

BIOLOGY 333/533

General Microbiology

Summer 2018

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Lecture: TNR 464, 9:00-10:15 am MTWRF
Lab: TNR 451, 10:30 am-12:30 pm MTWRF

Office hours: M 1-3 pm & by appointment
(Available most afternoons.)

A Desire2Learn (D2L) site is set up for the course.

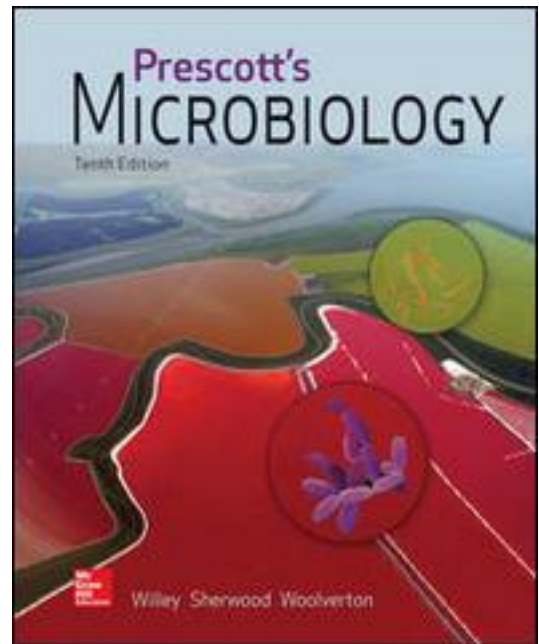
**Pre-requisites: Biology 101, 130 or 160; Biol 210;
Chem 106 or 117**

This course is designed to introduce you to the study of microorganisms. Although it will focus heavily on bacteria, other topics will be introduced including fungi, non-cellular infectious entities such as viruses, eukaryotic parasites, the immune system, and epidemiology.

Core learning objectives.

By the end of the semester you should be able to:

- Ask science-based questions and use critical thinking skills to investigate how and where microbes grow and interact with their physical and biological environment.
- Compare and contrast structural and biochemical features of prokaryotic cells, eukaryotic cells, and acellular agents.
- Explain the physiological and biochemical processes that are unique to microorganisms.
- Describe the applications of microbiology to biotechnology.
- Describe the impact of microbial processes to humans and the environment.



Textbook: Prescott's *Microbiology*, Willey, Sherwood & Woolverton. 10th Edition. Wm. C. Brown Publishers.

Lab Manual: *Microbiology Lab Manual* Spring/Summer 2018 edition. T. Barta. (Purchase in DUC Bookstore). Do not use a manual from a previous semester.

Optional supplement: *A Photographic Atlas for the Microbiology Lab*, by Leboffe and Pierce (DUC bookstore or commercial sources).

UWSP is committed to providing reasonable and appropriate accommodations to students with disabilities and temporary impairments. If you have a disability or acquire a condition during the semester where you need assistance, please contact the Disability and Assistive Technology Center on the 6th floor of Albertson Hall (library). DATC can be reached at 715-346-3365 or DATC@uwsp.edu. If you are already registered with the Disability and Assistive Technology Center, please inform me as soon as possible.

Lab-based Learning Objectives

Students will be able to use the lab skills they acquire to:

- Demonstrate aseptic technique in the safe handling and culture of microbes
- Complete commonly used laboratory procedures to culture and identify microbes
- Perform standard techniques to analyze the growth of microbes
- Apply scientific based methods (physical and chemical) treatments to inhibit their growth.
- Utilize the scientific method to plan, carry out, and analyze experiments
- Show competency in basic math as it relates to biology



General Course Policies

Attendance. This is a 15-week course compressed into six weeks. Full attendance is required. Excused absences are allowed for unavoidable emergencies only. Family vacations or trips are not considered unavoidable emergencies. In addition to missing material, each unexcused absence (lecture or lab) will result in 3-point deduction from total points.

Make-up exams and quizzes will be permitted ONLY for unavoidable emergencies provided that you have called or emailed in advance. *If you cannot call, please have someone else call.* The format of the make-up test may differ from that of the original test.

Academic Integrity. You are encouraged to work and study with each other in order to get the most out of the course. Lab experiments usually involve working in groups. However, you are expected to work independently on assignments, quizzes, and examinations. I will use Turnitin on assignments. Greater than 10% similarity scores will be interpreted as plagiarism. I take academic integrity very seriously. So should you. Sanctions for academic misconduct are likely to result in one or more of the following: repeating the test, receiving a zero on the test or assignment, a letter of reprimand in your academic file, or a failing grade in the course. Standards and Disciplinary Procedures for UWSP can be found at:

<https://www.uwsp.edu/dos/Documents/CommunityRights.pdf#page=11>

Communication. I prefer face-to face communication rather than email for some things, including questions on material, and discussion of exams and grades. In accordance with FERPA, I will not discuss grades or class performance in front of other students. Except for mathematical discrepancies, point challenges to your test must be handled privately in my office. Grading challenges must be made within 48 hours of the exam key being posted.

Cell phones. Cell phones may be used in lectures for Kahoot quizzes. Use of cell phones in lab is not allowed without permission. Repeated warnings may result in dismissal from the day's class.

Tests, Assignments, and Grading

There are 675-710 points in the course (depending on additional assignments or pop quizzes, and optional case study).

1) Lecture Exams (350 pts). There will be two term exams, each worth 100 points. Each exam will be based on 10-11 lectures plus any assigned reading. Dates for exams are 6/12 and 6/26 (also shown on s schedules). Final exam is the last day of class (7/6). The final exam will focus on the last unit of the course but also there will be a 50-point cumulative component of the exam.

2) Lab quizzes (100 pts). There are six lab quizzes, each worth 15 points plus a 10-pt quiz on lab math (last lab). Refer to the lab schedule for dates. These quizzes will cover theory and techniques from lab exercises, as well as actual and/or expected results. Lab quizzes cannot be taken early.

3) Practical lab exercises and assignment--PLEs (130 pts). There will be 6 practical lab exercises (PLEs) worth between 5 and 15 points each, and also a lab assignment worth 10 points. The PLEs are explained in the lab manual. The due dates are listed on the Laboratory Schedule.

4) Bacterial disease quiz (10 pts). You need to know the full scientific name of about 45 bacterial disease agents covered in lecture or lab. The quiz will be attached to the final exam.

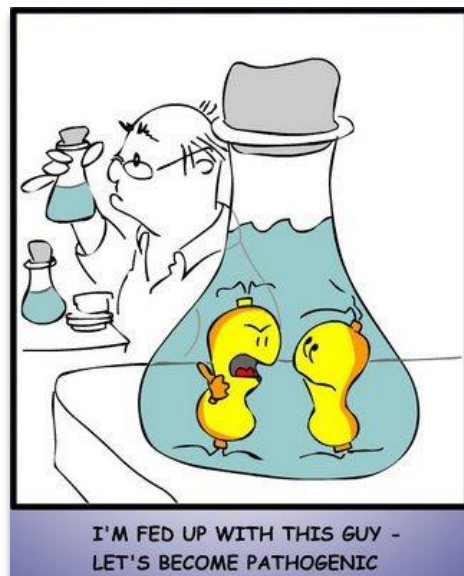
5) Pre-Lab/Post-lab Quizzes (75 pts). A pre-lab quiz (3-5 points each for most labs) that covers introduction material will be taken on D2L. A few labs have post-lab quizzes. The pre-lab quiz is due prior to the lab the start of lab. Post-lab quizzes are due by the next lab. There are NO MAKE-UPS or extensions for these quizzes.

6) Optional case study (one, worth 20 points). This assignment will be optional but will count toward the total possible points in the course. This assignment has the potential to raise your grade but this is not guaranteed. Details will be explained in class.

7) Students enrolled in Biol 533 will have an additional paper or project determined by consultation with instructor.

I reserve the right to add assignments or modify point values if they are to your benefit. You will also be evaluated on your ability to follow directions, practice safety, and properly use and care for the microscope and other equipment. Lack of attention to these things may result in deduction of points.

There will be optional Kahoot quizzes in lecture that carry no point values.



Grading

Grades are based on the percentage of total points. There will be opportunities to earn bonus points on exams and quizzes. There will also be at least one 10-point extra credit assignment. Please realize that **there are no additional points that can be added after the final exam**. Even if you tell me you “worked hard,” I cannot give you a higher grade because I have no way to objectively measure anyone’s perceived level of effort.

Grading scale

≥ 92.0% = A	87-89.9% = B+	77-79.9% = C+	67-69.9% = D+
90-91.9% = A–	82-86.9% = B	72-76.9% = C	60-66.9% = D
	80-81.9% = B–	70-71.9% = C–	< 60 % = F

Grades will be rounded to the nearest 0.1%. Because of the bonus points available on quizzes and exams, there will be no additional “rounding” up of grades beyond that.

Safety Policies



You will be asked to read and sign a safety agreement the first day of lab. Your signature indicates your compliance with the safety policies of this university. Please be aware that no eating or drinking is allowed in the lab. Also, students are not permitted to wear open-toed or open-heeled shoes in the lab. Even in warm weather, students should also wear clothing that covers the legs to the ankles (unintentional spillage of cultures and chemicals can and does occasionally happen). Safety goggles must be used in some procedures. Lab coats or aprons are not provided—you will need to provide your own if you wish to wear them.

EMERGENCY RESPONSE GUIDANCE

See the UWSP Emergency Management Plan at www.uwsp.edu/rmgt for more details on emergency responses. In the event of a medical emergency, call 911 or use the nearest red emergency phone. In the event of a tornado warning, proceed to the lowest level interior room without windows. If there is a fire alarm, evacuate the building in a calm manner. Meet on away from the building on the south side near the Sundial. Notify instructor or emergency personnel of any missing individuals. In an active shooter situation, remember: **Run/Hide/Fight** in that order. Evacuate quickly if able; if trapped, hide quietly in a locked room, turn off lights, and silence cellphones. Spread out—do not cluster together. *If no other option is available, work together to surprise and overtake the attacker.* Follow directions of emergency responders and stay where you are until directed. Please watch: [Shots Fired On Campus - When Lightning Strikes](#) on the Risk Management page.

Pointer Alerts are designed to provide information about active credible campus emergency situations that pose a threat and require immediate action. Sign up on the Risk Management page. Click on "Pointer Alerts."

Risk Management

Risk Management is a unit of Business Affairs. The office of Risk Management provides the UWSP campus with leadership and direction in the areas of general risk management, property and liability insurance and claims management, loss prevention and control, worker's compensation management, occupational health and safety, laboratory safety and chemical hygiene, DOT compliance, ergonomics, hazardous materials/wastes management, and environmental management.

Quick Links

- ✚ Emergency Plan
- ▲ Emergency Procedures
- 📄 Pointer Alerts ←
- 🎧 Training Resources

Personal Emergencies. If you anticipate receiving an important call (for reasons like family health issues), please notify me before class. If your family needs to contact you during class in an unanticipated emergency, they should call the biology office at 715-346-4524 or Campus Protective Services, 715-346-3456 (after hours).



“When observation is concerned, chance favors only the prepared mind.”
--Louis Pasteur

SUCCESS IS A CHOICE!

- **Make learning your top priority.** Even if you have a job outside of school, college is a full-time job. It is your career. Make the most of your tuition dollars.
- **Come to class every day.** Be there in mind as well as body. Don't rely on someone else's notes to learn what was important.
- **Take good notes.** The quizzes and exams will be based on your notes, so taking good notes is important. Develop a good shorthand technique that works for you so you can concentrate on what's being said. Leave lots of space for adding and clarifying things during review. Don't try to get down every word on the slides. You can get that later. Takes notes on what is being explained.
- **Study every day.** Plan on spending at least 1-2 hours per day per hour of class time. Also, research has shown that people learn better by studying intensively for short intervals frequently, compared to longer periods on a less frequent basis.
- **Study your notes when they are fresh,** i.e., as soon as possible after class even if only briefly (to get material from short-term memory into long-term memory).
- **Study in an active manner.** Just re-reading notes gives you a false sense of familiarity. Analyze them; quiz yourself, make comparative tables, term lists, one-page summaries, etc. Practice information retrieval. I do not recommend note cards because they fragment information rather than connect it.
- **Put your cell phone away while you are studying.** Texting and calling while studying interferes with your ability to concentrate and learn. There is no such thing as "multi-tasking."
- **Study to LEARN, not to just to pass the test.** Trying to study what you think will be emphasized on the test is counterproductive. The more you understand, the better you will do.
- **Find a study group or study partner.** You can quiz each other and help each other learn.
- **Spend your time in lab wisely.** Really think about the material in class and try to understand it. Think about the experiment you are doing. Ask questions. Knowledge is something that is built upon, not just acquired. Don't rush through the experiments just to get out of lab early.
- **Study your lab notes as much as your lecture notes.** Many students mistakenly think lab is a "supplement" to lecture. It is equally important. Use the lab intro PowerPoints.
- **If you need help, get it *right away*.** One of the biggest mistakes students make is waiting too long to get help. Please see me right away if you are having trouble understanding the material. I will do whatever I can to help you find the best way to comprehend the subject.
- **Keep a regular schedule, get enough sleep, eat a sensible diet, and stay sober. Seriously.** An all too common consequence of alcohol use is the inability to keep up on academic responsibilities. Research shows a strong negative correlation between alcohol and grades. Students with D/F averages consume 6.4 more drinks per week than "A" students. And even "B average" students drink an average of 1.1 more drinks per week than A students.

Summer 2018 Lecture Schedule (may be adjusted if needed)

<i>Week</i>	<i>Date</i>	<i>Topic</i>	<i>Text Reading</i>
1	T 5/29	Course Introduction; Scope of Microbiology; Evolution of Microorganisms	
	W 5/30	History of Microbiology as a Science	Chap. 1: 2-9; 11-17
	R 5/31	Review of biological chemistry	Appendix I
	F 1/31	Prokaryotic cell organization	Chap. 3
2	M 6/4	Cell structure, continued	Chap. 3
	T 6/5	Endospores; Bacterial cell growth; mathematics of growth	Chap 3: (3.9) Chap. 7: 132-137
	W 6/6	Bacterial Growth curves; Intro to metabolism	Chap. 10 (208-211)
	R 6/7	Energy Concepts and Enzymes	Chap. 10 (211-224)
	F 6/8	Carbohydrate metabolism, Glycolysis; carbohydrates other than glucose	Chap. 11: 229-235; 248-249
3	M 6/11	Aerobic & anaerobic respiration; fermentation	Chap. 11: 236-249
	T 6/12	Introduction to bacterial genetics, DNA structure & Replication	Chap.13: 284-293; 387
	W 6/13	EXAM I (through fermentation)	
	R 6/14	Central Dogma: Gene expression in bacteria	Chap 13: 298-316
	F 6/15	Gene regulation	Chap. 14: 321-328; 337-339
4	M 6/18	Mechanisms of Genetic Variation: mutations, plasmids, transposable elements	Chap. 16: 370-377, 382-384
	T 6/19	Mechanisms of Genetic Variation: conjugation, transformation, transduction	Chap. 16: 384-397
	W 6/20	Genetic Biotechnology: DNA cloning; Polymerase Chain Reaction	Chap. 17: 400-403; 406-410
	R 6/21	Bacterial Diversity: Archaea	Chap. 4, Chap. 20
	F 6/22	Bacterial diversity, cont. (Eubacteria)	Chaps. 22-24 (selected parts)
5	M 6/25	Intro to Viruses, Virus reproduction	Chap. 6;
	T 6/26	Exam II (through bacterial diversity)	
	W 6/27	Virus reproduction strategies, cont. Other non-cellular infectious entities	Chap. 27, Chap. 38
	R 6/28	Normal Microbiota of the Human Body	Chap. 32
	F 6/29	Immunology: Innate defenses	Chap. 33
6	M 7/2	Immunology: Adaptive defenses; Vaccines; Antibody applications; vaccines	Chap. 34 (736-760); Chap 36: 798-801; Chap. 37: 818-822
	T 7/3	Pathogenicity & virulence	Chap. 35: 771-781
	W 7/4	4th of July Holiday (No class)	
	R 7/5	Antibiotics & Antibiotic resistance	Chap. 9: 188-204; Chap. 16: 395-397

	F 7/6	FINAL EXAM	
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If lectures run ahead of schedule, there may be a lecture on epidemiology (pp. 818-822)

Summer 2018 Lab Schedule

Labs are designed to be completed within an approximate two-hour period. What affects lab completion time is preparedness for lab and efficient work habits. You are expected to read through the lab exercise(s) in the manual before coming to lab. Most labs have a prelab quiz, and sometimes a video, that must be completed before lab. Lab attendance is an absolute requirement. There are no make-up labs.

Proper safety precautions and respect for others in the lab are paramount. Careless or sloppy work in the laboratory cannot be tolerated. Careless behavior or work that endangers the student or others in the lab will affect the course grade. Behavior that continues past a warning may result in the student being asked to withdraw from the course.

The **lab quizzes** are given at the beginning of the period (dates noted below).

Lab#/Date	Lab Experiments, Activities	pages
Week 1		
1	T 5/29	Intro to the Lab; Lab Safety; Scientific Method; Fomites & Contamination
2	W 5/30	Microscopes & Measurement
3	R 5/31	Aseptic Technique & Culture Transfer Methods (videos)
4	F 6/1	Observing Growth & Colony Morphology; Simple Staining & Cell Morphology
Week 2		
5	M 6/4	Lab Quiz #1 (Labs 1-4) Cell morphology, cont., Gram staining
6	T 6/5	Acid-fast, Endospores and Capsule staining (video)
7	W 6/6	Bacterial Motility; PLE#1 (Gram stain unknown)
8	R 6/7	Bacterial Nutrition and Growth Media; Selective & Differential Media
9	F 6/8	Lab Quiz #2 (Labs 5-8) PLE#2: Morphological Unknown
Week 3		
10	M 6/11	Oxygen and Growth
11	T 6/12	Environmental Parameters of Growth: Temperature, pH, Water Activity
12	W 6/13	LECTURE EXAM 1 Quantitating Microbial Populations
13	R 6/14	Control of Growth by Heat and UV
14	F 6/15	Lab Quiz #3 (Labs 9-13) Chemical Control of Microbial Growth

Lab#/Date	Lab Experiments, Activities	pages.
Week 4		
15	M 6/18	Biochemical Characterization & Differentiation of Bacteria—part 1 (Exoenzymes)
16	T 6/19	Biochemical Characterization & Differentiation of Bacteria—part 2 (Other tests); Dichotomous Key Exercise (due 6/22)
17	W 6/20	PLE#3 (Isolation streak plate) Medically Significant Bacteria: The Enterics
18	R 6/21	Complete enteric tests Start PLE #4 Identification of an unknown enteric
19	F 6/22	Quiz #4 (Labs 14-18) Microbial Flora of the Mouth Unknown enteric: streak enteric isolate to fresh plate
Week 5		
20	M 6/25	Medically significant bacteria: The Cocci Unknown enteric: start broth
21	T 6/26	LECTURE EXAM 2 Bacteriophage

		Inoculate unknown enteric to test media	
22	W 6/27	Read unknown enteric results; Yeasts & Molds (observe yeasts, prepare Henrici mounts)	164
23	R 6/28	Bacterial Genetics: pGLO Experiment; PLE#5 (Micropipetting)	155
24	F 6/29	Lab Quiz #5 (Labs 19-22) ; PLE#4 Report due Soil Microbiology	171
Week 6			
25	M 7/2	Observe Fungi, Soil Results Water Microbiology	175
26	T 7/3	Food Microbiology	182
27	W 7/4	HOLIDAY-NO CLASSES	
28	R 7/5	Lab Quiz #6 (Labs 23-26) ; Chemotherapeutic agent testing; PLE #6 (serial dilution plating)	161
29	F 7/6	Math Quiz ; Complete PLE#6; Lab clean-up and check-out	

Lecture exams are noted. Exams are held during lecture time.

Normally, experimental results are observed in the following lab, but we may need to have flexibility in this due to the compacted schedule. Students will be notified of any other changes that may be need to be made in the schedule.