describe the kinds of microbes found in air
 3. Describe how water pollution and waterborne pathogens affect humans
 4. Describe how water is tested for sewage contamination and how it is purified
- K. Applied microbiology
1. Describe how food spoilage can be prevented
 2. Describe how microbes can be used as foods
 3. Explain how microbes are used making beer and wine
 4. Describe how microbes can be used in biotechnology

IV. METHODS OF INSTRUCTION

- A. Lectures
- B. Videos
- C. Class discussion
- D. Classroom demonstrations
- E. Laboratory exercises

V. REQUIRED TEXTBOOKS

Nester, Eugene W. et. al. Microbiology: A Human Perspective (current edition). New York: McGraw-Hill.

Leboffe, Michael, J. and Burton E. Pierce. Microbiology: Laboratory Theory and Application (current edition). Englewood, CO: Morton

Leboffe, Michael, J. and Burton E. Pierce. A Photographic Atlas for the Microbiology Laboratory (current edition). Englewood, CO: Morton

VI. REQUIRED MATERIALS

None

VII. SUPPLEMENTAL REFERENCES

Bergy's Manuals (Library Reserve Desk)

VIII. METHODS OF EVALUATION

- A. Written exams
- B. Laboratory exams
- C. Identification of microbial unknown
- D. Laboratory research project

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (TC 101; phone 636-481-3169).

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, <http://www.jeffco.edu>).

XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.