

Montgomery County Community College  
 BIO 140  
 Microbiology and Immunology  
 4-3-3

**COURSE DESCRIPTION:**

A study of microorganisms and their relationship to infectious disease in humans. The biology of microorganisms; infection and pathogenesis; resistance and immunity. For Allied Health specialties and Science majors. (Laboratory/lecture format). This course is subject to a course fee. Refer to <http://mc3.edu/adm-fin-aid/paying/tuition/course-fees> for current rates.

**REQUISITES:***Previous Course Requirements*

- High School Chemistry taken within the last five years, with a minimum grade of "C", **or** CHE 121, CHE 131, **or** CHE 151 taken within the last five years with a minimum grade of "C"
- Completion of BIO 121 **or** BIO 151 within the last five years with a minimum grade of "C", **or** a passing score on the MCCC Biology Placement Test.

*Concurrent Course Requirements*

None

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Demonstrate a basic knowledge and understanding of microbial characteristics including bacteria, fungi, parasites, and viruses.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Exams Lab Quizzes
2. Describe modes of transmission of disease and methods of control of microbes.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Exams Lab Quizzes

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
3. Describe the body's defense mechanisms including the principles of immunology, both specific and non-specific.	Lecture Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Exams
4. Explain the diversity of diseases caused by organisms worldwide through writing assignments and discussions of current news and case studies.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Exams Oral/Written Assignments
5. Briefly discuss laboratory methods for the diagnosis of infectious diseases.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Exams Lab Quizzes
<u>Laboratory</u> 6. Use the binocular microscope to identify microorganisms.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Lab Practical Exam Lab Quizzes Lab Unknowns

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
7. Perform all steps of a Gram stain resulting in the correct identification of bacteria.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Lab Practical Exam Lab Unknowns Lab Quizzes
8. Use diagnostic media and other laboratory tests to differentiate from positive and negative bacteria.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Lab Practical Exam Lab Unknowns Lab Quizzes
9. Perform sensitivity testing of bacteria.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Lab Practical Exam Lab Quizzes
10. Develop laboratory reports that reflect the use of the scientific method for experiments performed in the laboratory.	Lecture Laboratory Reports Laboratory Experiments Laboratory Practicum Group Discussions Case Studies Supplemental Readings Current News Relating to the Course Video Presentations Outlines	Lab Practical Exam Lab Unknowns Lab Quizzes

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The

benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria.*

## SEQUENCE OF TOPICS:

### Lecture

- I. Introduction to Medical Microbiology
  - A. The Microbial World and You
  - B. History of Microbiology
- II. Cell Structure and Function
  - A. Microscopic Observation
  - B. Microbial Metabolism and Growth
- III. Microbial Classification and Identification
  - A. Kingdoms
  - B. Scientific Nomenclature
  - C. Classification Methods and Tests
  - D. Identification Methods and Tests
- IV. Microbial Control
  - A. Sterilization and Disinfection
  - B. Antibiotics
  - C. Vaccines and Immune Modulation
- V. Survey of the Microbial World
  - A. Bacteria
  - B. Fungi – Yeast, Molds and Fleshy Fungi
  - C. Parasites – Protozoa and Helminths
  - D. Algae
  - E. Viruses
- VI. Host-Parasite Relationships
  - A. Principles of Disease and Epidemiology
  - B. Microbial Mechanisms of Pathogenicity
  - C. Specific and Non-Specific Immune Responses of the Host
- VII. Microorganisms and Human Disease
  - A. Microbial Diseases of the Respiratory System Including Pneumonia, Strep Throat and TB
  - B. Microbial Diseases of the Digestive System Including E. Coli 0157:H7, Salmonella and Hepatitis
  - C. Microbial Diseases of the Urinary and Reproductive Systems
  - D. Microbial Diseases of the Nervous System
  - E. Microbial Diseases of the Cardiovascular and Lymphatic System Including Lyme Disease
  - F. Microbial Diseases of the Skin and Eyes Including Athlete's Foot and Pink Eye
  - G. AIDS
    1. The virus
    2. Opportunistic infections
    3. Treatment, research
    4. Social and legal issues

### Laboratory

- I. Rules of the Laboratory: Use of the Microscope
- II. Organisms in the Environment

- The Importance of Handwashing
- III. Bacterial Morphology
  - A. Simple Stain
  - B. Gram Stain
  - C. Acid-fast Stain
- IV. Aseptic Technique Streak Dilution
- V. Staphylococcus Identification
- VI. Streptococcus Identification
- VII. Gram Negative Bacilli – Identification
- VIII. Controlling Bacteria with Disinfectants
- IX. Throat Cultures
- X. Urine Cultures
- XI. Susceptibility Testing

#### LEARNING MATERIALS:

##### Textbook:

Tortora, Funke, and Case. (2013). *Microbiology, An Introduction* (11<sup>th</sup> ed.). Pearson Benjamin Cummings Publishing Company, Inc.

Course objectives, outlines, supplemental readings, and handouts are provided by the instructor.

##### Laboratory Manual:

Earl, Judy. (2010). *BIO 140 Laboratory Manual* (6<sup>th</sup> ed.). Burgess.

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

#### COURSE APPROVAL:

Prepared by: Judy Earl, MS, MT(ASCP)	Date: 4/10/1998
Revised by: Elaine Venuti, MS, MT(ASCP)	Date: 2/16/2006
Revised by: Elaine Venuti, MS, MT(ASCP)	Date: 1/31/2009
VPAA/Provost Compliance Verification: Dr. John C. Flynn, Jr.	Date: 9/11/2009
Revised by: Elaine Venuti, MS, MT(ASCP)	Date: 6/26/2012
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 6/28/2012
Revised by: Elaine Venuti, MS, MT(ASCP)	Date: 11/26/2012
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 2/15/2013
Revised by: Elaine Venuti, MS, MT(ASCP)	Date: 3/14/2016
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 3/15/2016
Revised by: Debbie Dalrymple	Date: 06/27/2016
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 06/27/2016

Revised by: Debbie Dalrymple .  
VPAA/Provost or designee Compliance Verification:

Date: 12/18/2017

Date: 12/18/2017



*This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.*