



Microbiology for Non-Science Majors Lab (BIOL 2120)

Credit: 1 semester credit hours (2 hours of lab)

Meet: Online

Prerequisite/Co-requisite: Must be enrolled in BIOL 2320 at the same time

Course Description

Applying microbiological experiments to the study of the principle of microbiology, including structure, metabolism, and function of microbes. Development of microbiological methods including aseptic techniques, safely handling microbes, cultivating, and isolating bacteria, characterizing microbes by microscopy and biochemical tests, and determining antibiotic resistance.

Required Textbook and Materials:

Textbook: OpenStax Microbiology <https://openstax.org/details/books/microbiology>

McGraw Hill Connect Virtual Labs: register at McGraw Hill Connect to access Virtual Labs. Here is a tutorial on how to register: <https://www.mheducation.com/highered/support/connect/first-day-of-class/ia-blackboard-ultra-ltia.html>

Contact Information:

Instructor	Yunyan Anna Cheng
STARFISH	Found on Blackboard
Email	ycheng@lit.edu
Office Hours	Monday-Friday: 9 am-4 pm Please feel free to contact me outside office hours by email, messaging on Blackboard, or raising the "I Need Help" flag in Starfish.

Course Objectives

Upon completion of the course, the student will be able to:

1. Apply aseptic techniques to handle and culture microbes safely.
2. Identify bacteria and fungi by macroscopic and microscopic appearance.
3. Isolate pure cultures by using selective and differential media and the streak-plate method.
4. Perform biochemical tests to identify differences among bacteria.
5. Understand the effect of physical and chemical agents on microbial growth.
6. Perform and interpret antibiotic sensitivity and resistance tests.
7. Describe microbiological diagnostic techniques, as well as factors that may interfere with the interpretation of results.

Core Objectives

1. Critical thinking skills and problem-solving skills to make decisions in the laboratory.
2. Communication skills to effectively develop, interpret, and express the ideas and results of scientific investigations.
3. Quantitative skills to investigate and analyze data and use scientific tools in the laboratory to collect data.
4. Teamwork with students working together in groups on experiments and laboratory activities.

Course Outline

Module 1: Introduction to Microbiology
Module 2: Microbes Diversity
Module 3: Biochemistry, Metabolism & Growth
Module 4: Molecular Biology & Genetics
Module 5: Microbial Control & Pathogenicity
Module 6: Diseases, Epidemiology & Host Defenses

Grade Scale

- A 90 – 100 points
- B 80 – 89 points
- C 70 – 79 points
- D 60 – 69 points
- F 59 or below

Course Evaluation

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|----------------------------|-----|
| 1. Midterm and Final Exams | 30% |
| 2. Four Quizzes | 25% |
| 3. Lab Assignments | 25% |
| 4. Group Project | 20% |

Course Policies

1. Midterm Exam covers from Module 1 to Module 3. Final Exam covers from Module 4 to Module 6.
2. Each exam may include a variety of question styles, i.e. multiple-choice questions, true and false, fill in the blanks, case-based, etc.
3. Quiz 1 will cover Module 1. Quiz 2 will cover Module 2. Quiz 3 will cover Module 4. Quiz 4 will cover Module 5. Lab quizzes may contain questions regarding theory, procedures, and results.
4. If you miss assignments/classes due to unforeseen illnesses, deaths in the family, or other traumatic events, please provide documentation (letters from family are NOT acceptable) of the events that may conflict with coursework.
5. Late submissions of lab assignments and projects will be accepted with a deduction of 20% as a penalty without documentation.
6. Missed quizzes and exams can be made up by contacting the instructor with a deduction of 20% as a penalty without documentation.
7. Students will receive a zero for assignments not completed.

8. Students will complete a group project. Everyone needs to contribute to the group project. Please be attentive to your LIT email box and Blackboard messages for essential updates from your group member regarding your project. To ensure a collaborative and productive effort, we want to emphasize that every group member has the right to address any concerns about a lack of contribution from any team member. If necessary, **we can consider removing students who consistently do not contribute to the project.** We hope it won't come to that, and we encourage open communication to resolve any issues promptly.
Individual submission of the group project will have a penalty of 30% off and is by permit only.

Academic Dishonesty

1. Cheating and Plagiarism are two types of academic dishonesty.
2. Cheating is taking an examination or test dishonestly, as by improper access to answers. Plagiarism is taking someone else's work and misrepresenting it as your own.
3. A student's work should always be his/her own unless participating in a group project. Cheating and/or plagiarism will result in disciplinary action; i.e., zero on assignment/exam or an **F** in the course, expulsion, etc.

Students with Disabilities

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator, (409) 880-1737 or visit the office located in the Cecil Beeson Building.

AI STATEMENT

Lamar Institute of Technology (LIT) recognizes the recent advances in Artificial Intelligence (AI), such as ChatGPT, have changed the landscape of many career disciplines and will impact many students in and out of the classroom. To prepare students for their selected careers, LIT desires to guide students in the ethical use of these technologies and incorporate AI into classroom instruction and assignments appropriately. Appropriate use of these technologies is at the discretion of the instructor. Students are reminded that all submitted work must be their own, original work unless otherwise specified. Students should contact their instructor with any questions as to the acceptable use of AI /ChatGPT in their courses.

Weekly Checklist (Tentative)

Week:	To Do:	Due Date:
<p><u>WEEK 1</u> Aug 26 – 30 Lab Safety</p>	<ul style="list-style-type: none"> <input type="checkbox"/> 1st Lab - Virtual Labs Tutorial <input type="checkbox"/> Lab Safety – Hand Washing Procedure <input type="checkbox"/> Lab Safety – Personal Safety <input type="checkbox"/> Join a group for Group Project: Gram Stain by 8/30 	<p>08.30.24</p>
<p><u>WEEK 2-3</u> Sep 02 – 13</p> <p>Module 1 Quiz 1</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Aseptic Technique – Broth Culture to Sterile Broth <input type="checkbox"/> Aseptic Technique – Broth Culture to Sterile Agar Plate <input type="checkbox"/> Aseptic Technique – Slant Culture to Sterile Agar Slant <input type="checkbox"/> Microscopy – Operation of Brightfield Microscope <input type="checkbox"/> Microscopy – Oil Immersion <input type="checkbox"/> Quiz 1: Module 1 (Thursday 9/12 12:30 am - 11:59 pm) 	<p>09.12.24</p> <p>09.13.24</p>
<p><u>WEEK 4-6</u> Sep 16 – Oct 04</p> <p>Module 2 Quiz 2</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Staining - Preparing a Smear Sample from a Bacterial Sample <input type="checkbox"/> Staining – Gram Staining <input type="checkbox"/> Staining – Acid-Fast Staining <input type="checkbox"/> Staining – Capsule Staining <input type="checkbox"/> Staining – Spore Staining <input type="checkbox"/> Microscopy – Diversity of Microorganism <input type="checkbox"/> Ubiquity of Microorganisms – Sampling Surfaces for Bacteria <input type="checkbox"/> Microscopy – Euglena Wet Mount <input type="checkbox"/> Microscopy – Pond Water Wet Mount <input type="checkbox"/> Organismal Diversity – Fungi <input type="checkbox"/> Quiz 2: Module 2 (Thursday 10/03 12:30 am - 11:59 pm) <input type="checkbox"/> Work on Group Project: Gram Staining due 11.08.24 	<p>10.03.24</p> <p>10.03.24</p>
<p><u>WEEK 7-8</u> Oct 07 – 18</p> <p>Module 3 Midterm Exam</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Isolation Methods: Pour Plating <input type="checkbox"/> Isolation Methods: Quantification by Colony Counting <input type="checkbox"/> Isolation Methods: Quantitative Dilution of Bacteria <input type="checkbox"/> Isolation Methods: Quadrant Streak Plate Method <input type="checkbox"/> Isolation Methods: Subculturing of Bacteria <input type="checkbox"/> Isolation Methods: Optical Density <input type="checkbox"/> Microbial Growth: Effects of Osmotic Pressure <input type="checkbox"/> Microbial Growth: Effects of pH 	<p>10.17.24</p> <p>10.18.24</p>

	<ul style="list-style-type: none"> ☐ Microbial Growth: Effects of Temperature ☐ Microbial Growth: Oxygen Requirements and Anaerobic Jar ☐ Microbial Growth: Oxygen Requirements and Fluid Thioglycolate Medium Tubes ☐ Midterm Exam: Module 1-3 (Thursday 10/18 12:30 am - 11:59 pm) ☐ Work on Group Project: Gram Staining due 11.08.24 	
<u>WEEK 9-10</u> Oct 21 – Nov 01 Module 4 Quiz 3	<ul style="list-style-type: none"> ☐ Bacterial Genetics – DNA Profiling ☐ Bacterial Genetics – Bacterial Transformation ☐ Bacterial Genetics – Polymerase Chain Reaction (PCR) ☐ Quiz 3: Module 4 (Thursday 10/31 12:30 am - 11:59 pm) ☐ Work on Group Project: Gram Staining due 11.08.24 	10.31.24 11.01.24
<u>WEEK 11-12</u> Nov 04 – Nov 15 Module 5 Quiz 4	<ul style="list-style-type: none"> ☐ Control of Microbial Growth – Antimicrobial Sensitivity Testing (Kirby-Bauer Method) ☐ Control of Microbial Growth – Effect of Antiseptics and Disinfectants ☐ Control of Microbial Growth – Effect of Ultraviolet Light ☐ Quiz 4: Module 5 (Thursday 11/14 12:30 am - 11:59 pm) ☐ Group Project: Gram Staining due 11.08.24 	11.08.24 11.14.24 11.15.24
<u>WEEK 13-15</u> Nov 18 – Dec 06 Module 6	<ul style="list-style-type: none"> ☐ Unknown Bacterial Identification – Sample #1 ☐ Unknown Bacterial Identification – Sample #2 ☐ Unknown Bacterial Identification – Sample #3 ☐ Unknown Bacterial Identification – Sample #4 ☐ Unknown Bacterial Identification – Sample #5 ☐ Unknown Bacterial Identification – Sample #6 ☐ Unknown Bacterial Identification – Sample #7 ☐ Unknown Bacterial Identification – Sample #8 ☐ Unknown Bacterial Identification – Sample #9 ☐ Unknown Bacterial Identification – Sample #10 	
<u>WEEK 16</u> Dec 09 – 13 Final Exam	<ul style="list-style-type: none"> ☐ Final Exam: Module 4-6 (Tuesday 12/10 12:30 am – 8/16 11:59 pm) 	12.10.24