

# BIOL-220: GENERAL MICROBIOLOGY

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## Effective Term

Fall 2025

## SECTION A - Course Data Elements

### CB04 Credit Status

Credit - Degree Applicable

### Discipline

Minimum Qualifications	And/Or
Biological Sciences (Master's Degree)	

### Subject Code

BIOL - Biology

### Course Number

220

### Department

Biology (BIOL)

### Division

Science and Engineering (SE)

### Full Course Title

General Microbiology

### Short Title

General Microbiology

### CB03 TOP Code

0403.00 - Microbiology

### CB08 Basic Skills Status

NBS - Not Basic Skills

### CB09 SAM Code

E - Non-Occupational

### Rationale

Changes include minor adjustments to course content, textbook update, reading and writing assignments update, online delivery hybrid changed to permanent from emergency only

## SECTION B - Course Description

### Catalog Course Description

Morphology, metabolism, molecular genetics and ecology of bacteria, fungi, viruses, helminths and protozoa. Extensive laboratory work includes aseptic techniques, methods of cultivation, identification and enumeration of bacteria, examination of biochemical characteristics and molecular biology techniques using common bacteria. Primarily intended for students pursuing degrees in a health sciences field or majoring in biological sciences.

## SECTION C - Conditions on Enrollment

### Open Entry/Open Exit

No

### Repeatability

Not Repeatable

### Grading Options

Letter Grade or Pass/No Pass

**Allow Audit**

Yes

**Requisites**

**Prerequisite(s)**

Completion of BIOL-120 or BIOL-219 with a minimum grade of C.

**Requisite Justification**

**Requisite Description**

Course in a Sequence

**Subject**

BIOL

**Course #**

120

**Level of Scrutiny**

Content Review

**Upon entering this course, students should be able to:**

1. Describe cellular structure, function, and growth.
2. Describe DNA replication, protein synthesis, cellular metabolism, and mechanisms of ATP generation.
3. Demonstrate a working knowledge of basic laboratory skills and safety guidelines.
4. Use a microscope to focus on and make conclusions about various specimens.
5. Perform mathematical operations such as metric conversions.

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**Requisite Description**

Course in a Sequence

**Subject**

BIOL

**Course #**

219

**Level of Scrutiny**

Content Review

**Upon entering this course, students should be able to:**

1. Describe cellular structure, function, and growth.
2. Describe DNA replication, protein synthesis, cellular metabolism, and mechanisms of ATP generation.
3. Demonstrate a working knowledge of basic laboratory skills and safety guidelines.
4. Use a microscope to focus on and make conclusions about various specimens.
5. Perform mathematical operations such as metric conversions.

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**SECTION D - Course Standards**

**Is this course variable unit?**

No

**Units**

5.00000

**Lecture Hours**

54

**Lab Hours**

108

**Outside of Class Hours**

108

**Total Contact Hours**

162

**Total Student Hours**

270

**Distance Education Approval****Is this course offered through Distance Education?**

Yes

**Online Delivery Methods**

DE Modalities	Permanent or Emergency Only?
Hybrid	Permanent
Online with Proctored Exams	Emergency Only

**SECTION E - Course Content****Student Learning Outcomes****Upon satisfactory completion of the course, students will be able to:**

1. Identify the differences between the major groups of microorganisms and the non-living infectious agents.
2. Compare and contrast methods of microbial growth control in the body and in the environment.
3. Analyze in detail the human host defenses and immune mechanisms.

**Course Objectives****Upon satisfactory completion of the course, students will be able to:**

1. Describe and analyze the differences between the major groups of microorganisms.
2. Distinguish and compare the function of structures found in bacteria, fungi, viruses, helminths and protozoa.
3. Differentiate between the types of light microscopy and electron microscopy and their utilization.
4. Differentiate between aerobic and anaerobic metabolism in bacteria, evaluating the energy flow between glycolysis, the citric acid cycle and the electron transport systems.
5. Compare the growth cycles or mechanisms of proliferation of bacteria, viruses, viroids and prions.
6. Discuss microbial genetic and biochemical techniques used in bacterial identification and evolutionary analysis.
7. Compare and contrast methods of microbial growth control in the body and in the environment.
8. Analyze in detail the human host defenses and immune mechanisms.
9. Distinguish the differences in morphology, staining reactions and biochemical reactions of common bacterial species encountered in both clinical laboratories and the environment.
10. Analyze the results of data collected from laboratory experiments and relate the results to clinical and environmental situations.

**Course Content**

1. LECTURE
  - a. Scope and diversity of the microbial world
  - b. Theory of and practice of microscopic visualization of microorganisms
  - c. Functional anatomy of prokaryotic and eukaryotic cells
  - d. Microbial metabolism
  - e. Microbial growth
  - f. Microbial genetics
  - g. Biotechnology and DNA technology
  - h. Classification of microorganisms

- i. Control of microbial growth
- j. Antimicrobial drugs
- k. Eukaryotes
  - i. fungi
  - ii. algae
  - iii. protozoa
  - iv. helminths
- l. Principles of disease and epidemiology
- m. Microbial mechanisms of pathogenicity
- n. Innate immunity
- o. Adaptive immunity
- p. Vaccines
- 2. LABORATORY
  - a. Microscopy
    - i. Oil immersion
  - b. Microorganisms in the environment
  - c. Aseptic technique and bacterial transfer
  - d. Staining methodology
    - i. Simple and negative stains
    - ii. Gram stain
    - iii. Acid-fast stain
    - iv. Cell wall stain
  - e. Motility assessment
    - i. Hanging drop
    - ii. Motility agar
  - f. Media and pure culture techniques
  - g. Cultural characteristics of bacteria
  - h. Water quality testing
    - i. Biochemical properties of bacteria
    - j. Staining and biochemical unknown

## Methods of Instruction

### Methods of Instruction

Types	Examples of learning activities
Lab	Students will perform staining procedures and troubleshoot and interpret stained specimens.
Lecture	Students will attend lectures and answer objective questions to solidify their knowledge of the course material.

### Instructor-Initiated Online Contact Types

Announcements/Bulletin Boards  
 Chat Rooms  
 Discussion Boards  
 E-mail Communication  
 Telephone Conversations  
 Video or Teleconferencing

### Student-Initiated Online Contact Types

Chat Rooms  
 Discussions  
 Group Work

### Course design is accessible

Yes

## Methods of Evaluation

### Methods of Evaluation

Types	Examples of classroom assessments
Exams/Tests	Four lecture exams, including comprehensive final. One comprehensive laboratory practical exam.
Quizzes	Online and in-class quizzes.
Lab Activities	Formal written lab report for each unknown laboratory exercise.

## Assignments

### Reading Assignments

Weekly reading of text chapters in preparation for lectures. Students may be assigned additional online readings covering subjects such as the history of typhoid fever, antibiotic resistance and superbugs, and vaccine education.

### Writing Assignments

Formal written laboratory reports on identification of microbial organisms. Written essays on lecture exams require students to critically assess topics such as bacterial cell wall structure, adaptive immunity, horizontal gene transfer, and control of gene expression.

## SECTION F - Textbooks and Instructional Materials

### Material Type

Textbook

### Author

Tortora G., Case C., Bair III W., Weber D., Funke B.

### Title

Microbiology, An Introduction

### Edition/Version

14th

### Publisher

Pearson

### Year

2023

### Material Type

Manual

### Author

Johnson T., C. Case

### Title

Laboratory Experiments in Microbiology, 12th ed.

### Publisher

Experiments in Microbiology, 12th ed. Publisher: P

### Year

2018

## **Course Codes (Admin Only)**

### **ASSIST Update**

No

### **CB00 State ID**

CCC000309043

### **CB10 Cooperative Work Experience Status**

N - Is Not Part of a Cooperative Work Experience Education Program

### **CB11 Course Classification Status**

Y - Credit Course

### **CB13 Special Class Status**

N - The Course is Not an Approved Special Class

### **CB23 Funding Agency Category**

Y - Not Applicable (Funding Not Used)

### **CB24 Program Course Status**

Program Applicable

### **Allow Pass/No Pass**

Yes

### **Only Pass/No Pass**

No