

MERCER COUNTY COMMUNITY COLLEGE
MATH, SCIENCE AND HEALTH PROFESSIONS DIVISION
COURSE OUTLINE

BIO 201 General Microbiology
Summer A 2023-Lecture & Lab In-Person
Course Coordinator: Professor D.N. Hilker
Hilkerd@mccc.edu 609-570-3367 Office: HS 113
Course Website: <http://www.mccc.edu/~hilkerd>

<u>4</u>	<u>3</u>	<u>3</u>
Credit Hours	Lecture Hours	Laboratory Hour

Required Texts/Laboratory Items:

1. Microbiology, by Tortora, et.al.
Benjamin Cummings Publishing Co., 13th Edition, 2019
ISBN 9780134605180
2. BIO201 General Microbiology Lecture Notes, by D.N. Hilker
MCCC Book Store, Fourth Edition
3. Laboratory Experiments in General Microbiology, by D.N. Hilker
Stipes Publishing Co., 6th Edition. Only carried by MCCC Bookstore
4. Print laboratory lecture notes before each lab. Notes can be found on the course website located at <http://www.mccc.edu/~hilkerd/> OR can be purchased under Optional Texts.
5. ***READ CAREFULLY-This class will be held in person at the West Windsor campus. It will NOT be offered online. Please refer to the college's Campus Wellness guidelines regarding COVID-19 guidelines for 2023.***
https://www.mccc.edu/wellness_protocols.shtml#vax .

Optional Texts:

1. BIO201 General Microbiology Laboratory: Laboratory Experiment Lecture Notes, by Prof. Hilker (5/2019) or they can be printed from the website (refer to #4 above)

Catalog Description:

The study of the morphology, taxonomy and metabolism of microbes with emphasis on fungi, protozoa, helminths, viruses and bacteria. Review of role of microbes in nature and their industrial application and medical importance. The laboratory portion of the course stands alone and is essentially a complete and separate course by itself and will include mini-lectures.

Prerequisites: Successful completion of BIO 101 or BIO 103 (grade of C or better) or consent of instructor

Note: Participation in Biology laboratory courses is permitted provided the student has completed the required prerequisites, is a minimum of 16 years of age or by permission of the instructor and the Dean of the division.

Grading: Note-Blackboard is unable to calculate the final course grade.**Lecture: 75% of total course grade**

1. There will be a total of 5 exams given in the course. **All exams count!!!** Exams will count 70%. Students who are unable to be present for a scheduled exam and have an excused absence must contact the instructor prior to the exam. No call, no show to any exam will result in a zero for that exam. In the case where a student misses an exam, an alternate exam may be administered at the discretion of the instructor at the end of semester. All exams counts (no grades are dropped).
2. **Class Assignments:** There will be 10 Class Assignments given on Blackboard with each worth 10 pts (100 points total). They are to be submitted individually without collaboration with fellow classmates. Use your notes from the lecture Power Point presentations. Don't use outside resources; use your lecture notes. **Answers that have come from outside resources will not receive any credit.** All of the answers are found in your lecture notes. Use them! There are no make-up assignments if not completed by the designated date. Class Assignments count 5% of your grade.

Laboratory: 25% of total course grade

1. There will be a total of **11 laboratory quizzes (10 points each)** counting **90%** of your laboratory grade. The lowest quiz will be dropped and the best 10 quiz grades will be counted in your laboratory grade. **There are no make-up quizzes if you miss a laboratory quiz.**
2. Each student will be given an **unknown microorganism** that he/she will try to identify. Correct identification (written laboratory report required) will result in an additional 10 points and will count **10% of your laboratory grade**. Failure in attempting the unknown will result in a zero for the entire laboratory portion of the course. The students' performance will also be constantly evaluated by the laboratory instructor.

Absence from more than 2 lab classes will result in the instructor withdrawing a student from the course or failing the course if it occurs after the withdrawal deadline for the semester.

Final Course Grade (Note: Blackboard is not able to calculate a final BIO201 course grade)

In summary, the computation of the final course grade is as follows:

Lecture: 1. Sum of 5 exams /5 x 70%

2. Sum of 10 Class Assignments x 5%

Laboratory:

1. Sum of 10 best lab quizzes x 90% } x 25%

2. Additional 10pts if unknown identified }

For example:

Lecture: 1. Sum of 5 exams = 400 pts.

2. Sum of 10 assignments = 96 pts. (100 pts. max)

- Laboratory: Sum of 10 best lab quizzes = 80 pts. x 0.90 = 72 pts.
 Correct unknown identified = 10 pts.
- $\frac{400 \text{ pts.} \times .70}{5} = 56 \text{ pts.}$
 - 96 pts. x 0.05 = 4.8 pts.
 - (72 pts. + 10 pts.) x .25 = 20.5 pts.
- Total = 81.3 pts. = B⁻

Course Grading:

A = 93-100	C ⁺ = 77-79
A ⁻ = 90-92	C = 70-76
B ⁺ = 87-89	D = 60-69
B = 83-86	F = 0-59
B ⁻ = 80-82	

Microbiology Laboratory: The laboratory involves students working with microorganisms using proper safety precautions. Students should assume that these microbes have the potential to cause disease if they are not handled properly or if the student is immunocompromised. If you have a predisposing medical condition, please consult with your physician about taking this class. A list of microbes used in the laboratory can be provided upon request.

Lecture Attendance: I expect students to attend class unless you are ill or have some other important reason for not attending. If you are unable to attend please inform me of your absence. An attendance sheet will be circulated in lecture. Please print your name and only your name

Mercer's Academic Integrity Policy

Any student who: a) knowingly represents work of others as his/her own; b) uses or obtains unauthorized assistance in the execution of any academic work; or c) gives fraudulent assistance to another student is guilty of cheating. **Violators will be penalized in accordance with established college policies and procedures and be given a zero grade for that assignment.**

Your examination should reflect your work and knowledge alone. You may not use **any** outside help, written or oral. You may not use notes of any sort; nor exchange papers, comments or gestures with classmates. Such an exchange of information constitutes cheating. You are just as guilty of cheating **giving** information to a person as is the person **receiving** it. Any observed instance of cheating is punishable by confiscation of the examination papers and being assigned a grade of zero for the examination. This applies equally to the giver and receiver of information. Cheating may result in a student being removed from the course and/or being reported to the Academic Integrity Committee for possible academic probation or dismissal. Be careful not to give the **appearance** of cheating. Keep your eyes to yourself. Keep your papers right in front of you so they cannot be seen by the people to either side of you or the person behind you.

Note: I reserve the right to conduct an additional evaluation (e.g. oral or written exam) if any particular test score is dramatically inconsistent with other exam results or classroom performance. My goal is to make an accurate and fair assessment of a student's performance in this course.

Course Objectives

Upon satisfactory completion of this course, students should be able to:

1. Highlight the historical events associated with the field of microbiology and immunology. (GE 1,7; CS A,D, E, F)
2. Distinguish between prokaryotic and eukaryotic cells and understand the evolutionary relatedness of organisms. (GE 1, 3, 4; CS A, B, D, E, F)
3. Develop a thorough understanding of the molecular structure, growth requirements and metabolic processes of various microorganisms. (GE 1, 3, 4; CS A, B, D, E, F)
4. Describe the impact of microbes in nature and society, the role of microbes in an ecosystem and human impact on the evolution of microorganisms. (GE 1, 3, 4, 9; CS A, B, C, D, E, F)
5. Analyze the various immunological methods that hosts utilize to defend themselves from microorganisms and how these organisms can impact human homeostasis. (GE 1, 3, 4; CS A, B, D, E, F)
6. Describe the methods available in controlling, preventing and treating infectious disease. (GE 1, 3, 4, 7; CS A, B, D, E, F)
7. Develop microbiological laboratory skills in applying the scientific method of inquiry to gather and use information for the purposes of critical thinking, information analysis and problem solving in a microbiology laboratory. (GE 1, 2, 3, 4, 9; CS A, B, C, D, E, F)

Course-specific General Education Knowledge Goals and Core Skills.

General Education (GE) Knowledge Goals

Goal 1. Communication. Students will communicate effectively in both speech and writing.

Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Goal 7. Historical Perspective. Students will understand historical events and movements in World, Western, non-Western or American societies and assess their subsequent significance.

Goal 9. Ethical Reasoning and Action. Students will understand ethical issues and situations.

MCCC Core Skills (CS)

Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.

Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.

Goal C. Ethical Decision-Making. Students will recognize, analyze and assess ethical issues and situations.

Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.

Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.

Units of study in detail

Unit 1: Introduction to Microbiology

Learning Objectives

The student will be able to...

- Explain the benefits of microorganisms to the environment and society
- Identify individuals who have contributed to the field of microbiology and immunology
- Classify living organisms based on their molecular and cellular characteristics
- Explore the various methods used to observe bacteria microscopically

Unit 2: Mycology

Learning Objectives

The student will be able to...

- Characterize the organisms that make up the Fungi Kingdom and discuss their benefits to society
- Compare and contrast fungi to other types of microbes
- Understand the structural composition and growth requirements of yeast and molds
- Understand the effects of mycoses on the human body

Unit 3: Animal Parasites**Learning Objectives**

The student will be able to...

- Understand the characteristics of protozoa and their interactions with arthropod vectors
- Compare and contrast protozoa and helminths to other types of microbes
- Explain the features of parasitic helminths
- Understand the effects of protozoa and helminthic infections on the human body

Unit 4: Bacterial Structure and Physiology**Learning Objectives**

The student will be able to...

- Compare and contrast eukaryotic and prokaryotic cells
- Describe the morphological appearance of bacteria
- Explain the physical and chemical growth requirements of bacteria
- Demonstrate knowledge of binary fission and bacterial growth phases
- Compare and contrast methods by which bacteria can exchange genetic information

Unit 5: Virology**Learning Objectives**

The student will be able to...

- Explain the characteristics and requirements of viruses
- Compare and contrast bacteriophages with animal viruses
- Classify animal viruses based on their nucleic acid
- Describe prions and compare them to other organisms
- Explain the relationship between viruses and cancer

Unit 6: Bacterial Groups**Learning Objectives**

The student will be able to...

- Explain how bacteria are grouped based on their metabolic processes, biochemical characteristics and structural and morphological appearances
- Understand the benefits and detrimental effects of bacteria to the environment and society
- Explain their importance in various ecosystems

Unit 7: Applied Microbiology**Learning Objectives**

The student will be able to...

- Explore food preservation methods in preventing microbial spoilage
- Describe the use of microbes in the food industry and their industrial uses
- Examine the use of microbes in energy production
- Explain the role of microbes in genetic engineering and give examples of their applications in the medical and agricultural fields

Unit 8: Infection and Disease-An Introduction to Microbial Pathogenesis**Learning Objectives**

The student will be able to...

- Understand the terms that are used to describe the types, occurrences and duration of infectious disease
- Investigate the methods infectious diseases are spread and their host-parasite relationships
- Describe a microbe's physiological features and metabolic reactions, including exoenzymes and toxins, that enables them to alter their pathogenicity

Unit 9: Resistance to Infection-Cellular Defenses**Learning Objectives**

The student will be able to...

- Describe a host's first line of defense when combating an infection including both non-aggressive and aggressive measures
- Describe a host's second line of defense and differentiate between the various types of phagocytic cells
- Analyze the steps of an inflammatory response when combating an infection and the roll of various proteins and cells in the body

Unit 10: Immunology-Antibodies and Humoral Defense**Learning Objectives**

The student will be able to...

- Compare and contrast cellular and humoral defenses
- Understand the difference between antigens and antibodies
- Characterize the five types of immunoglobulins and explain their molecular structure
- Analyze T and B lymphocytes and explain their role in immunological development
- Understand immunological disorders and the role of antibodies in tissue transplants and hypersensitivity reactions

Unit 11: Methods of Microbial Control-Preventing and Controlling Microbial Infections**Learning Objectives**

The student will be able to...

- Understand the various physical and chemical methods of microbial control
- Differentiate between antiseptics vs. disinfectants
- Explain the general principles of microbial chemotherapy and historical events surrounding antibiotic discoveries
- Describe the various mechanisms of action that anti-bacterial antibiotics exert on bacteria and the side effects of antibiotics
- Understand the general mechanisms of action that anti-fungal, anti-protozoan, anti-helminthic and anti-viral drugs exert on microbes
- Describe how drug resistance occurs and the dangers of antibiotic abuse globally

Unit 12: Microbial Diseases of the Skin, Eyes and Respiratory Tract**Learning Objectives**

The student will be able to...

- Understand the anatomy and the normal flora of the skin, eyes and upper/lower respiratory tract
- Describe the various bacterial, viral, fungal, and protozoan diseases of these areas and the methods used to treat and identify them

Unit 13: Microbial Diseases of the Digestive System**Learning Objectives**

The student will be able to...

- Understand the anatomy and normal flora of the digestive system
- Differentiate between an intoxication and infection
- Describe the various bacterial, viral, fungal, protozoan and helminthic diseases of this area and the methods used to treat and identify them

Unit 14: Microbial Diseases of the Urinary and Reproductive Systems**Learning Objectives**

The student will be able to...

- Understand the anatomy and normal flora of the urinary and reproductive systems
- Describe the various bacterial, viral, fungal, and protozoan diseases associated with the urinary and reproductive systems and the methods used to treat and identify them
- Describe other sexually transmitted diseases including AIDS

Unit 15: Microbial Diseases of the Nervous and Cardiovascular Systems**Learning Objectives**

The student will be able to...

- Understand the anatomy of the nervous and cardiovascular systems
- Describe the various bacterial, viral, fungal, protozoan and helminthic diseases associated with these systems and the methods used to treat and identify them

Laboratory Component: The laboratory exercises permit an understanding of techniques, reinforce certain lecture material and introduce concepts and material not presented in lecture.

Learning Objectives

The student will be able to...

- Conduct experiments independently as well as with others in the laboratory
- Master the necessary microbiological laboratory skills when applying the scientific method of inquiry
- Use critical thinking skills when gathering and analyzing information and problem solving in a microbiology laboratory
- Identify an unknown microorganism and present their findings orally and written

Summer A 2023
BIO201 Lecture Schedule

Note: Dates of Class Assignments/Exams will be announced in class and are found in the course calendar located in Blackboard. Schedule is subject to change at the discretion of the instructor.

<u>Unit #</u>	<u>Day :</u>	<u>Chapter(s)</u>	<u>Subject</u>
1	5/22	1, 3, 10, 14	Introduction to Microbiology <i>Class Assignment #1: Unit 1</i>
2	5/24	12, 21,22,24-26	Mycology <i>Class Assignment #2: Unit 2</i>
3	5/24 & 26	12, 22-26	Animal Parasites: Protozoa & Helminths <i>Class Assignment #3: Unit 3</i>
4	5/31*& 6/2	2, 4, 5, 6, 8	Bacterial Physiology, Structure, & Genetics <i>Class Assignment #4: Unit 4</i> EXAM 1-Units 1, 2, 3: 5/31/23
5	6/2 & 6/5	13, 21-26	Virology <i>Class Assignment #5: Unit 5</i>
6	6/5 & 6/7	11 & 27; Appendix E	Bacterial Groups <i>Class Assignment #6: Unit 6</i>
7	6/7 & 6/9	9 & 28	Applied Microbiology & Biotechnology <i>No Class Assignment</i> EXAM 2-Units 4, 5, 6 ; 6/9/23
8	6/9 & 6/12	14, 15	Infection & Disease <i>No Class Assignment</i>
9	6/12	6	Cellular Defenses: 1 st & 2 nd Lines of Defense <i>No Class Assignment</i>
10	6/12 & 6/14	17, 18, 19	Immunity: Humoral Defenses (3 rd Line of Defense) Hypersensitivity & Serology <i>Class Assignment #7: Unit 10 (I, II, III)</i>
11	6/14 & 6/16	7, 20	Control of Microbes <i>No Class Assignment</i> EXAM 3-Units 7,8,9,10 (I,II,III): 6/14/23
12	6/16	21, 24	Diseases of the Skin, Eyes & Respiratory System <i>Class Assignment 8: Units 11/12</i>

*Memorial Day Recess-Mon. May 29, 2023

**Withdrawal Deadline: Fri. June 9, 2023

<u>Unit #</u>	<u>Day:</u>	<u>Chapter(s)</u>	<u>Subject</u>
13	6/21*	25	Diseases of the Digestive System EXAM 4-Units 10 (IV on), 11, 12: 6/21/23
14	6/23	26	Diseases of the Urinary/Reproductive Systems Class Assignment 9: Units 13/14
15	6/23 & 6/26	22, 23	Diseases of the Nervous & Cardiovascular Systems Class Assignment 10: Unit 15 Exam 5-Units 1-15 (Cumulative-100 Ques.) 6/28/23 In-Class -2 hours

***Juneteenth Recess: Mon. 6/19/23**
MCCC Summer A 2023 Classes end 6/27/23

Mastering Microbiology Website: Optional

The textbook publisher has a comprehensive tutorial and review tool that provides students with a wide variety of activities for every chapter in the textbook. These activities are **not required** for the course. The access code for this site is included with the new edition of the text. If it's not included or if you have an older version of the text and would like to purchase access to the site go to <http://www.masteringmicrobiology.com/>.

Microbiology Resources:

The following websites might be of interest to you: www.sciencenews.org , www.sciencedaily.com www.cdc.gov (Centers for Disease Control), and www.asm.org (American Society of Microbiology; podcasts available)

Lecture Exam Dates: Tentative Dates (subject to change by the instructor)

Exams 1-4 (50 Ques.) will be **given in class (60 minute limit)**. Exam 5 (100 Ques.) will be given in class with a 2 hour time limit. Refer to the course website <http://www.mccc.edu/~hilkerd> for Exam 5 dates and times for each lecture section

Exam #1	Units 1,2,3-Wed. 5/31/23
Exam #2	Units 4,5,6-Fri. 6/9/23
Exam #3	Units 7,8,9,10 (I, II, III)-Wed. 6/14/23
Exam #4	Units 10 (IV on),11,12-Wed. 6/21/23
Exam #5	Units 1-15 (50 Ques. Units 13,14,15 & 50 Ques. Units 1-12)-Wed/ 6/28/23

Accessibility Statement

Mercer County Community College recognizes disability as an aspect of diversity. This class has been designed to meet the diverse needs of all learners. Please feel free to schedule an appointment with me to discuss your unique learning needs.

If you have, or believe you have, a disability and feel that you will require academic accommodations please contact CITA@mccc.edu. The website https://www.mccc.edu/student_services_needs.shtml provides comprehensive step-by-step information regarding accessibility and reasonable academic accommodations.

Financial Aid Statement

It is recommended that students complete an application for financial aid to determine eligibility for financial assistance. The application is **FREE** and available for completion as of **October 1, 2022** for the 2023-24 academic year. Visit studentaid.gov to complete your application. Applications should be completed **before** May 1, 2023. Students who are interested in MCCC Foundation scholarships are expected to complete an application as well.

Diversity, Equity, and Inclusion Statements

Inclusivity Statement: Mercer County Community College's (MCCC) students, faculty, and staff are diverse. MCCC strives to be inclusive and equitable, which is critical to our educational mission. MCCC seeks to embrace difference, adapt to change, and make scholarly contributions to the community at large. MCCC aims to create supportive and inclusive learning environments in which individual differences are understood, respected, appreciated, and recognized as a source of strength. If there are aspects of the design, instruction, and/or experiences within a course that you see as resulting in barriers to your inclusion, please notify the instructor as soon as possible.

Religious/Cultural Observance: Cultural and religious holidays are significant to many people. Persons who have religious or cultural observances that coincide with this class should let the instructor know in writing of any rescheduling consideration needs by the deadline provided by the instructor or if no deadline is provided, at least 2 weeks prior to the observance.

Summer A 2023
BIO 201 LABORATORY SCHEDULE

Disposable gloves MUST be brought to ALL labs. Closed-toed shoes are highly recommended.

<u>Day:</u>	<u>Laboratory</u>	<u>Experiments</u>	<u>Topics</u>
5/22	1	1, 2, 3	Introduction to Light Microscopes Survey of Microbes Collecting Microbes
5/24	2	3	Mold Identification Isolation Techniques
5/26	3	4	Staining Techniques
5/31*	4	5 6	Culture Media Pour Plate Techniques
6/2	5	7 8	Temp. vs. Growth Temp. vs. Survival
6/5	6	9 10 11 12	pH Osmotic Pressure Ultraviolet Light Anaerobic Techniques
6/7	7	23 24 25	Transformation Latex Agglutination Parasitology
6/9**	8	13 14 17 18	Antimicrobial Agents Antibiotics Skin Microbes Throat Cultures
6/12	9	17-18 19 20	ID Skin & Throat Microbes Water Analysis for Contamination Water Microbes
6/14	10	15	Biochemical Reactions

***Memorial Day Recess-Mon. 5/29/23**

****Withdrawal Deadline: Fri. 6/9/23**

<u>Day:</u>	<u>Laboratory</u>	<u>Experiments</u>	<u>Topics</u>
6/16	11	15 16	Biochemical Reactions Unknown Identification
6/21*	12	16	Unknown Identification
6/23	13	16	Unknown Identification

***Juneteenth Recess-Mon. 6/19/23**

Laboratory classes will end on Friday 6/23/23

Students may keep track of their progress in this class by recording their results on this page.

Lecture:

Exam #1: _____

Exam #2: _____

Exam #3: _____

Exam #4: _____

Exam #5: _____

Laboratory:

Quiz #1: _____

Quiz #2: _____

Quiz #3: _____

Quiz #4: _____

Quiz #5: _____

Quiz #6: _____

Quiz#7:_____

Quiz#8:_____

Quiz#9:_____

Quiz#10:_____

Quiz#11:_____

Unknown ID:_____

Class Assignments: Maximum of 100 points

#1 _____

#2 _____

#3 _____

#4 _____

#5 _____

#6 _____

#7 _____

#8 _____

#9 _____

#10 _____

Withdrawal Deadline: Fri. June 9, 2023