MICRO 5 Course Outline as of Fall 2011

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:
Completion of CHEM 60 or higher (V6) and Completion of BIO 10 or higher (V7)

Recommended Preparation:
Eligibility for ENGL 1A or equivalent

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: Completion of CHEM 60 or higher (V6) and Completion of BIO 10

or higher (V7)
Recommended: Eligibility for ENGL 1A or equivalent
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

Outcomes and Objectives:
Upon successful completion of this course students will be able to:
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 pathogen 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. The pre-microbial world
  B. Discovery of the microbial world and development of the microscope
  C. Spontaneous generation
  D. Koch's postulates
  E. Contribution of biochemistry and molecular biology to microbiology
  F. Contribution of microbiology to world civilization
II. Cell biology
  A. Chemistry and biochemistry review
  B. Lipids, membranes and cells
  C. DNA, RNA, protein: structure and function
  D. ATP synthesis and cell work
  E. The eukaryotic cell: structure and function; endosymbiotic theory
  F. The prokaryotic cell: structure and function
  G. Comparioson of bacteria and archaea
III. Methodology
  A. Steps of the scientific method and Koch's postulates
  B. Methods of sterilization and disinfection
  C. Media and their construction and utilization
  D. Methods of obtaining pure cultures
  E. Staining and microscopy
  F. Antibiotic sensitivity tests
  G. Enrichment culture
  H. Fermentation: theory and practice
  I. Transformation
  J. Polymerase chain reaction and gel electrophoresis
  K. Enzyme linked immunosorbent assay (ELISA)
  L. Collection and analysis of environmental samples
IV. Antimicrobial agents
  A. Sterilization, disinfectants, antiseptics
  B. Antibiotics
    1. mode of action
    2. resistance mechanisms
V. 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
VI. Virus
  A. Definitions and historical background
  B. Interactions with cells
  C. Viral disease
    1. vaccination, treatment and prevention
    2. polio, rabies and HPV
    3. HIV/AIDS
    4. H5N1 Avian Influenza

VII. Ecological principles
A. The human as ecosystem
B. Symbiosis
C. Impact on model of infectious disease
VIII. Infectious disease
A. Role of normal flora
B. Mechanisms of pathogenicity
C. Epidemiology
1. community-acquired infections
2. hospital-acquired infections
D. Role of the host in disease
1. innate resistance
2. aquired resistance
3. factors influencing host resistance
E. Vaccination, prevention and treatment
F. Specific diseases of the human population
1. bacterial
2. viral
3. fungal
4. protozoal
5. comparison of common diseases and practices in the developed world versus the developing world
IX. 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 in the food and chemical industries

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

Assignment:

1. Reading assignments from text, averaging one chapter per week; additional reading assignments averaging 1-5 pages per week.
2. Laboratory experiments, data collection, demonstration of sterile and culture technique.

3. Research papers: 1-2 per semester, averaging 2-3 pages each
4. Examinations: 4 lecture exams, 3 lab exams and a final exam.
5. Oral presentation: 1 per semester.

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 5 - 10%

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.

Sterile and culture technique, microscopy	Skill Demonstrations 1 - 10%

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

Multiple choice, completion, essay, lab exams, quizzes	Exams 70 - 85%

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

Oral presentation	Other Category 5 - 10%

Representative Textbooks and Materials:
Microbiology: An Introduction, 10th edition, by G.J. Tortora, B.R. Funke and C.L. Case, 2010
Microbiology: A Systems Approach, 2nd edition, , M.K. Cowan, K.P. Talaro, 2009
Microbiology: A Photographic Atlas for the Laboratory, S.K. Alexander and D. Strete, 2001
Instructor prepared lab manual