

**BIO 303: Microbiology**

<p><b>Instructor Information:</b> Mary Ann Arnold Hedrick</p> <p><b>Cell Phone:</b> 540-818-6544</p> <ul style="list-style-type: none"><li>You may text me if you have an immediate concern or question.</li><li>If you prefer to talk via phone, text me your name, the class ID (BIO 303), the number to call, and what time/day to call.</li><li>I will answer or return calls/texts Mon- Sat. between 9 am to 5 pm.</li></ul> <p><a href="mailto:mhedrick@ferrum.edu">mhedrick@ferrum.edu</a>:</p> <ul style="list-style-type: none"><li>preferred method of communication</li></ul>	<p><b>Office Hours:</b></p> <ul style="list-style-type: none"><li>Virtual office hours for immediate response via online chat on Monday and Wednesday from 10am to 11am (Zoom or Google Meet Drop in Office Hours).</li><li>Video chat available through Google Meet (or Zoom) by request.</li><li>If these do not work well with your schedule, please email me.</li></ul> <p>Note: emails will be answered within 24 hours on weekdays and 24-48 hours on weekends – please return the same courtesy, and check your email as I may try to reach you as well.</p>
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**I. COURSE DESCRIPTION:****Credit Hour (s): 4**

A study of the anatomy, physiology, isolation, and identification of microorganisms concentrating primarily on the bacteria. The roles of various groups in nature, medicine, and industry are also studied. Immunology portion stresses the practical aspects in an individual isolation and identify setting. 4 Credit (s). 6 Contact Hour (s)

**Prerequisite (s):** BIO 111

**COURSE STRUCTURE:** This course is conducted entirely online, which means students do not have to be on campus to complete any portion of it. Access to a computer with internet access is required. Students will participate in the course using Ferrum's Online Course Management System called Brightspace ([ferrum.desire2learn.com](http://ferrum.desire2learn.com)) Students will use their Student ID number and create a private password to access Brightspace. Within Brightspace, students will access online lessons, course materials, and resources. At designated times throughout the course, students will participate in a blend of self-paced and group paced activities using Brightspace and additional internet based technologies. Activities will consist of discussion forums, course readings, papers, assignments, and exams. Assigned faculty will support the students throughout this semester (length of course—8 (7) or 15-week) week course.

I will be available on Monday and Wednesdays through drop in virtual office hours via ZOOM or Google Meet from 10 am to 11 pm. During my office hours, I will be available for:

- Questions
- Subject review or practice.

## II. COURSE REQUIREMENTS

**Required Materials: NO purchase is necessary. I will provide you with the following materials:**

- Microbiology, Openstax eBook.
- Microbiology Lecture Videos and Lab Videos.
- Microbiology handouts (study guides), Pictures, and etc. by Mary Hedrick

### Required Readings:

Note: Ancillaries to the textbooks (e.g., lectures, articles, etc.) will be posted on Brightspace

### Additional Materials for Learning:

- Computer with basic audio/visual output equipment
- Web cam (built into computer or a separate device)
- Internet access (broadband recommended)
- Microsoft Office
- Google Education Suite (provided via your Ferrum College email account)

**Brightspace Requirements:** To ensure compatibility with Brightspace, enable JavaScript and Cookies on your browser, and disable pop-up blockers. In addition, you must have Adobe Flash Player 10.1 or later. Information about preferred compatible browsers for use with Brightspace are available at the following website:

[https://documentation.brightspace.com/EN/brightspace/requirements/all/browser\\_support.htm](https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm)

**SmarterProctoring Requirements:** All online courses include at least one assessment administered in conjunction with SmarterProctoring. Therefore, you must use the latest version of Google Chrome and have Internet access with at least 1 MB of download speed.

## III. COURSE OBJECTIVES AND PROGRAM STUDENT LEARNING OUTCOMES

These objectives and SLOs are assessed using the assignments as shown.

### Course Learning Outcomes/Objectives:

The **virtual laboratory portion** of the course will provide a detailed review of procedures used to isolate and identify microorganisms, including microscopy and staining, biochemical testing, molecular biology, and serological techniques.

The student will be expected to:

1. Identify the different types of microorganisms.
2. Discuss the history of microbiology.
3. Discuss the relationship between microorganisms and disease.
4. Explain the importance of modern developments in microbiology.
5. Know the importance of chemical compounds in microorganisms, including the macromolecules.
6. Know the different types of microscopy.
7. Describe the basic principles of staining.
8. Know the differences between prokaryotes and eukaryotes.
9. Identify the basic units of cell structure and describe the function of each.
10. Describe the basic principles relating to the mechanism of how substances enter cells.
11. Identify the main features of microbial metabolism including the role of enzymes and energy.
12. Explain the mechanisms of cellular respiration and photosynthesis.
13. Know the physical and chemical requirements of microbial growth.
14. Know the different types of culture media.
15. Discuss the reproductive methods of bacteria.
16. Explain the methods of measuring microbial growth.
17. Explain the methods of controlling microbial growth.
18. Discuss phylogeny and classification of microorganisms.
19. List the three domains.
20. Give the characteristics of the domain Bacteria and Archaea.
21. Give the characteristics of fungi, lichens, algae, protozoa, helminths, and arthropods.
22. Describe the structure and life cycle of a virus.
23. Discuss the significance of pathology, infection and disease.
24. Explain how infectious diseases are classified.
25. Explain pattern of disease and the spread of infection.
26. Discuss the significance of nosocomial infections.
27. Explain how pathogens produce disease by overcoming defenses of the host.
28. Explain the use of antimicrobial drugs in the treatment of infectious diseases.
29. Identify and discuss microbial diseases of the skin and eyes.
30. Identify and discuss microbial diseases of the nervous system.
31. Identify and discuss microbial diseases of the cardiovascular and lymphatic systems.
32. Identify and discuss microbial diseases of the respiratory system.
33. Identify and discuss microbial diseases of the digestive system.
34. Identify and discuss microbial diseases of the urinary and reproductive systems.
35. Identify the roles of various groups of bacteria in nature.
36. Describe the role bacteria play in Medicine.
37. Describe the role bacteria play in industry.
38. Describe how the Immunology portion stresses the practical aspects in an individual isolation and identify setting.

#### IV. ASSIGNMENTS

All assignments for this course will be submitted electronically through Brightspace unless otherwise instructed.

<p style="text-align: center;"><b><u>Description of Assignment:</u></b></p> <p>*More information about each assignment/assessment will be provided on Brightspace.</p>	<p style="text-align: center;"><b>Points</b></p>
<p style="text-align: center;"><b><u>Discussion Boards:</u></b></p> <p><b><u>Points:</u></b> Each Module's DB is worth up to <b>20 Points</b> each.</p> <ul style="list-style-type: none"> <li>• There are 5 DBs for a <b>total of 100 points</b></li> </ul> <p><b><u>Topics:</u></b> Weekly discussion board topics will vary. The DB may include one of the following:</p> <ul style="list-style-type: none"> <li>• Quick Research article on a particular topic</li> <li>• Case-studies</li> <li>• Article readings: Current Microbiology Readings</li> </ul> <p><b><u>Reason for Assignment:</u></b> The DBs are for students to learn current Microbiology topics from each other and collaborate with each other. This should be a quick assignment to learn current microbiology material.</p>	<p style="text-align: center;">100 Total Points</p>
<p style="text-align: center;"><b><u>Lecture Review Questions:</u></b></p> <p><b><u>Points:</u></b> Each module's Lecture Review questions is worth up to <b>100 Points each</b>.</p> <ul style="list-style-type: none"> <li>• There are 5 modules for a <b>total of 500 Points</b>.</li> </ul> <p><b><u>Topics:</u></b> During each module, you will learn particular topics in microbiology using mini lecture videos.</p> <ul style="list-style-type: none"> <li>• I have created mini lecture videos to highlight the main concepts/topics I want you to learn. I used the information within the chapters (that are listed in your modules) to cover the topics in my mini lecture videos.</li> <li>• You will be tested on the mini lecture video material (Use the eBook as a reference).</li> </ul> <p><b><u>Reason for Assignment:</u></b> The mini lecture videos are for students to learn the main concepts/topics in microbiology for undergraduate students. I used the ASM Curriculum Guidelines for Undergraduate Microbiology when I created my mini lectures.</p>	<p style="text-align: center;">500 Total Points</p>
<p style="text-align: center;"><b><u>Virtual Lab Activity Answer:</u></b></p> <p><b><u>Points:</u></b> Each Module's Lecture Review questions is worth up to <b>50 Points each</b>.</p> <ul style="list-style-type: none"> <li>• There are 5 modules for a total of <b>250 Points</b></li> </ul> <p><b><u>Topics:</u></b> During each module, you will learn microbiology laboratory techniques using videos, virtual labs, and activities.</p> <p><b><u>Reason for the Assignment:</u></b> The quick virtual labs, lab videos, and lab activities are created for the students to learn the main/common Laboratory Techniques used microbiology for undergraduate students. I used the ASM Curriculum Guidelines for Undergraduate Microbiology when I created the laboratory assignments.</p>	<p style="text-align: center;">250 Total Points</p>
<p style="text-align: center;"><b><u>Final Test:</u></b></p> <p><b><u>Points:</u></b> The <b>Final Test is worth up to 150 Points</b>.</p>	<p style="text-align: center;">150 Total Points</p>

<ul style="list-style-type: none"> <li>• It is a proctored test.</li> <li>• It will be a timed test</li> <li>• It will cover both lecture and lab material learned this semester.</li> <li>• Study the Final Quizlet Review I post in Module 5 before taking the test.</li> </ul>	
<b><u>Total Overall Points:</u></b>	<b>1000 Points</b>

**In addition to the Graded Forums, there are a few other forums in our class:**

- Student lounge (a place for students in your class to connect and chat about non-course related things)
- Q&A (a general Q&A forum for general questions where students can answer each other as well as the professor)
- Ask the Professor (Forum for asking non-personal questions to the professor).

<b>SCHEDULE OF TOPICS / ASSIGNMENTS</b>		
<b>Module</b>	<b>Topic</b>	<b>Assignments</b>
1	<p><b>Topics: Lecture</b>  <b>Selected Topics to learn will be taken from the following chapters:</b></p> <ul style="list-style-type: none"> <li>• <b>Chapter 1:</b> <i>An Invisible World</i></li> <li>• <b>Chapter 2:</b> <i>How we See the World</i></li> <li>• <b>Chapter 3:</b> <i>The Cell</i></li> </ul> <p><b>Topic: Lab</b></p> <ul style="list-style-type: none"> <li>• <b>Video:</b> <i>Lab safety and Lab Equipment</i></li> <li>• <b>Virtual Lab:</b> <i>Ubiquity of Microorganisms Virtual Lab</i></li> <li>• <b>Virtual Lab:</b> <i>Microscope Virtual Lab and Video</i></li> <li>• <b>Virtual Microscope slides:</b> <i>Eukaryotic Cells, Specific bacterial shapes, Viruses, Flagella, capsules, spores, Prokaryotic cells</i></li> </ul>	<p>Read the chapter readings and watch the lecture videos. They will help you to complete the assignments below. Complete the following assignments for a grade:</p> <ul style="list-style-type: none"> <li>• <b>Module 1:</b> Discussion Board</li> <li>• <b>Module 1:</b> Lecture Review questions</li> <li>• <b>Module 1:</b> Virtual Lab Activity Answers</li> </ul>
2	<p><b>Topics: Lecture</b>  <b>Selected Topics to learn will be taken from the following chapters:</b></p> <ul style="list-style-type: none"> <li>• <b>Chapter 4:</b> <i>Prokaryotic Diversity</i></li> <li>• <b>Chapter 5:</b> <i>The Eukaryotes of Microbiology</i></li> <li>• <b>Chapter 6:</b> <i>A Cellular Pathogens</i></li> </ul> <p><b>Topics: Lab</b></p> <ul style="list-style-type: none"> <li>• <b>Video:</b> <i>Aseptic Technique and Transfers</i></li> </ul>	<p>Read the chapter readings and watch the lecture videos. They will help you to complete the assignments below. Complete the following assignments for a grade:</p> <ul style="list-style-type: none"> <li>• <b>Module 2:</b> Discussion Board</li> <li>• <b>Module 2:</b> Lecture Review questions</li> <li>• <b>Module 2:</b> Virtual Lab Activity Answers</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Virtual Lab:</b> <i>Simple staining Virtual Lab</i></li> <li>• <b>Virtual Lab:</b> <i>Streak Plate Virtual Lab</i></li> <li>• <b>Virtual Lab:</b> <i>Gram Stain Virtual Lab</i></li> </ul>	
3	<p><b>Topics: Lecture</b>  <b>Selected Topics to learn will be taken from the following chapters:</b></p> <ul style="list-style-type: none"> <li>• <b>Chapter 8:</b> <i>Microbial Metabolism</i></li> <li>• <b>Chapter 9:</b> <i>Microbial Growth</i></li> <li>• <b>Chapter 13:</b> <i>Control of Microbial Growth.</i></li> <li>• <b>Topic:</b> <i>The role bacteria play in the environment</i></li> </ul> <p><b>Topics: Lab</b></p> <ul style="list-style-type: none"> <li>• <b>Virtual Lab:</b> <i>Investigating Bacterial Growth</i></li> <li>• <b>Video:</b> <i>Differential Media Agar: Mannitol Salt, Blood Agar, EMB, McConkey</i></li> <li>• <b>Virtual Lab:</b> <i>What Kills Germs? Virtual Lab</i></li> <li>• <b>Virtual Lab:</b> <i>SIM Motility Virtual Lab</i></li> </ul>	<p>Read the chapter readings and watch the lecture videos. They will help you to complete the assignments below. Complete the following assignments for a grade:</p> <ul style="list-style-type: none"> <li>• <b>Module 3:</b> Discussion Board</li> <li>• <b>Module 3:</b> Lecture Review questions</li> <li>• <b>Module 3:</b> Virtual Lab Activity Answers</li> </ul>
4	<p><b>Topics: Lecture</b>  <b>Selected Topics to learn will be taken from the following chapters:</b></p> <ul style="list-style-type: none"> <li>• <b>Chapter 14:</b> <i>Antimicrobial Drugs</i></li> <li>• <b>Chapter 15:</b> <i>Microbial Mechanisms of Pathogenicity</i></li> <li>• <b>Chapter 16:</b> <i>Disease and Epidemiology</i></li> <li>• <b>Topic:</b> <i>The Role that bacteria play in industry.</i></li> </ul> <p><b>Topics: Lab</b></p> <ul style="list-style-type: none"> <li>• <b>Virtual Lab:</b> <i>Antibiotic susceptibility test</i></li> <li>• <b>Virtual Lab:</b> <i>Bacterial ID Virtual Lab</i></li> <li>• <b>Virtual Lab:</b> <i>Bacterial Sampling</i></li> </ul>	<p>Read the chapter readings and watch the lecture videos. They will help you to complete the assignments below. Complete the following assignments for a grade:</p> <ul style="list-style-type: none"> <li>• <b>Module 4:</b> Discussion Board</li> <li>• <b>Module 4:</b> Lecture Review questions</li> <li>• <b>Module 4:</b> Virtual Lab Activity Answers</li> </ul>
5	<p><b>Topics: Lecture</b>  <b>Selected Topics to learn will be taken from the following chapters:</b></p> <ul style="list-style-type: none"> <li>• <b>Chapter 17:</b> <i>Innate Nonspecific Host</i></li> </ul>	<p>Read the chapter readings and watch the lecture videos. They will help you to complete the assignments below. Complete the following assignments</p>

	<ul style="list-style-type: none"> <li>• <b>Chapter 18:</b> <i>Adaptive Specific Host</i></li> <li>• <b>Chapter 19:</b> <i>Diseases of the Immune System.</i></li> <li>• <b>Chapter 20:</b> <i>Laboratory Analysis of the Immune response. (selected tests)</i></li> </ul> <p><b>Topic: Lab</b></p> <ul style="list-style-type: none"> <li>• <b>Virtual Lab:</b> <i>Elisa Virtual Lab</i></li> </ul> <p><b>Final Test:</b></p> <ul style="list-style-type: none"> <li>• Your Final Test will be comprehensive.</li> <li>• It will cover all the material in Lecture and Lab.</li> <li>• I will give you a quizlet to use as a quick review of the main concepts.</li> <li>• Hint: Study the quizlet before taking your test</li> <li>• Your test will be a timed and proctored test.</li> </ul>	<p>for a grade:</p> <ul style="list-style-type: none"> <li>• <b>Module 5:</b> Discussion Board</li> <li>• <b>Module 5:</b> Lecture Review questions</li> <li>• <b>Module 5:</b> Virtual Lab Activity Answers</li> </ul> <p><b>Complete your Final Test!</b>  <b>Good Luck!</b></p>
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**Time on Task/Course Contact Hour Equivalency**

The course workload may be estimated by determining the time-on-task for students enrolled in online courses. Course participants may use the Time on Task Guide, which is located on the Ferrum GOES website. This guide serves as a means to calculate credit and contact hours in an online course. This document may be used by students and faculty to estimate total learning and instructional time. Students and faculty may refer to [Online Credit and Contact Hour Equivalency Guide](#) for additional time equivalencies for common course assessments and instructional content.

**V. GENERAL POLICIES**

**GRADING SCALE**

90-100%	A
80-89%	B
70-79%	C
60-69%	D
<59%	F

**Academic Integrity**



In all instances, policies identified in the Ferrum College Catalog and the Ferrum College Student and Faculty Handbooks regarding the Honor System shall be followed. Specifically, do not:

- Cheat.
- Plagiarize, that is, use another person's words or ideas as your own without proper documentation.
- Collaborate with others unless specifically requested in an assignment or discussion.
- Let another student login to your Brightspace account.

Failure to follow this policy will result in disciplinary action which can affect your academic standing in the College.

**Online Attendance Policy (this policy is specific to online courses)**

Ferrum College policy dictates that attendance is expected and that students are responsible for all course work assigned in their online courses. Simply logging into an online course is not sufficient, by itself, to demonstrate academic attendance by a student. In an online course what constitutes attendance is determined by the instructor. These requirements may include, but are not limited to, submission of an academic assignment, exam, online discussion forum post, or emailing the course instructor.

If a student is unable to complete work or misses a course deadline for any reason, the student must account for the "absence" with their instructor. The instructor, in consultation with the Dean of the School of Graduate and Online Education Studies and Provost, may determine that unusual circumstances and the student's work in the course justify the assignment of a grade other than F. Unusual circumstances include extended illness or other emergencies, the student's participation in college-sponsored activities, or some combination thereof.

**Civility Policy (this policy is specific to online courses)**

Online courses promote the advance of knowledge through positive and constructive debate both inside and outside the classroom. Discussions on the Internet, however, can occasionally degenerate into needless insults and "flaming." Such activity and the loss of good manners are not acceptable in a university setting--basic academic rules of good behavior and proper "Netiquette" must persist. Remember that you are in a place for the fun and excitement of learning that does not include descent to personal attacks, or student attempts to stifle the discussion of others.

**Office of Academic Accessibility (OAA) (this policy is specific to online courses)**

As directed by Ferrum College's policy, any student with a disability who qualifies for and chooses to seek academic accommodations (such as testing, captioning, or other services) must request accommodations through the Office of Academic Accessibility. The director can be reached by email at [nbeach@ferrum.edu](mailto:nbeach@ferrum.edu) and information is available at [www.ferrum.edu/accessibility](http://www.ferrum.edu/accessibility).





Students pursuing academic accommodations must submit appropriate documentation to the director of OAA and follow Ferrum College's OAA established procedures in a timely manner. If you believe you are not receiving the accommodations needed, your responsibility is to immediately contact the director by email, explain your concern to the degree you feel comfortable explaining it in writing, and request an appointment.

Remember that accommodations cannot be granted retroactively; they must be requested in a timely manner before the accommodation is needed.

### **Tech Support**

Students needing technical assistance with Brightspace at any time during the course or to report a problem can contact Ferrum's 24/7 Brightspace Technical Support Center at: 1-877-325-7778 or Email and Chat available through this link: <https://community.brightspace.com/support/s/>.

Campus Help Desk Support is available via email at: [helpdesk@ferrum.edu](mailto:helpdesk@ferrum.edu) or via phone during normal business hours at: 540-365-4357