**MICRO 5 Course Outline as of Summer 2009**

# 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

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|---|---|
| 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 and completion of BIO 10.

**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 and completion of BIO 10.

Recommended: Eligibility for ENGL 1A or equivalent
Limits on Enrollment:
Transfer Credit: CSU;UC. (CAN BIOL14)
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

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|---|---|---|---|---|
| **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 | | |

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| **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. Describe the steps in the scientific method.
3. Relate basic principles of chemistry and cell biology to microbes.
4. Describe the unique structures and mechanisms of microbial genetics.
5. Categorize microbes taxonomically and evolutionarily.
6. Describe viruses and their relation to cells.
7. Compare various mechanisms of pathogenicity.
8. Describe the function of the immune system and its relation to disease.
9. Safely and aseptically perform a variety of microbiological laboratory techniques.
10. 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
- F. The prokaryotic cell: structure and function

III. Methodology
- A. Steps of the scientific method and Koch's postulates
- B. Methods of sterilization: heat and filtration
- 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. non-specific resistance
2. immune system
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

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 and essays: 3 per semester, averaging 2-3 pages each
4. Examinations: 4 lecture exams, 3 lab exams and a final exam.

**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.

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| Essays and research papers | Writing<br>10 - 30% |

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

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| None | Problem solving<br>0 - 0% |

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

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| Sterile and culture technique | Skill Demonstrations<br>1 - 10% |

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

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| Multiple choice, completion, essay, lab exams, quizzes | Exams<br>60 - 80% |

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

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|---|---|
| None | Other Category<br>0 - 0% |

**Representative Textbooks and Materials:**
Microbiology: An Introduction, 9th edition, by G.J. Tortora, B.R. Funke and C.L. Case, 2006
Microbiology: A Human Perspective by E.W. Nester, C.E. Roberts, M.T. Nester, 5th edition, 2007
Microbiology: A Photographic Atlas for the Laboratory, S.K. Alexander and D. Strete, 2001
Instructor prepared lab manual