

Lassen Community College Course Outline

BIOL-20 Microbiology

5.0 Units

I. Catalog Description

This is an introductory course covering the biology (morphology, anatomy, physiology, classification, identification and development) of micro-organisms (viruses, protozoa, parasitic worms, algae, fungi, with emphasis on bacteria) their significance and their role in human affairs. This course has been approved for Online and hybrid delivery.

Recommended Preparation: Biology 1

Transfers to both UC/CSU

CSU GE Area: B2 & B3

IGETC GE Area: 5B & 5C

General Education Area: A

51 Hours Lecture, 102 Hours Lab 102 Hours Lab, 255 Total Student Learning Hours

Scheduled: Fall

II. Coding Information

Repeatability: Not Repeatable, Take 1 Time

Grading Option: Graded or Pass/No Pass

Credit Type: Credit - Degree Applicable

TOP Code: 040300

III. Course Objectives

A. Course Student Learning Outcomes

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

1. Perform isolations of bacteria from a mixed bacterial broth culture and utilize various microbiological techniques to identify the bacteria to the genus or species level.
2. Exhibit oral and written communication skill.
3. Compare and contrast various organisms, examples may include protozoa, fungi, and multi-cellular parasites.
4. Explain the metabolic activity of cellular organelles
5. Perform biological laboratory skills and display habits of good laboratory practices.

B. Course Objectives

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

1. Define the following terms: microbiology, bacteriology, virology, phycology, parasitology, helminthology, mycology, medical entomology, and immunology.
2. Describe the historical development of microbiology as a science.
3. List the kingdoms and assemble the scientific hierarchy for designated organisms.
4. Diagram disease cycles for selected pathogenic protozoa, fungi, and worms.

5. Construct a dichotomous key to differentiate various organisms studied in class.
6. Diagram and describe the lytic and lysogenic cycle of a temperate phage.
7. Write a paragraph comparing and contrasting prokaryotic and eukaryotic cells.
8. Diagram and label parts of a "typical" bacteria cell.
9. Describe and perform the procedures necessary to obtain a good spore, negative, acid-fast, and gram stain.
10. Classify bacteria based on metabolic criteria, oxygen requirements and temperature requirements.
11. Differentiate between fermentation and respiration.
12. Outline the steps in aseptic technique.
13. Explain methodologies for obtaining pure cultures and determining numbers of bacteria cells.
14. Interpret a bacterial growth curve.
15. Discuss physical and chemical methods of controlling bacteria growth
16. Discuss concepts in bacterial heredity and reproduction.
17. Discuss protein synthesis and gene regulation in prokaryotes.
18. Discuss contemporary advances in recombinant DNA technology.
19. Describe a microbial food chain.
20. Identify quantitative and qualitative analysis of contaminated water.
21. Diagram a cycle of infection.
22. Identify the body's defense mechanisms against infection.
23. Compare and contrast humoral and cell-mediated immunity.
24. Define serology and describe various serological tests.

IV. Course Content

The following may be included; however, the order of presentation, relative emphasis and the depth of treatment will depend on the preference of the instructor:

- A. History of Microbiology
- B. Survey of Microorganisms
 1. Kingdom Protista
 2. Kingdom Plantae (Algae)
 3. Kingdom Fungi
 4. Kingdom Animalia
 5. Viruses
- C. Prokaryote Morphology
- D. Survey of Bacteria (Bergey's Manual)
- E. Microbial Metabolism
- F. Microbial Growth
- G. Microbial Control
- H. Microbial Genetics
- I. Microbial Ecology
 1. Soil Microbiology
 2. Aquatic Microbiology
 3. Food Microbiology
 4. Industrial Microbiology
- J. Disease
- K. Immunity
- L. Serology

V. Assignments

A. Appropriate Readings

Reading assignments which will be used to enhance the learning process may include, but are not limited to:

1. Standard college level lecture and laboratory texts
2. Monthly scientific journals such as Scientific American and Science
3. Electronic and other archival research on a variety of topics in microbiology
4. Newspaper articles relevant to current topics in microbiology

B. Writing Assignments

In order to successfully complete this course, students must demonstrate understanding of course content through writing assignments which may include, but are not limited to:

1. Essay answers to questions on mixed format examinations
2. Written analysis of laboratory exercises in microbiology
3. Research paper on a topic of interest pertinent to microbiology

C. Expected Outside Assignments

Examples of outside assignments may include, but are not limited to:

1. Reading assignments as specified in the course syllabus
2. Library and Learning Center: electronic and other archival research on a variety of topics in the field of microbiology
3. Written analysis of laboratory exercises in microbiology
4. Research paper on a topic of interest pertinent to microbiology
5. Read and summarize newspaper articles relevant to current topics in microbiology

D. Specific Assignments that Demonstrate Critical Thinking

Examples of assignments that demonstrate critical thinking may include, but are not limited to:

1. Review of periodicals and newspapers
2. Analysis and synthesis information presented in the text and during lecture to formulate answers to essay questions on mixed format exams
3. The integration of information presented during lecture and lab to formulation a course of action designed to allow the student to arrive at the correct identity of an unknown consisting of three bacteria.

VI. Methods of Evaluation

Traditional Classroom Evaluation

The formulation of a student grade will be based upon:

- A. Performance on mixed-format exams including essay questions asking students to critically analyze topics discussed in class.
- B. Construct a dichotomous key to separate the following organisms: Anabaena, Anopheles, Balantidium coli, Clonorchis sinensis, Giardia lamblia, Rhizopus stolonifera, Taenia pisiformis, Trichinella spiralis, and Trypanosoma gambiense.
- C. Describe the processes that a prokaryotic cell would utilize to convert genetic information into a functional product.
- D. Discuss the process that will allow members of the Bacillaceae family to survive under conditions that would kill many other bacteria.
- E. Describe one method, generally available in the typical American home, that could be used to sterilize a towel contaminated with pathogenic non-endospore forming bacteria

- F. Describe an individual's physiological response to the penetration of a previously un-encountered virus into the dermis of the skin.
1. Performance on weekly quizzes
 2. Performance on a term paper based on research
 3. Performance on a comprehensive laboratory notebook

Hybrid Evaluation

A combination of traditional classroom and online evaluations will be used, such as (1) Traditional Classroom: objective examinations and essay examinations, laboratory practical examinations and (2) Online delivery: online quizzes, essay forum postings, chat rooms and email communications.

Online Evaluation:

Identical to face-to-face instruction including a variety of evaluation methods such as: research papers, asynchronous and synchronous discussions (chat/forum), exercises/assignments, online quizzes and exams, and postings to online website.

VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

Traditional Classroom Delivery Correspondence Delivery

Hybrid Delivery

Online Delivery

Traditional classroom Delivery

1. Lecture and computer assisted presentations
2. Computer generated tutorials
3. Laboratory
4. Discussion and problem solving performed in and outside class
5. Homework and extended projects
6. Collaborative projects

Hybrid Delivery

Hybrid modality may involve face to face instruction mixed with online instruction. A minimum of 1/3 of instruction including 100 % of labs will be face to face. The remaining hours will be taught online through a technology platform as adopted by the district.

Online Delivery:

Online instruction will be utilized through the technology platform adopted by the District. A mixture of asynchronous and synchronous methods will be utilized. Online delivery will consist of participation in live video meetings, forum-based discussions and posts, web links, email communications, lecture posts, exams and online lectures. Adding extra resources and other media sources as appropriate.

VIII. Representative Texts and Supplies

Required – Tortora, Funke & Case; *"Microbiology: An Introduction"*, 2019, 13th edition, Pearson, ISBN: 978-0-321-92915-0

A laboratory manual book will be prepared and provided by instructor.

Recommended - *"A Photographic Atlas for Microbiology"*, Leboffe & Pierce, Morton, 2005, ISBN: 9780895826565.

IX. Discipline/s Assignment

Biological Sciences

X. Course Status

Current Status: Active

Original Approval Date: 1/16/1990

Revised By: Crystal Tobola

Curriculum/Academic Standards Committee Revision Date: 11/29/2022