

Syllabus for Biology 235 Microbiology

Instructor: Dr. Frank T. Kuserk
305 Collier Hall of Science
Office phone: (610) 861-1429
Home phone: (215) 368-2593
e-mail: kuserk@moravian.edu

Office Hours: MWF 10:00 AM - 11:00 AM and by appointment

Classrooms: Lecture – 235 Priscilla Payne Hurd Academic Center (PPHAC)
Lab – 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: Wheelis, Mark. 2008. *Principles of Modern Microbiology*. Jones and Bartlett Publishers, Sudbury, MA (ISBN 978-0-7637-1075-0)

Leboffe, M.J. and B.E. Pierce. 2008. *Microbiology: Laboratory Theory and Application* (Brief edition). Morton Publishing Co., Englewood, CO. (ISBN 978-0-89582-705-0).

Grading:	Lecture Exam 1	100 points
	Lecture Exam 2	100 points
	Lecture Exam 3	100 points
	Final Exam	100 points
	Lecture Presentation	50 points
	Laboratory Data Sheets	100 points
	Lab Midterm Exam	50 points
	Lab Final Exam	50 points
	Unknown Isolation & Identification Project	100 points
	Laboratory Attendance & Evaluation	<u>50 points</u>
		800 points

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 2008**

Day & Date		Topic	Wheelis Chap.
M	Aug. 25	History & Scope of Microbiology	1,2
W	27	History & Scope of Microbiology	1,2
F	29	Procaryotic Cell Structure & Function	4
M	Sept. 01	No Class-Labor Day	
W	03	Procaryotic Cell Structure & Function	4
F	05	Procaryotic Cell Structure & Function	4
M	08	Eucaryotic Cell Structure & Function	5
W	10	Eucaryotic Cell Structure & Function	5
F	12	Viruses & Noncellular Infectious Agents	6
M	15	Viruses & Noncellular Infectious Agents	6
W	17	Exam 1	1, 2, 4, 5, 6
F	19	Microbial Metabolism: Fermentation & Respiration	7
M	22	Microbial Metabolism: Fermentation & Respiration	7
W	24	Microbial Metabolism: Fermentation & Respiration	7
F	26	Microbial Metabolism: Autotrophic Growth	8
M	29	Microbial Metabolism: Nitrogen Fixation	8
W	Oct. 01	Microbial Growth	9
F	03	Microbial Growth	9
M	06	No Class-Fall Break	
W	08	Microbial Control: Student Instruction	
F	10	Microbial Control: Student Instruction	
M	13	Microbial Control: Student Instruction	
W	15	Exam 2	7, 8, 9, Microbial Control
F	17	Microbial Evolution & Systematics	13
M	20	Microbial Evolution & Systematics	13
W	22	Procaryotic Microbes	14
F	24	Procaryotic Microbes	14
M	27	Procaryotic Microbes	14
W	29	Biogeochemistry & Microbial Ecology	16
F	31	Biogeochemistry & Microbial Ecology	16
M	Nov. 03	Symbiosis	17
W	05	Exam 3	13, 14, 16, 17
F	07	Microbial Pathogenesis	19
M	10	Microbial Pathogenesis	19
W	12	Microbial Pathogenesis	19
F	14	Host Defenses: Non-specific Host Resistance	18
M	17	Host Defenses: Non-specific Host Resistance	18
W	19	Host Defenses: Specific Immunity	18
F	21	Host Defenses: Specific Immunity	18
M	24	Host Defenses: Specific Immunity	18
W	26	No class: Thanksgiving break	

F		28	No class: Thanksgiving break	
M	Dec.	01	Epidemiology and Human Disease	20
W		03	Epidemiology and Human Disease	20
F		05	Human Exploitation of Microbes	21
M		08	Human Exploitation of Microbes	21
W		10	Human Exploitation of Microbes	21

Final Exam: Date, time & place to be announced

18, 19, 20, 21

Biology 235
Laboratory Schedule
Fall 2008

Date	Laboratory Exercise
R Aug. 28	Do: Exercise 1-1 (GloGerm Hand Wash Education System) Set up: Exercise 1-2 (Nutrient Broth & Nutrient Agar Preparation) Exercise 2-1 (Ubiquity of Microorganisms) Read: Exercise 2-13 (Steam Sterilization)
T Sept. 02	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: Wheelis, Chapter 3
R Sept. 04	Set up: Exercise 1-3 (Common Aseptic Transfers and Inoculation Methods) Exercise 1-4 (Streak Plate Methods of Isolation) Exercise 2-2 (Colony Morphology) Exercise 2-3 (Growth Patterns on Slants) Exercise 2-4 (Growth Patterns in Broth) Do: Exercise 3-4 (Simple Stains)
T Sept. 09	Read: Exercises 1-3, 1-4, 2-2, 2-3, 2-4 Do: Exercise 3-6 (Gram Stain) Exercise 3-7 (Acid-Fast Stains)
R Sept. 11	Do: Exercise 3-8 (Capsule Stain) Exercise 3-9 (Endospore Stain) Exercise 3-11 (Flagella Stain)
T Sept. 16	Set up: Exercise 2-5 (Evaluation of Media) Exercise 2-6 (Fluid Thioglycollate Medium) Exercise 2-7 (Anaerobic Jar) Exercise 2-8 (The Effect of Temperature on Microbial Growth) Exercise 2-9 (The Effect of pH on Bacterial Growth) Exercise 2-10 (The Effect of Osmotic Pressure on Microbial Growth)
R Sept. 18	Read: Exercises 2-5, 2-6, 2-7, 2-8, 2-9, 2-10
T Sept. 23	Set up: Exercise 4-1 (Mannitol Salt Agar) Exercise 4-2 (Phenylethyl Alcohol Agar) Exercise 4-3 (Columbia CNA with 5% Sheep Blood Agar) Exercise 4-4 (Eosin Methylene Blue Agar)

Exercise 4-5 (Hektoen Enteric Agar)
Exercise 4-6 (MacConkey Agar)

R	Sept. 25	Read: Exercises 4-1, 4-2, 4-3, 4-4, 4-5, 4-6
T	Sept. 30	Set up: Exercise 5-1 (Oxidation-Fermentation Test) Exercise 5-2 (Phenol Red Broth) Exercise 5-3 (Methyl Red and Voges-Proskauer Tests) Exercise 5-4 (Catalase Test) Exercise 5-5 (Oxidase Test) Exercise 5-6 (Nitrate Reduction Test) Exercise 5-7 (Citrate Test) Exercise 5-8 (Decarboxylation Test) Exercise 5-9 (Phenylalanine Deaminase Test)
R	Oct. 02	Read: Exercises 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 5-9
T	Oct. 07	No Lab-Fall Break
R	Oct. 09	Laboratory Midterm Exam
T	Oct. 14	Set up: Exercise 5-10 (Bile Esculin Test) Exercise 5-11 (Starch Hydrolysis) Exercise 5-12 (Urea Hydrolysis) Exercise 5-13 (Casein Hydrolysis) Exercise 5-14 (Gelatin Hydrolysis) Exercise 5-17 (SIM Medium) Exercise 5-18 (Klinger Iron Agar)
R	Oct. 16	Read: Exercises 5-10, 5-11, 5-12, 5-13, 5-14, 5-17, 5-18
T	Oct. 21	Set up: Exercise 5-19 (Bacitracin Susceptibility Test) Exercise 5-20 (Blood Agar) Exercise 5-21 (Coagulase Tests) Exercise 5-22 (Motility Test) Exercise 9-1 (Identification of Enterobacteriaceae)
R	Oct. 23	Read: Exercises 5-19, 5-20, 5-21, 5-22, 9-1
T	Oct. 28	Set up: Exercise 7-5 (Membrane Filter Technique) Exercise 7-6 (Multiple Tube Fermentation Method for Total Coliform Determination) Continue: Exercise 9-1
R	Oct. 30	Read: Exercises 7-5, 7-6 Continue: Exercise 9-1

T	Nov. 04	No Lab
R	Nov. 06	Field trip to Lehigh Gap Nature Center to collect soil samples for Microbial counts and isolation Do: Exercise 9-5 (Enterotube II)
T	Nov. 11	Set up: Exercise 1-6 (Spread Plate Method of Isolation) Exercise 6-1 (Standard Plate Count) using soil samples
R	Nov. 13	Read: Exercise 6-1 Isolate soil bacteria
T	Nov. 18	Set up: Exercise 7-5 (Membrane Filter Technique) Exercise 7-6 (Multiple Tube Method for Coliform) Do: Preliminary tests on soil bacteria isolate for Biolog ID system
R	Nov. 20	Do: Biolog ID identification
T	Nov. 25	Do: Biolog ID identification
R	Nov. 27	No Lab-Thanksgiving Break
T	Dec. 02	Set up: Exercise 7-2 (Antibiotic Susceptibility Test)
R	Dec. 04	Read: Exercise 7-2 Lab cleanup
T	Dec. 9	Laboratory Final Exam