

Syllabus for Biology 235

Microbiology

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Office Hours: MWF 10:15 AM - 11:15 AM and by appointment

Classrooms: Lecture – MWF Period 2a (8:55 AM-9:45 AM)
301 Priscilla Payne Hurd Academic Center (PPHAC)
Lab – T, R (12:45 PM-3:45 PM)
300 Collier Hall of Science

Course Description: Microbiology quite naturally involves the study of microorganisms, literally those organisms such as bacteria, viruses, fungi, algae, and protozoa that are too small to be seen clearly by the naked eye. This, however, would be a monumental task to perform within the time limits of one semester. Therefore, we will primarily restrict ourselves to the study of bacteria and viruses during this course. Even then, we will only be able to scratch the surface. Broad in its scope, this course will introduce you to the taxonomy, evolution, morphology, physiology, ecology and behavior of microorganisms. We will pay particular attention to the nature of infectious organisms in causing disease and how the human body fights these foreign invaders. I hope that you will find our journey exciting!

Course Objectives: Upon completion of this course students will be able to demonstrate:

- 1) knowledge of basic concepts in microbiology, including understanding the dynamic nature of host-microbe interactions in causing infectious disease and the importance of host defenses in the disease process
- 2) ability to make a scientific argument & support it with appropriate examples or scientific justification
- 3) knowledge of and ability to apply the scientific process
- 4) ability to find, evaluate, & use published scientific information
- 5) ability to objectively analyze and interpret data and to use other qualitative and quantitative microbiological techniques
- 6) competence in scientific writing and oral communication
- 7) ability to work together in teams
- 8) ability to integrate concepts within and among disciplines of science
- 9) understanding of the relevance of microbiology to society

Texts: Willey, Joanne, M., Linda M. Sherwood and Christopher J. Woolverton. 2009. *Prescott's Principles of Microbiology*. Mc-Graw-Hill, Boston (ISBN: 978-0-07-337523-6).

Leboffe, M.J. and B.E. Pierce. 2006. *Microbiology: Laboratory Theory and Application* (Second edition). Morton Publishing Co., Englewood, CO. (ISBN 978-0-89582-708-1).

Grading:	Lecture Exam 1	15%
	Lecture Exam 2	15%
	Lecture Exam 3	15%
	Final Exam	15%
	Laboratory Data Sheets	15%
	Lab Midterm Exam	10%
	Lab Final Exam	10%
	Laboratory Attendance & Evaluation	<u>5%</u>
		100%

Grading Scale: The grading scale is as follows:

A = 93-100%	C = 73-76%
A- = 90-92%	C- = 70-72%
B+ = 87-89%	D+ = 67-69%
B = 83-86%	D = 63-66%
B- = 80-82%	D- = 60-62%
C+ = 77-79%	F = 59% and below

Class Attendance: It has been my experience that students who do poorly in this course generally have numerous absences. I strongly suggest that you attend and participate in all lecture sessions unless you have a valid reason not to. I will not specifically maintain lecture attendance records. However, if I detect that you have excessive absences or are habitually tardy I will speak with you in private.

Laboratory sessions, because they involve hands-on experiences that cannot be mastered effectively without performing them, are especially critical if one is to become a successful scientist.

Policy on Academic Honesty: Moravian College's policies on academic honesty and disruptive course-related student behavior can be found in the Student Handbook. It is assumed that each of you has read and understands these policies and the consequences of violating them.

**Microbiology Lecture Schedule
Fall 2009**

Day & Date		Topic	WSW Chapter
M	Aug. 31	History & Scope of Microbiology	1
W	Sept. 02	History & Scope of Microbiology	1
F	04	Prokaryotic Cell Structure & Function	3
M	07	No Class-Labor Day	
W	09	Prokaryotic Cell Structure & Function	3
F	11	Prokaryotic Cell Structure & Function	3
M	14	Eukaryotic Cell Structure & Function	4.1-4.8
W	16	Eukaryotic Cell Structure & Function	4.1-4.8
F	18	Viruses & Other Acellular Agents	5
M	21	Viruses & Other Acellular Agents	5
W	23	Exam 1	1, 3, 4, 5
F	25	Microbial Nutrition	6
M	28	Microbial Growth	7
W	30	Control of Microorganisms	8
F	Oct. 02	Control of Microorganisms	8
M	05	Control of Microorganisms	8
W	07	Introduction to Metabolism	9
F	09	Introduction to Metabolism	9
M	12	No Class-Fall Break	
W	14	Catabolism: Energy Release and Conservation	10
F	16	Catabolism: Energy Release and Conservation	10
M	19	Catabolism: Energy Release and Conservation	10
W	21	Exam 2	6-10
F	23	Microbial Evolution, Taxonomy & Diversity	17
M	26	Microbial Evolution, Taxonomy & Diversity	17
W	28	Biogeochemical Cycling & Microbial Ecology	25
F	30	Biogeochemical Cycling & Microbial Ecology	25
M	Nov. 02	Microorganisms in Natural Environments	26
W	04	Microorganisms in Natural Environments	26
F	06	Microbial Interactions	27
M	09	Microbial Interactions	27
W	11	Exam 3	17, 25-27
F	13	Pathogenicity of Microorganisms	30
M	16	Pathogenicity of Microorganisms	30
W	18	Antimicrobial Chemotherapy	31
F	20	Antimicrobial Chemotherapy	31
M	23	Epidemiology of Infectious Disease	33
W	25	No class: Thanksgiving break	
F	27	No class: Thanksgiving break	
M	30	Epidemiology of Infectious Disease	33
W	Dec. 02	Non-specific Host Resistance	28
F	04	Non-specific Host Resistance	28
M	07	Specific Immunity	29

W 09 Specific Immunity 4 29

Final Exam: Tuesday, Dec 15, 1:30PM

28-31, 33

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Fall 2009

Date	Laboratory Exercise
R Sept. 03	Set up: Exercise 1-2 (Nutrient Broth & Nutrient Agar Preparation) Exercise 2-1 (Ubiquity of Microorganisms) Read: Introduction
T Sept. 08	Read: Exercises 1-2, 2-1 Do: Exercise 3-1 (Introduction to the Light Microscope) Exercise 3-2 (Calibration of the Ocular Micrometer) Exercise 3-3 (Examination of Eukaryotic Microbes) Assignment: Willey, Sherwood & Woolverton, Chapter 2
R Sept. 10	Set up: Exercise 1-2 (Common Aseptic Transfers and Inoculation Methods) Exercise 1-3 (Streak Plate Methods of Isolation) Exercise 2-2 (Colony Morphology) Do: Exercise 3-4 (Simple Stains)
T Sept. 15	Read: Exercises 1-2, 1-3, 2-2 Do: Exercise 3-6 (Gram Stain) Exercise 3-7 (Acid-Fast Stains)
R Sept. 17	Do: Exercise 3-8 (Capsule Stain) Exercise 3-9 (Endospore Stain) Exercise 3-11 (Flagella Stain)
T Sept. 22	Set up: Exercise 2-5 (Evaluation of Media) Exercise 2-9 (Anaerobic Jar) Exercise 2-10 (The Effect of Temperature on Microbial Growth) Exercise 2-11 (The Effect of pH on Bacterial Growth) Exercise 2-12 (The Effect of Osmotic Pressure on Microbial Growth)
R Sept. 24	Read: Exercises 2-5, 2-9, 2-10, 2-11, 2-12
T Sept. 29	Set up: Exercise 4-1 (Mannitol Salt Agar) Exercise 4-2 (Phenylethyl Alcohol Agar) Exercise 4-3 (Desoxycholate Agar) Exercise 4-4 (Endo Agar) Exercise 4-5 (Eosin Methylene Blue Agar) Exercise 4-6 (Hektoen Enteric Agar) Exercise 4-7 (MacConkey Agar) Exercise 4-8 (Xylose Lysine Desoxycholate Agar)
R Oct. 01	Read: Exercises 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8
T Oct. 06	Set up: Exercise 5-1 (Oxidation-Fermentation Test) Exercise 5-2 (Phenol Red Broth) Exercise 5-4 (Methyl Red and Voges-Proskauer Tests) Exercise 5-5 (Catalase Test)

Exercise 5-6 (Oxidase Test)
 Exercise 5-7 (Nitrate Reduction Test)
 Exercise 5-8 (Citrate Test)
 Exercise 5-10 (Decarboxylation Test)
 Exercise 5-11 (Phenylalanine Deaminase Test)

R	Oct. 08	No lab
T	Oct. 13	No lab-Fall Break
R	Oct. 15	Lab Midterm Read: Exercises 5-1, 5-2, 5-4, 5-5, 5-6, 5-7, 5-8, 5-10, 5-11
T	Oct. 20	Set up: Exercise 5-12 (Bile Esculin Test) Exercise 5-13 (Starch Hydrolysis) Exercise 5-15 (Urea Hydrolysis) Exercise 5-16 (Casein Hydrolysis) Exercise 5-17 (Gelatin Hydrolysis) Exercise 5-20 (SIM Medium) Exercise 5-21 (Triple Sugar Iron Agar)
R	Oct. 22	Read: Exercises 5-12, 5-13, 5-15, 5-16, 5-17, 5-20, 5-21
T	Oct. 27	Set up: Exercise 5-26 (Blood Agar) Exercise 5-27 (Coagulase Tests) Exercise 5-28 (Motility Test) Exercise 5-30 (Enterotube II)
R	Oct. 29	Read: Exercises 5-26, 5-27, 5-28, 5-30
T	Nov. 03	No lab
R	Nov. 05	Field trip to Lehigh Gap Nature Center to collect soil and water samples for microbial counts and isolation
T	Nov. 10	Set up: Exercise 8-1 (Membrane Filter technique) using water samples Exercise 8-2 (Multiple Tube Fermentation Method for Total Coliform Determination) using water samples Exercise 8-4 (Standard Plate Count) using soil samples
R	Nov. 12	Read: Exercises 8-1, 8-2, 8-4
T	Nov. 17	Do: Preliminary tests on soil bacteria isolate for Biolog ID system

R	Nov. 19	Do: Biolog ID identification
T	Nov. 24	Do: Biolog ID identification
R	Nov. 27	No Lab-Thanksgiving Break
T	Dec. 01	Set up: Exercise 7-3 (Antibiotic Susceptibility Test)
R	Dec. 03	Read: Exercise 7-3 Lab cleanup
T	Dec. 09	Laboratory Final Exam