Biology 333/533
General Microbiology

Spring 2017

Lecture:
11:00-11:50 MW
TNR 120

Labs
Sect. 1 10:00-11:50 TR
Sect. 2 1:00-1:50 TR
TNR 451

Dr. Terese Barta
TNR 465
715-346-4241
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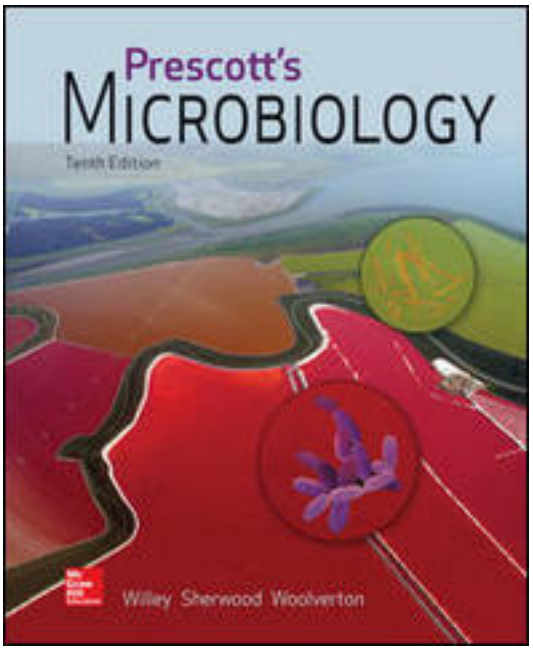
Office hours
3:00-4:00 M
3:00-4:00 TR
3:00-5:00 W
Other times by appointment



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

Lab Manual: *Microbiology in the Laboratory* 2016-17 edition. UWSP Printing & Design. In two parts (Purchase in DUC Bookstore). *No used copies.*

Required supplies: black permanent marker (such as a Sharpie®), safety goggles with covered vents.

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

Course Description & Objectives

Pre-reqs: Biology 101, 130 or 160, Chem 106 0r 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 infectious agents.

• Explain the biochemical and physiological processes that are unique to microbial organisms.

• Describe the application of microbial genetics to biotechnology.

• Describe the impact of microbial processes to humans and the environment.

Inside this Syllabus

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 practices 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

TESTS, ASSIGNMENTS, AND GRADING POLICIES

There are 530-550 points in the course, depending on the number of homework assignments.

1) Lecture Exams (350 pts). There will be three unit exams, each worth 100 points. Each exam will be based on lecture material, plus any assigned reading (announced in class). See schedule for dates. The final exam will focus on the last unit of the course but there will be a 50-point cumulative component of the exam. Final exam is Monday, Dec 19 (10:15 AM)

2) Lab quizzes (100 pts). There are six lab quizzes, each worth 15 points plus a 10-pt quiz on lab math. 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. If you miss a lab quiz (for an excusable absence), it must be made up no later than the next lab period (except in cases of hospitalization). Lab quizzes can not be taken early.

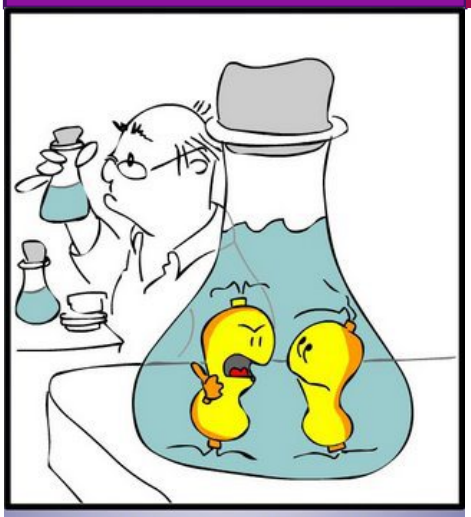
3) Practical lab exercises--PLEs (60= pts). There will be five practical lab exercises (PLEs), three of which are worth 10 points and two that are worth 15 The PLEs are explained in the lab manual. The due dates are listed on the Laboratory Schedule.

4) Bacterial disease quiz 10 points. You need to know the full scientific name of about 45 bacterial disease agents. The quiz will be added to the final exam.

5) Homework and online assignments (variable points, up to 30 points total). The nature of the assignments will be explained in class.

In addition to the point-generating activities described above, you are expected to have complete attendance and full attention and participation in class. 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.

Please note: I reserve the right to add any assignments I think are necessary for the course if they are to your benefit.



Grading Scale:

≥ 92.0%	= A
90-91.9%	= A–
87.5-89.9%	= B+
82-87.4%	= B
80-81.9%	= B–
77.5-79.9%	= C+
72-77.4%	= C
70-71.9%	= C–
67.5-69.9%	= D+
60-67.4%	= D
< 60 %	= F

A Desire2Learn (D2L) site is set up for the course. You can keep track of your points in the class on the **Grades** page.

If you fail the first exam, you must schedule a meeting with me.

Because of the bonus points available on quizzes and exams, there will be no "rounding" up of grades if you are below a point cut-off.

GENERAL POLICIES

Make-up exams and quizzes will be permitted ONLY for unavoidable emergencies provided that you have called in advance. If I am not available to take your call, you should leave a message on voice-mail (it will record the date and time of your call). *If you cannot call, please have someone else call.* The format of the make-up quiz may differ from that of the original quiz.

Excused absences are allowed for unavoidable emergencies only. Family vacations and hunting trips are not considered unavoidable emergencies.

Academic Integrity. You are encouraged to work and study with each other in order to get the most out of the course. Lab experiments also involve working in groups. However, you are expected to work independently on assignments, quizzes, and examinations.

Standards and Disciplinary Procedures for UWSP can be found at:

http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SRR-2010/rightsChap14.pdf

I take academic integrity 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, a letter of reprimand in your academic file, or a failing grade in the course.

Communication: Some things are better discussed face to face instead of email. If you need to email me, however, please be aware that I check email while I am work, but infrequently on weekends and evenings.

If you have questions on the way your exam is graded, please see me in my office. I will not discuss your exam in front of other students. Except for mathematical errors, point challenges to your exam grades must be done in person within 48 hours of the exam key being posted.

Cell phones. Use of cell phones without permission is not permitted.* Timers and calculators are provided if needed. Exams may not be photographed.

Grades are based on the percentage of total points. I cannot give you a higher grade if you tell me you "worked hard" because *I have no way to objectively measure anyone's perceived level of effort.* Please realize that **there are no additional points that can be added after the final exam**.

*First offense: verbal warning; 2nd time: verbal warning and phone must be placed on instructor bench for the rest of class; 3rd time: 2 pt deduction from course points.

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 (ON TIME) everyday.** 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.
- **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.
- **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 or look for ways 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.
- **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.
- **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."
- **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.

If you are registered with the Disability and Assistive Technology Center, please inform me as soon as possible to plan any course or test accommodations that may be necessary. If you have a disability but have not contacted the DATC, please call 346-3365 or visit 609 LRC to register for services.

I may have a service dog in training that comes to class with me. If you have allergies or personal objections to this, please notify me as soon as possible. Your objection will remain confidential.

Safety Issues

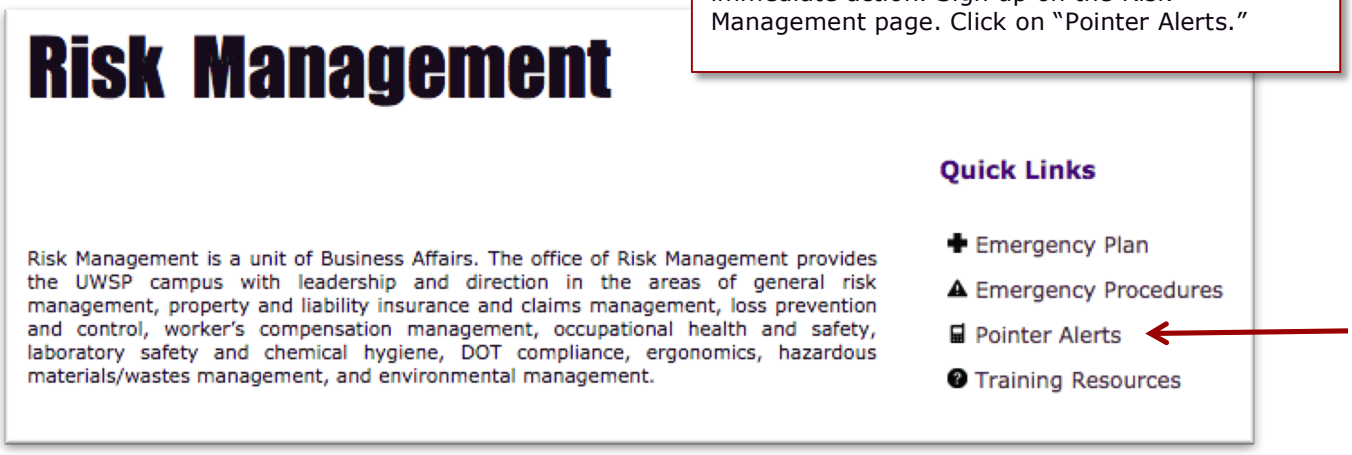
LAB SAFETY

You will be asked to read and sign a safety agreement the first day of lab. Your signature indicates your willingness to abide by 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). 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."



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).

Lecture Schedule (may be adjusted if needed):

Week	*Date*	*Topic*	*Text Reading*
1	M 1/23	Course Introduction	
	W 1/25	Evolution of Microorganisms History of Microbiology as a Science	Chap. 1: 2-9;11-17
2	M 1/30	Review of biological chemistry	Appendix I
	W 2/1	Prokaryotic cell organization (cell envelope)	Chap. 3: 42-53
3	M 2/6	Cell structure, continued: Cell wall, capsules	Chap. 3: 53-62
	W 2/8	Cell structure, cont,: cytoplasm, external structures	Chap 3: 62-74
4	M 2/13	Endospores; Archaeal Cell Structure	Chap. 3: 75-77; Chap. 4: 80-88
	W 2/15	Bacterial cell growth & mathematics of growth	Chap. 7: 132-137
5	M 2/20	Intro to metabolism: Enzymes	Chap. 10: 217-224
	W 2/22	Energy processes: ATP and REDOX reactions	Chap. 10: 208-217
6*	M 2/27	Carbohydrate metabolism, Glycolysis; carbohydrates other than glucose	Chap. 11: 229-235; 248-249
	W 3/1	Aerobic & anaerobic respiration	Chap: 236-245
7	M 3/6	Fermentation; catabolism of proteins & lipids	Chap. 11: 245-249
	W 3/8	Introduction to bacterial genetics, DNA structure & Replication	Chap.13: 284-293; 387
8	M 3/13	Central Dogma: Gene expression in bacteria	Chap 13: 298-316
	W 3/15	Gene regulation	Chap. 14: 321-328; 337-339
9	3/20-3/24	SPRING BREAK – NO CLASS	
10	M 3/27	Mechanisms of Genetic Variation: mutations, transposable elements	Chap. 16: 370-377, 382-384
	W 3/29	Mechanisms of Genetic Variation: conjugation, transformation, transduction	Chap. 16: 384-397
11*	M 4/3	Genetic variation, cont. DNA cloning; Polymerase Chain Reaction (assignment)	Chap. 17: 400-403; 406-410
	W 4/5	Intro to Viruses	Chap. 6: 109-121, 124
12	M 4/10	Virus reproduction strategies (Also refer to Chap. 38)	Chap. 27: 598-599; 607-611
	W 4/12	Viruses, cont.,	Chap. 27: 611-621
13	M 4/17	Viruses, cont., other non-cellular infectious agents	Chap. 27: 127-129
	W 4/19	Immunology: innate defenses	Chap. 33: 707-712
14	M 4/24	Innate defenses, cont.	Chap 33: 712-724; 730-734
	W 4/26	Immunology: adaptive defenses	Chap. 34: 736-759
15	M 5/1	Pathogenicity & virulence	Chap. 35: 771-781
	W 5/3	Disease therapies: anti-serum, vaccines, & antibiotics	262, Chap. 9; 739-740
16	M 5/8	Epidemiology	818-822
	W 5/10	TBA (Review or finish topics)	

***Lecture Exams 6:00-7:30 pm on Wednesday, 3/1 and 4/5 (Room to be announced).**

Spring 2017 Lab schedule

Labs are designed to be completed within the 1 hour-50 minute period. Preparedness for lab and efficient work habits on your part are essential to making that a reality. You are expected to read through the lab exercise(s) in the manual before coming to lab. Experimental results will usually be recorded and discussed during the following lab session.

Proper safety precautions and respect for others in the lab is paramount. Careless or sloppy work in the laboratory will not be tolerated. Students who demonstrate careless work that endangers themselves or others in the lab will lose points in the course, and if the behavior continues, could be asked to withdraw from the course.

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

Week	Dates	Day	Lab Exercises	Page
1	Jan 24	T	Lab Introduction; Glo-germ experiment; Fomites & Contamination	3-7; 17
	Jan 26	R	Scientific method (handwashing experiment)	8, 15
2	Jan 31	T	Aseptic Technique & Culture Transfer Methods	26 (V)
	Feb 2	R	Selective and Differential Media	37
3	Feb 7	T	Microscopes & Measurement	41 (V)
	Feb 9	R	**Quiz 1;** Basic Staining Techniques	53 (V)
3	Feb 14	T	Bacterial Morphology	58
	Feb 16	R	More Differential Staining: Capsule, Spore, Acid-fast Stains	63 (V)
4	Feb 21	T	**PLE #1** (Morph. Unknowns); Motility	69; 72
	Feb 23	R	**Quiz 2;** Relationship of Oxygen to Growth	76
5	Feb 28	T	Environmental Parameters: Temp, pH Osmosis	80
	March 2	R	Quantitating Microbial Populations	100,192; V
6	March 7	T	Bacterial Growth Curve	108
	March 9	R	**Quiz 3;** Control of Microbial Growth (Heat & UV); *PLE #1 graded*	86 (V)
7	March 14	T	Chemical Control of Growth	93
	March 16	R	Fungi: yeasts and molds	131
8	Mar 20-24		SPRING BREAK	

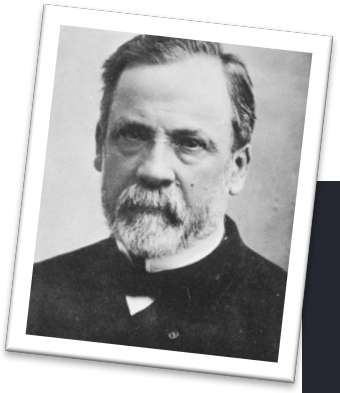
9	Mar 28	T	Finish fungi; Biochemical Characterization of Bacteria	114
	Mar 30	R	Read biochemical tests	117
10	April 4	T	**PLE #2**: Biochemical unknown (start tests)	125
	April 6	R	**Quiz 4;** Read PLE #2 biochemical results	(117)
11	April 11	T	Bacteriophage; **PLE #5 (Micropipetting)**	127
	April 13	R	Bacterial Genetics: pGLO Transformation	167
12	April 18	T	Microbiology of Water	138
	April 20	R	Soil Microbiology; *PLE #2 graded*	149
13	April 25	T	**Quiz #5**; Food Microbiology	142
	April 27	R	Microbial Flora of Humans: the cocci	149
14	May 2	T	Dental Microbiology**; PLE #3 (isolation streak)**	153; 159
	May 4	R	**Math quiz;** Chemotherapeutic Agent Testing;	161
15	May 9	T	Tracking Disease Outbreaks (ELISA): **PLE #4 (serial dilution plating)**	179
	May 11	R	**Quiz 6; Complete PLE#4**; Lab check out	

(V) = labs that have video(s) on D2L that should be viewed before coming to class.

Post-lab Quizzes. To help you review lab material and prepare for lab quizzes, there are post-lab quizzes for most of the lab exercises . Each quiz consists of 3 to 5 questions. You have 2 days after each lab to take the quiz (no exceptions). These do not affect your grade.

Please note: students that drop the course must clean their slides and empty their cans before their drop slip will be signed.

FINAL EXAM: *Wednesday, May 17, 12:30-14:30 pm (Exam group 11).* No exceptions unless student can document three exams scheduled on the same day.



"When observation is concerned, chance favors only the prepared mind."