

# MICR R100: PRINCIPLES OF MICROBIOLOGY

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**Originator**

ptrujillo

**College**

Oxnard College

**Discipline (CB01A)**

MICR - Microbiology

**Course Number (CB01B)**

R100

**Course Title (CB02)**

Principles of Microbiology

**Banner/Short Title**

Principles of Microbiology

**Credit Type**

Credit

**Start Term**

Fall 2023

**Catalog Course Description**

This course is an introduction to the structure, metabolic activities, utility and pathogenicity of bacteria, fungi, algae, protozoa and viruses. The topics will include distribution, metabolism, molecular genetics, biotechnology, immunity, cancer, probiotics and the physical/chemical methods used in control of microbes and cellular pathogens. The principles of disease transmission, prevention and immunity will also be presented. The diversity of the microbial world and its applications to improving human health and quality of life are emphasized.

**Taxonomy of Programs (TOP) Code (CB03)**

0403.00 - Microbiology

**Course Credit Status (CB04)**

D (Credit - Degree Applicable)

**Course Transfer Status (CB05) (select one only)**

A (Transferable to both UC and CSU)

**Course Basic Skills Status (CB08)**

N - The Course is Not a Basic Skills Course

**SAM Priority Code (CB09)**

E - Non-Occupational

**Course Cooperative Work Experience Education Status (CB10)**

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

**Course Classification Status (CB11)**

Y - Credit Course

**Educational Assistance Class Instruction (Approved Special Class) (CB13)**

N - The Course is Not an Approved Special Class

**Course Prior to Transfer Level (CB21)**

Y - Not Applicable

**Course Noncredit Category (CB22)**

Y - Credit Course

**Funding Agency Category (CB23)**

Y - Not Applicable (Funding Not Used)

**Course Program Status (CB24)**

1 - Program Applicable

**General Education Status (CB25)**

Y - Not Applicable

**Support Course Status (CB26)**

N - Course is not a support course

**Field trips**

Will not be required

**Grading method**

(L) Letter Graded

**Does this course require an instructional materials fee?**

No

**Repeatable for Credit**

No

**Is this course part of a family?**

No

**Units and Hours**

**Carnegie Unit Override**

No

**In-Class**

**Lecture**

**Minimum Contact/In-Class Lecture Hours**

52.5

**Maximum Contact/In-Class Lecture Hours**

52.5

**Activity**

**Laboratory**

**Total in-Class**

**Total in-Class**

**Total Minimum Contact/In-Class Hours**

52.5

**Total Maximum Contact/In-Class Hours**

52.5

**Outside-of-Class**

**Internship/Cooperative Work Experience**

**Paid****Unpaid****Total Outside-of-Class****Total Outside-of-Class****Minimum Outside-of-Class Hours**

105

**Maximum Outside-of-Class Hours**

105

**Total Student Learning****Total Student Learning****Total Minimum Student Learning Hours**

157.5

**Total Maximum Student Learning Hours**

157.5

**Minimum Units (CB07)**

3

**Maximum Units (CB06)**

3

**Prerequisites**

Course taught at the level of intermediate algebra or placement as determined by the college's multiple measures assessment process and CHEM R104 (or higher) and ANAT R101 and PHSO R101 and BIOL R101 or BIOL R101H or BIOL R120

**Advisories on Recommended Preparation**

ENGL R101

**Entrance Skills****Entrance Skills**

Interpret, solve and balance chemistry equations, recognize structures of RNA and DNA, understand the principles of acid-base reactions and oxidation-reduction reactions.

**Prerequisite Course Objectives**

CHEM R104-Recognize the basic structures and functions of DNA, and RNA.

CHEM R104-Describe the scientific method and how it is applied in chemistry.

CHEM R104-Explain the difference among atoms, molecules, ions, chemical compounds, and mixture.

CHEM R104-Identify formulas and names of acids, bases, and salts.

CHEM R104-Analyze the principles of acid-base reaction and oxidation-reduction reaction.

CHEM R104-Classify the families of organic compounds according to their functional groups.

CHEM R104-Assess the impact of organic compounds in the human body and modern society.

CHEM R104-Recognize the relationships of carbohydrates, proteins, and lipids in the human body.

CHEM R104-Describe the metabolism and biochemical production in the human body.

**Entrance Skills**

Understand human physiology principles as they relate to the disease process for respiration, digestion, neurological function, renal function, lymphatic function and blood filtration of toxins.

**Prerequisite Course Objectives**

PHSO R101-Apply these terms in interpretation of data gathered in lab and utilized in the construction of tables and graphs.

PHSO R101-Explain the basic concepts of physiology and relate them to clinical situations.

PHSO R101-Properly use common laboratory equipment such as spectrophotometer, auto-pipettes, centrifuge, etc...

PHSO R101-Safely perform a variety of lab procedures and techniques.

PHSO R101-Work effectively in laboratory group settings.

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**Entrance Skills**

Knowledge of anatomical details of basic organ systems

**Prerequisite Course Objectives**

ANAT R101-Discuss both the gross and macro-anatomical structures and basic functions of the human system using accepted anatomical terms, planes, and points of reference.

ANAT R101-Distinguish the major cell and tissue types based on their morphology and functional characteristics.

ANAT R101-Predict, explain and analyze which cell or tissue type would be located in a given region based on the known characteristics of cells and tissues.

ANAT R101-Identify and recognize the parts of the human organ systems focusing most intently on the integument, skeletal, muscular, nervous, endocrine, digestive, circulatory, respiratory and uro-genital systems.

ANAT R101-Describe the key structural features of different human cell and major tissue types.

ANAT R101-Identify and describe the anatomy of the systems of the human body.

ANAT R101-Relate structure and function at the cellular through system levels of organization of human body systems.

ANAT R101-Describe structural and anatomical changes that occur in disease, injury, congenital malformation or aging of the human body systems.

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**Entrance Skills**

Correct usage of the english language for assignments.

**Prerequisite Course Objectives**

ANAT R101-Discuss both the gross and macro-anatomical structures and basic functions of the human system using accepted anatomical terms, planes, and points of reference.

ANAT R101-Distinguish the major cell and tissue types based on their morphology and functional characteristics.

ANAT R101-Predict, explain and analyze which cell or tissue type would be located in a given region based on the known characteristics of cells and tissues.

ANAT R101-Identify and recognize the parts of the human organ systems focusing most intently on the integument, skeletal, muscular, nervous, endocrine, digestive, circulatory, respiratory and uro-genital systems.

ANAT R101-Describe the key structural features of different human cell and major tissue types.

ANAT R101-Identify and describe the anatomy of the systems of the human body.

ANAT R101-Relate structure and function at the cellular through system levels of organization of human body systems.

BIOL R101-Describe the scientific method of inquiry as it relates to biological organisms.

BIOL R101-Describe current issues and applications of biotechnology.

BIOL R120-Analyze current methods of recombinant DNA and biotechnology

CHEM R104-Explain the difference among atoms, molecules, ions, chemical compounds, and mixture.

CHEM R104-Describe the metabolism and biochemical production in the human body.

PHSO R101-Explain the basic concepts of physiology and relate them to clinical situations.

PHSO R101-Analyze and evaluate the concepts of physiologic theories as they relate to the laws of physics and chemistry.

PHSO R101-Write clear, concise and coherent expositions that demonstrate the ability to communicate physiological concepts.

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**Entrance Skills**

Experience using biology, chemistry, anatomy and physiology laboratory equipment safely.

**Prerequisite Course Objectives**

ANAT R101-Distinguish the major cell and tissue types based on their morphology and functional characteristics.

ANAT R101-Use a light microscope competently and report accurately the observation made while using prepared slides.

ANAT R101-Use the tools and techniques required to complete a detailed dissection of cat and other livestock organs. Compare and contrast cat and other livestock organs to human examples.

CHEM R104-Assess the impact of organic compounds in the human body and modern society.

PHSO R101-Properly use common laboratory equipment such as spectrophotometer, auto-pipettes, centrifuge, etc...

PHSO R101-Safely perform a variety of lab procedures and techniques.

PHSO R101-Work effectively in laboratory group settings.

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**Entrance Skills**

Use college level writing skills in a one page writing assignment and a term paper.

**Prerequisite Course Objectives**

ENGL R101-Demonstrate college-level control of mechanical elements of writing such as grammar, syntax, spelling, vocabulary, and idiomatic usage

ENGL R101-Research a topic, analyze and synthesize information, and report findings in a properly documented essay

ENGL R101-Write timed essays in class exhibiting acceptable college-level control of mechanics, organization, development, and coherence

**Entrance Skills**

Knowledge of the central dogma of biology, basic biochemical metabolism, ability to think critically in biology and understand biotechnology and its applications

**Prerequisite Course Objectives**

BIOL R101-Describe the scientific method of inquiry as it relates to biological organisms.

BIOL R101-Describe the structure and function of cells and common organelles and their relationship to tissues, organs, and organ systems.

BIOL R101-Explain the chemical and molecular basis for human nutritional needs.

BIOL R101-Explain energy flow through the biological world with reference to photosynthesis, cellular respiration, and ecological cycles.

BIOL R101-Interpret inheritance patterns and describe the mechanisms involved in meiosis and mitosis.

BIOL R101-Summarize the role of nucleic acids in protein synthesis.

BIOL R101-Describe current issues and applications of biotechnology.

BIOL R120-Explain the chemical and molecular aspects of living systems

BIOL R120-Identify subcellular structures and describe their functions

BIOL R120-Explain the components of cellular metabolism

BIOL R120-Describe the process of cell reproduction and relate it to the process of neoplasm

BIOL R120-Discuss and compare classical Mendelian genetics and Non-Mendelian genetics

BIOL R120-Compare and contrast viral and bacteriophage genetics

BIOL R120-Analyze current methods of recombinant DNA and biotechnology

**Entrance Skills**

Algebraic fluency with expressions and equations. Understanding functions and graphs.

**Requisite Justification****Requisite Type**

Prerequisite

**Requisite**

Course taught at the level of intermediate algebra or placement as determined by the college's multiple measures assessment process

**Requisite Description**

Course not in a sequence

**Level of Scrutiny/Justification**

Content review

**Requisite**

CHEM R104 (or higher)

**Requisite Description**

Course in a sequence

**Level of Scrutiny/Justification**

Closely related lecture/laboratory course

**Requisite**

ANAT R101

**Requisite Description**

Course in a sequence

**Level of Scrutiny/Justification**

Closely related lecture/laboratory course

**Requisite**

PHSO R101

**Requisite Description**

Course in a sequence

**Level of Scrutiny/Justification**

Closely related lecture/laboratory course

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**Requisite**

BIOL R101

**Requisite Description**

Course in a sequence

**Level of Scrutiny/Justification**

Closely related lecture/laboratory course

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**Requisite**

BIOL R120

**Requisite Description**

Other (specify)

**Specify Other Requisite Description**

The prerequisites for BIOL R120 with BIOL R120L provide an equivalent preparation for pre-professional medical and research oriented students as the listed Math, Chemistry, Anatomy, Physiology prerequisites (and recommended English course).

**Level of Scrutiny/Justification**

Closely related lecture/laboratory course

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**Requisite Type**

Advisory

**Requisite**

ENGL R101

**Requisite Description**

Other (specify)

**Specify Other Requisite Description**

Microbiology MICR R100 writing assignments assume a knowledge of college level writing skills taught in the ENGL R101

**Level of Scrutiny/Justification**

Required communication/computation skill

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**Student Learning Outcomes (CSLOs)**

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

- |   |  |
|---|--|
| 1 | The student will produce a term paper using sourced reviews from PubMed on a topic related to microbiology.  |
| 2 | The students will be able to list a unique symptom identifier for the pathogens and conditions listed on the CDC (Centers for Disease Control)current notifiable disease list. |

**Course Objectives**

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

- |   |   |
|---|---|
| 1 | Describe the structure and function of prokaryotic and eukaryotic cells.    |
| 2 | Compare and contrast eukaryotic cell structure with that of the prokaryote. |

- 3 Analyze the fluid nature of bacterial taxonomy.
- 4 Categorize the basic principles of microbial control.
- 5 Summarize the diversity of forms in the microbial world.
- 6 Distinguish the diversity of microbial metabolism.
- 7 Interpret the immune system's functions and various host defense mechanisms found in the eukaryotes.
- 8 Illustrate the principles of disease transmission and prevention.
- 9 Demonstrate an understanding of microbial genetics as they relate to microbial evolution, recombinant DNA technologies and biotechnology.

## Course Content

### Lecture/Course Content

1. Introduction
  - a. Definition of microbiology
  - b. Ancient ideas of disease and putrefaction
  - c. Discovery of microorganisms
  - d. Spontaneous generation controversy
  - e. Germ theory of disease
  - f. Significant discoveries in microbiology
2. Synopsis of biological chemistry
  - a. Structure of matter
  - b. Acids, bases and salts
  - c. Biologically important molecules
  - d. Chemical reactions
3. Nomenclature and taxonomy
  - a. Classification
  - b. Identification
4. Structure of prokaryotic and eukaryotic
  - a. Definition
  - b. Gross cellular morphology of eubacteria and archaeobacteria
  - c. Fine structure of bacterial cells
  - d. Fine structure of eukaryotic cells
5. Metabolism
  - a. Enzymes
  - b. Nutrient transport
  - c. Bioenergetics
  - d. Photosynthesis
  - e. Fermentation
  - f. Aerobic respiration
  - g. Anaerobic respiration
  - h. Ecology
  - i. Bioremediation
6. Control of microorganisms
  - a. Principles
  - b. Physical agents
  - c. Chemical agents
  - d. Chemotherapeutic agents
7. Microbial diversity
  - a. Archaeobacteria
  - b. Eubacteria
  - c. Fungi
  - d. Slime molds
  - e. Algae
  - f. Protozoa
  - g. Viruses
8. Microbial genetics

- a. DNA structure and function
- b. DNA replication
- c. Gene expression
- d. Regulation of gene expression
- e. Gene modification
- 9. Recombinant DNA technologies
  - a. Gene cloning
  - b. Clone library production
  - c. Electrophoresis
  - d. Northern Blot
  - e. Southern blot
  - f. Polymerase chain reaction
  - g. Western Blot
  - h. FACS
  - i. Bioreactor
- 10. Health and disease
  - a. Host-parasite relationships
  - b. Pathogenesis
  - c. Non-specific host defense mechanisms
  - d. Specific host defense mechanisms
  - e. Diseases of the immune system
  - f. Applied immunology
- 11. Epidemiology
  - a. Modes of transmission
  - b. Portals of entry
  - c. Vectors and reservoirs
  - d. Vaccines
  - e. Normal flora
- 12. Diseases related to:
  - a. Skin
  - b. Respiratory tract
  - c. Gastrointestinal tract
  - d. Urogenital tract
  - e. Central nervous system
  - f. Cardiovascular system

**Laboratory or Activity Content**

No laboratory or activity content.

**Methods of Evaluation**

**Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):**

Written expression  
Problem solving exercises

**Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):**

Computational homework  
Essay exams  
Film/video productions  
Individual projects  
Oral presentations  
Problem-solving exams  
Quizzes  
Recitals  
Reports/papers  
Research papers  
Essays  
Problem-Solving Assignments



## Instructional Methodology

### Specify the methods of instruction that may be employed in this course

Audio-visual presentations  
 Case studies  
 Class activities  
 Class discussions  
 Computer-aided presentations  
 Demonstrations  
 Distance Education  
 Group discussions  
 Guest speakers  
 Internet research  
 Lecture

### Describe specific examples of the methods the instructor will use:

Methods may include, but are not limited to:

1. Video presentations to include germ theory of disease, cell theory, cellular respiration, photosynthesis, molecular genetics, and recombinant DNA technologies
2. Demonstrations of chemical reactions, enzyme functions, DNA replication, immune system and others.
3. In class discussions and overhead presentations to include all topics
4. Group activities including game playing (metabolism, cell, genetics, immune system)
5. Computer based bioinformatics exercises.
6. Video presentations to include germ theory of disease, cell theory, cellular respiration, photosynthesis, molecular genetics, and recombinant DNA technologies
7. Demonstrations of chemical reactions, enzyme functions, DNA replication, immune system and others.
8. In class discussions and overhead presentations to include all topics
9. Group activities including game playing (metabolism, cell, genetics, immune system)
10. Computer based bioinformatics exercises

## Representative Course Assignments

### Writing Assignments

1. Students will be required to submit a term paper based on reviews of microbiology from Pubmed.
2. Summaries of journal articles related to microbiology are required. These will consist primarily of finding original research contributions to microbiology, biotechnology and immunology, reading and summarizing the articles.

### Critical Thinking Assignments

1. In an exam essay, illustrate prokaryotic cell structure and determine the vulnerabilities that are targeted in chemotherapeutic microbial control.
2. In a term paper assignment, Integrate knowledge of eukaryotic cell structure and processes which pathogens corrupt to cause infection.
3. In a discussion, relate microbial growth to metabolism.
4. In take home assignments, diagram microbial genetics and recombinant DNA technologies.
5. In an essay on a specific pathogen chosen by the student, analyze host-parasite relationships together with non-specific and specific host defense mechanisms.
6. Develop a self-selected student presentation that will simultaneously illuminate several major concepts including germ theory of disease, biochemistry, genetics, immunity, recombinant DNA, bionanotechnology, environmental sciences and bioenergy.
7. In a take home written exam, relate the cells of immunity to their functional networks and applications to medicine.
8. In a discussion, describe how probiotics can be protective of damaged or diseased areas of the body.
9. Sample examination question: According to Koch's postulates and the germ theory of disease, pathogens: a. must be capable of being grown in pure culture b. cannot be found in samples as mixed cultures c. include helminths, protozoans, bacteria and viruses d. are bacteria capable of binary fission e. only exist within the human body.

### Reading Assignments

1. Students will be required to read scientific journal article reviews from the Pubmed database at [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov) related to the discipline of microbiology, including medicine, nursing, dental health and biotechnology. There are over 5000 research journals published weekly, biweekly, semi-annually, and annually, some examples are from:
  - a. Antimicrobial Agents and Chemotherapy
  - b. Applied and Environmental Microbiology

- c. Clinical and Diagnostic Laboratory Immunology
- d. Clinical Microbiology Reviews
- e. Eukaryotic Cell
- f. Infection and Immunity
- g. Journal of Bacteriology
- h. Journal of Clinical Microbiology
- i. Journal of Virology
- j. Microbiology and Molecular Biology Reviews
- k. Molecular and Cellular Biology
- l. Nature Biotechnology
- m. Genetics
- n. Cell
- o. Science
- p. Nature
- q. JAMA
- r. Lancet

**Problem-Solving and Other Assignments (if applicable)**

None

**Outside Assignments****Representative Outside Assignments**

Typical outside of classroom assignments:

1. Reading
  - a. Students will be required to read scientific journal article reviews from the Pubmed database at [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov) related to the discipline of microbiology, including medicine, nursing, dental health and biotechnology. There are over 5000 research journals published weekly, biweekly, semi-annually, and annually, some examples are from:
    - i. Antimicrobial Agents and Chemotherapy
    - ii. Applied and Environmental Microbiology
    - iii. Clinical and Diagnostic Laboratory Immunology
    - iv. Clinical Microbiology Reviews
    - v. Eukaryotic Cell
    - vi. Infection and Immunity
    - vii. Journal of Bacteriology
    - viii. Journal of Clinical Microbiology
    - ix. Journal of Virology
    - x. Microbiology and Molecular Biology Reviews
    - xi. Molecular and Cellular Biology
    - xii. Nature Biotechnology
    - xiii. Genetics
    - xiv. Cell
    - xv. Science
    - xvi. Nature
    - xvii. JAMA
    - xviii. Lancet
2. Writing
  - a. Students will be required to submit a term paper based on reviews of microbiology from PubMed.
3. Summaries of journal articles related to microbiology are required. These will consist primarily of finding original research contributions to microbiology, biotechnology and immunology, reading and summarizing the articles.

**Articulation****Equivalent Courses at 4 year institutions**

University	Course ID	Course Title	Units
CSUCI	BIOL 301	Microbiology	4

**Comparable Courses within the VCCCD**

MICR M01 - General Microbiology  
 MICR V01 - General Microbiology

**Equivalent Courses at other CCCs**

College	Course ID	Course Title	Units
Los Angeles City College	Microbiology 1	Introductory Microbiology	5

**Attach Syllabus**

MICR R100 Syllabus Fall 2020.docx

**District General Education****A. Natural Sciences****A1. Biological Science**

Approved

**B. Social and Behavioral Sciences****C. Humanities****D. Language and Rationality****E. Health and Physical Education/Kinesiology****F. Ethnic Studies/Gender Studies****Course is CSU transferable**

Yes

**CSU Baccalaureate List effective term:**

sophomore

**CSU GE-Breadth****Area A: English Language Communication and Critical Thinking****Area B: Scientific Inquiry and Quantitative Reasoning****B2 Life Science**

Approved

**Area C: Arts and Humanities**

**Area D: Social Sciences**

**Area E: Lifelong Learning and Self-Development**

**Area F: Ethnic Studies**

**CSU Graduation Requirement in U.S. History, Constitution and American Ideals:**

**IGETC**

**Area 1: English Communication**

**Area 2A: Mathematical Concepts & Quantitative Reasoning**

**Area 3: Arts and Humanities**

**Area 4: Social and Behavioral Sciences**

**Area 5: Physical and Biological Sciences**

**Area 5B: Biological Science**

Approved

**Area 6: Languages Other than English (LOTE)**

**Textbooks and Lab Manuals**

**Resource Type**

Textbook

**Classic Textbook**

Yes

**Description**

Black, Jacqueline. *Microbiology Principles and Explorations* (10th edition). New York, NY, Wiley (publisher), ISBN: 978-1-119-39011-4

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**Resource Type**

Other Resource Type

**Description**

www.dnalc.orgDNA Learning Center from the Cold Spring Harbor Laboratory.

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**Resource Type**

Other Resource Type

**Description**

PubMed www.ncbi.nlm.nih.govMedical Literature Database from the US Government.

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**Resource Type**

Other Resource Type

**Description**

Clinical Microbiology Made Ridiculously Simple Study Guide. Any edition. Published by Medmaster

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**Resource Type**

Other Resource Type

**Description**

Online resources that accompany the Black text (formerly on CD).

**Resource Type**

Other Resource Type

**Description**

Latest edition of the study guide to accompany the textbook.

**Library Resources****Assignments requiring library resources**

One page writing summarizing a PubMed review article assignment and the Term Paper assignment.

**Sufficient Library Resources exist**

Yes

**Example of Assignments Requiring Library Resources**

Acquiring three to five full text scientific review articles on a microbiology disease or text topic from the Pubmed database.

**Distance Education Addendum****Definitions****Distance Education Modalities**

Hybrid (1%–50% online)  
Hybrid (51%–99% online)  
100% online

**Faculty Certifications**

**Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.**

Yes

**Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.**

Yes

**Regular Effective/Substantive Contact****Hybrid (1%–50% online) Modality:**

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
E-mail	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes and to submit certain types of assignments.
Other DE (e.g., recorded lectures)	Recorded tutorials, lectures, and Zoom/video meetings.

Video Conferencing	Video tools such as ConferZoom may be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Student-to-student group meetings will also be encouraged.
Telephone	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes.
Synchronous Dialog (e.g., online chat)	Instant messaging and/or chat to allow instructor-student and student-student dialogue for teaching and/or studying.

**Hybrid (51%–99% online) Modality:**

<b>Method of Instruction</b>	<b>Document typical activities or assignments for each method of instruction</b>
Video Conferencing	Video tools such as ConferZoom may be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Student-to-student group meetings will also be encouraged.
Other DE (e.g., recorded lectures)	Recorded tutorials, lectures, and Zoom/video meetings.
E-mail	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes and to submit certain types of assignments.
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
Telephone	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes.
Synchronous Dialog (e.g., online chat)	Instant messaging and/or chat to allow instructor-student and student-student dialogue for teaching and/or studying.

**100% online Modality:**

<b>Method of Instruction</b>	<b>Document typical activities or assignments for each method of instruction</b>
Video Conferencing	Video tools such as ConferZoom may be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Student-to-student group meetings will also be encouraged.
E-mail	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes and to submit certain types of assignments.
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
Other DE (e.g., recorded lectures)	Recorded tutorials, lectures, and Zoom/video meetings.
Telephone	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes.
Synchronous Dialog (e.g., online chat)	Instant messaging and/or chat to allow instructor-student and student-student dialogue for teaching and/or studying.

**Examinations****Hybrid (1%–50% online) Modality**

On campus  
Online

**Hybrid (51%–99% online) Modality**

On campus

Online

**Primary Minimum Qualification**

BIOLOGICAL SCIENCES

**Review and Approval Dates****Department Chair**

05/05/2023

**Dean**

05/08/2023

**Technical Review**

05/10/2023

**Curriculum Committee**

05/10/2023

**DTRW-I**

MM/DD/YYYY

**Curriculum Committee**

MM/DD/YYYY

**Board**

MM/DD/YYYY

**CCCCO**

MM/DD/YYYY

**Control Number**

CCC000562630

**DOE/accreditation approval date**

MM/DD/YYYY