MICRO 5 Course Outline as of Fall 2018

CATALOG INFORMATION

Dept and Nbr: MICRO 5 Title: GENERAL MICROBIOLOGY
Full Title: General Microbiology
Last Reviewed: 8/14/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	5.00	Lab Scheduled	6.00	6	Lab Scheduled	105.00
		Contact DHR	0		Contact DHR	0
		Contact Total	9.00		Contact Total	157.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 262.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Course covers the morphology, growth, metabolism, genetics, and control of microorganisms, with emphasis on bacteria and viruses. Includes principles of microbial pathogenicity, and the human immune response. Emphasis on laboratory techniques. Intended for allied health majors considering transfer to CSU or UC.

Prerequisites/Corequisites:
Course completion of ENGL 1A; AND
Completion of BIO 10 or higher (V7); AND
Completion of CHEM 60 OR completion of CHEM 1A or higher (V6)

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Course covers the morphology, growth, metabolism, genetics, and control of microorganisms, with emphasis on bacteria and viruses. Includes principles of microbial pathogenicity, and the human immune response. Emphasis on laboratory techniques. Intended

for allied health majors considering transfer to CSU or UC. (Grade Only)
Prerequisites/Corequisites: Course completion of ENGL 1A; AND
Completion of BIO 10 or higher (V7); AND
Completion of CHEM 60 OR completion of CHEM 1A or higher (V6)
Recommended:
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
	C	Natural Sciences	Fall 1981	
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B2	Life Science	Fall 1981	
	B3	Laboratory Activity		
IGETC:	**Transfer Area**		Effective:	Inactive:
	5B	Biological Sciences	Fall 1981	
	5C	Fulfills Lab Requirement		

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1981	Inactive:

CID:

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Integrate basic principles of microbial cell structures and processes with evolutionary and ecological concepts.
2. Explain the impact of microbiology on medical, public health and environmental concerns.
3. Demonstrate proficiency in a variety of standard laboratory techniques used for the routine culture, analysis and identification of microorganisms.

Objectives:
In order to achieve these learning outcomes, during the course the students will:
1. Outline the history of major microbiological discoveries and describe their contributions to world civilization.
2. State Koch's postulates and apply them to different types of pathogens and to new diseases.
3. Relate basic principles of chemistry and cell biology to structure and function of microbes.
4. Explain how the unity of basic cell processes contributes to difficulties in treating infectious disease.
5. Describe the principles and mechanisms of microbial genetics and coevolution and apply them to the problem of increasing drug resistance in microorganisms.
6. Describe viruses and their relation to cells.
7. Compare and evaluate the various mechanisms of control and prevention of microbial disease.

8. Discuss the mechanisms of pathogenicity in microbes.
9. Compare and contrast the epidemiology of community acquired and hospital acquired infections.
10. Describe the functions of the human immune system, its relations to disease, and how vaccination contributes to immunity.
11. Describe the etiology, epidemiology, treatment and prevention of a variety of important infectious diseases.
12. Safely and aseptically perform a variety of microbiological laboratory techniques.
13. Collect and analyze data.

Topics and Scope:

I. Historical development
   A. Discovery of the microbial world and development of the microscope
   B. Spontaneous generation vs. biogenesis
   C. Koch's postulates
   D. Contribution of microbiology to biochemistry and molecular biology
   E. Contribution of microbiology to world civilization
II. Cell biology
   A. Chemistry and biochemistry review
   B. Lipids, membranes and transport
   C. DNA, RNA, protein: structure, function and flow of information
   D. ATP synthesis and cell work
   E. The eukaryotic cell: structure and function; endosymbiotic theory
   F. The prokaryotic cell: structure and function
   G. Comparison of bacteria and archaea
III. Antimicrobial agents
   A. Sterilization, disinfectants, antiseptics
   B. Antibiotics
      1. mode of action
      2. resistance mechanisms
IV. Microbial genetics
   A. Genome and phenotype
   B. Mutation, selection, adaptation
   C. Horizontal gene transfer
      1. transformation
      2. conjugation
      3. transduction
   D. Relation to virulence and antibiotic resistance
V. Viruses
   A. Definitions and historical background
   B. Interactions with cells
   C. Viral diseases of importance
VI. Ecological principles
   A. The human as ecosystem
   B. Symbiosis
   C. Impact on model of infectious disease
VII. Infectious disease
   A. Role of microbiome
   B. Mechanisms of pathogenicity
   C. Epidemiology
   D. Role of the host in disease

1. innate resistance
2. acquired resistance

E. Vaccination, prevention and treatment
F. Specific diseases of the human population

VIII. Applied microbiology
A. Modern biotechnology
B. Environmental microbiology
1. wastewater treatment
2. antibiotic isolation
3. environmental sampling and analysis

C. The role of hospital and public health laboratories
D. Fermentation applications

Laboratory Exercises
I. Laboratory safety and sanitation
II. Laboratory Techniques
A. Aseptic technique
B. Bacterial culture (liquid and solid medium)
C. Microscopy and staining techniques
D. Preparation and sterilization techniques
E. Analyses of bacteria in water, soil, and the community at large
F. Antibiotic sensitivity
G. Metabolic tests and bacterial identification
H. Bacterial mutagenesis
I. Transformation
J. Polymerase chain reaction and gel electrophoresis
K. ELISA (enzyme-linked immunosorbent assay)

Assignment:

Lecture Related Assignments:
1. Reading assignments from text, averaging one chapter per week; additional reading assignments averaging 1-5 pages per week
2. Research papers: 1-2, averaging 2-4 pages each
3. Quizzes: 0-15
4. Lecture exams: 3-4 (including multiple choice, completion, and essay questions)
5. Oral presentation: 1

Lab Related Assignments:
1. Laboratory experiments, data collection, demonstration of laboratory techniques
2. Lab exams: 2-3

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Research papers	Writing 4 - 15%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

None	Problem solving 0 - 0%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Laboratory experiments, data collection, demonstration of laboratory techniques	Skill Demonstrations 1 - 15%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, Lecture exams, Lab exams	Exams 70 - 90%

Other: Includes any assessment tools that do not logically fit into the above categories.

Oral presentation, Attendance and participation	Other Category 5 - 15%

Representative Textbooks and Materials:
Microbiology: An Introduction. 12th ed. Tortora, Gerard and Funke, Berdell and Case, Christine. Pearson. 2016
Microbiology: A Systems Approach. 4th ed. Cowan, Marjorie. McGraw-Hill. 2015
Microbiology: A Photographic Atlas for the Laboratory. Alexander, Steven and Strete, Dennis. Pearson. 2001 (classic)
Instructor prepared lab manual