

# Biology 333/533

## General Microbiology

Fall 2016

### Lecture:

11:00-11:50 MW  
TNR 464

### Labs

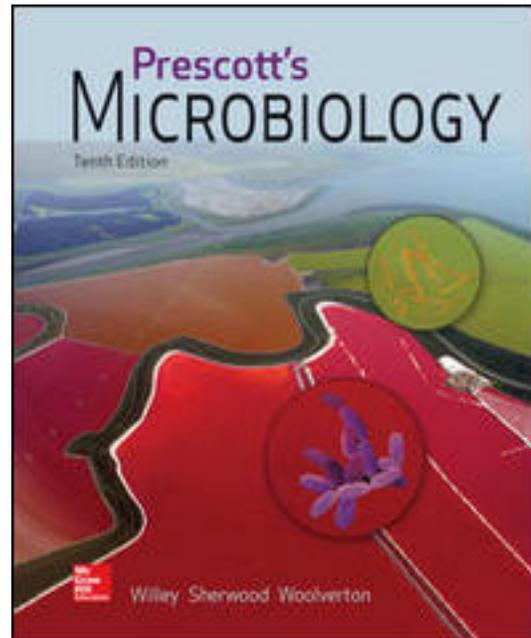
Sect. 1 10:00-11:50 TR  
Sect. 2 1:00-1:50 TR  
TNR 451

### Dr. Terese Barta

TNR 465  
715-346-4241  
tbarta@uwsp.edu

### Office hours

2:00-3:00 MW  
3:00-4:00 TR  
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.*

## Course Description & Objectives

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.

**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).

### Inside this Syllabus

Tests, Assignments, Grading	2
Grading Scale	3
Course Policies	3
How to Succeed	4
Safety issues	5



## 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

Your grade for the course will be based on the percentage you obtain of the following points:

### 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 (55 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.

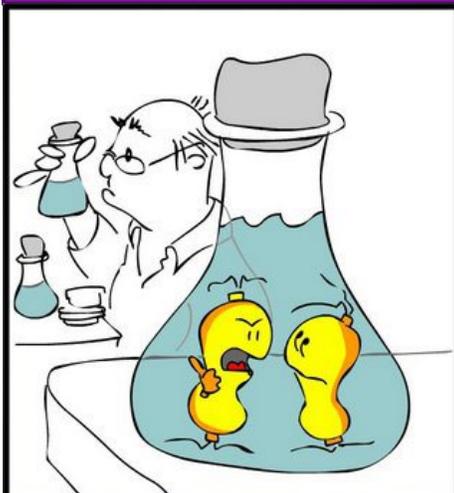
### 4) Bacterial disease quiz

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 bonus assignments** (variable points up to 20 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.*



I'M FED UP WITH THIS GUY -  
LET'S BECOME PATHOGENIC

### 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 in the course (at least 10), 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/RightsRespos/SR-R-2010/rightsChap14.pdf>

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

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 are not allowed in the lab *for any reason*. \* Timers and calculators are provided if needed. Exams may not be photographed.

\*First offense: verbal warning; 2<sup>nd</sup> time: verbal warning and phone must be placed on instructor bench for the rest of class; 3<sup>rd</sup> 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.



## 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

## EMERGENCY RESPONSE GUIDANCE

See the UWSP Emergency Management Plan at [www.uwsp.edu/rmgt](http://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.

**You can sign up for Pointer Alerts**, an emergency communication alert system that allows UW-Stevens Point students, faculty, and staff to be additionally notified in the event of a campus emergency. The system is designed to provide information about active credible emergency situations that pose a threat and require immediate action. Go to the Risk Management page and 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):

<i>Week</i>	<i>Date</i>	<i>Topic</i>	<i>Text chapter, pp.</i>
1	W 9/7	Evolution of Microorganisms & Microbiology	Chap. 1
2	M 9/12	Review of biological chemistry	Appendix I (A1 –A6)
	W 9/14	Review of biological chemistry	Appendix I (A7 –A8); 290-91
3	M 9/19	Prokaryotic cell structure (cell envelope)	Chap. 3: 42-53
	W 9/21	Cell structure, continued	Chap. 3: 53-62
4	M 9/26	Cell structure, cont.	Chap 3: 62-74
	W 9/28	Endospores; Archaeal Cell Structure	Chap. 3: 75-77; Chap. 4
5	M 10/3	Bacterial cell growth & mathematics of growth	Chap. 7: 132-137
	W 10/5	Intro to metabolism: Enzymes & Energy	Chap. 10: 217-224; 211-217
6*	M 10/10	Chemoorganotrophic fueling processes	Chap. 11
	<b>W 10/12</b>	Glycolytic pathways, sugar metabolism	Chap. 11, cont.
7	M 10/17	Aerobic & anaerobic respiration	Chap. 11, cont.
	W 10/19	Fermentation; catabolism of other macromolecules	Chap. 11: 245-249
8	M 10/24	Introduction to bacterial genetics, DNA structure & Replication	Chap.13: 284-298
	W 10/26	Gene expression in bacteria	Chap 13: 298-316
9	M 10/31	Gene regulation	Chap. 14: 321-328
	W 11/2	Mechanisms of Genetic Variation: mutations, transposable elements	Chap. 16
10	M 11/7	Mechanisms of Genetic Variation: conjugation, transformation, transduction	Chap. 16, cont.
	W 11/9	Biotechnology: DNA cloning & PCR	Chap. 17: 401-403; 406-414
11*	M 11/14	Intro to Viruses	Chap. 6
	<b>W 11/16</b>	Virus reproduction strategies	Chap. 27
12	M 11/21	Viruses, cont.,	Chap. 27, cont.
	W 11/23	Viruses, cont., other non-cellular infectious agents	Chap. 27, cont.
13	M 11/28	Pathogenicity & virulence	Chap. 35
	W 11/30	Immunology: innate defenses	Chap. 33
14	M 12/5	Innate defenses, cont.	Chap. 33, cont.
	W 12/7	Immunology: adaptive defenses	Chap. 34
15	M 12/12	Immunology: Vaccines	Chap. 33: 739-740; 818-822
	W 12/14	Epidemiology	Chap. 37

**\*Lecture Exams are scheduled 6:00-7:30 pm on Wednesday, October 12 and November 16 (TNR 120).**

## Fall 2016 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	Sept 6	T	Course Introduction; Lab Safety; Glo-germ experiment	3-7; 17
	Sept 8	R	Fomites & Contamination; Scientific method (handwashing experiment)	8, 15
2	Sept 13	T	Aseptic Technique & Culture Transfer Methods	26 (V)
	Sept 15	R	Selective and Differential Media	37
3	Sept 20	T	Microscopes & Measurement	41 (V)
	Sept 22	R	<b>Quiz 1</b> ; Basic Staining Techniques	53 (V)
4	Sept 27	T	Bacterial Morphology	58
	Sept 29	R	More Differential Staining: Capsule, Spore, Acid-fast Stains	63 (V)
5	Oct 4	T	<b>PLE #1</b> (Morph. Unknowns); Motility	69; 72
	Oct 6	R	<b>Quiz 2</b> ; Relationship of Oxygen to Growth	76
6	Oct 11	T	Environmental Parameters: Temp, pH Osmosis	80
	Oct 13	R	Quantitating Microbial Populations	100,192; V
7	Oct 18	T	Bacterial Growth Curve	108
	Oct 20	R	<b>Quiz 3</b> ; Control of Microbial Growth (Heat & UV); <i>turn in PLE #1</i>	86 (V)
8	Oct 25	T	Chemical Control of Growth	93
	Oct 27	R	Fungi: yeasts and molds	131
9	Nov 1	T	Finish fungi; Biochemical Characterization of Bacteria	114
	Nov 3	R	Read biochemical tests	117

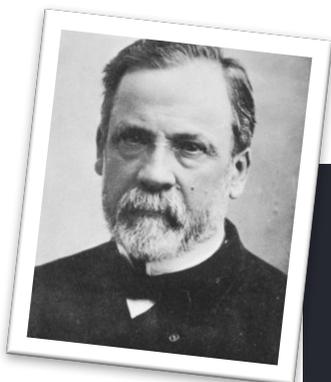
10	Nov 8	T	<b>PLE #2:</b> Biochemical unknown (start tests)	125
	Nov 10	R	<b>Quiz 4;</b> Read PLE #2 biochemical results	(117)
11	Nov 15	T	Bacteriophage; <b>PLE #5 (Micropipetting)</b>	127
	Nov 17	R	Bacterial Genetics: pGLO Transformation	167
12	Nov 22	T	Soil Microbiology; <i>PLE #2 Results due</i>	138
	Nov 24	R	<b>THANKSGIVING (NO CLASS)</b>	149
13	Nov 29	T	Microbiology of Water	142
	Dec 1	R	<b>Quiz #5;</b> Food Microbiology	149
14	Dec 6	T	Normal flora (cocci); Dental Microbiology	153; 159
	Dec 8	R	<b>Math quiz;</b> Chemotherapeutic Agent Testing; <b>PLE #3 (isolation streak)</b>	161
15	Dec 13	T	Tracking Disease Outbreaks (ELISA); <b>PLE #4 (serial dilution plating)</b>	179
	Dec 15	R	<b>Quiz 6; Complete PLE#4;</b> Lab check out	

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

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

**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).

**FINAL EXAM:** Monday, December 19, 10:15 AM-12:15 PM (no exceptions unless student can document three exams scheduled on the same day).



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