

Microbiology for the Health Sciences

Fall 2017

Lecture:
12:30-1:20 TR
TNR 464

Lab:
MW 10:00-11:50
TNR 451

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TNR 465
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Office hours
2:00-3:00 M,R
3:00-4:00 T
Other times by
appointment

Biology 233

Pre-reqs: Biology 101, 130 or 160, and Chem 101.

This course is designed to introduce you to the study of microorganisms and how they impact humans. 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.

Textbook: *Microbiology, The Human Experience* by Foster, Aliabadi, & Slonczewski.

Lab Manual: *Microbiology Lab Exercises*, edited by T. Barta, 2017. UWSP Printing & Design. Available in the DUC Bookstore.

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

Course Description & Objectives

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 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, especially human health.

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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
- Perform commonly used laboratory practices to culture and identify microbes
- Use standard techniques to analyze the growth of microbes
- Apply scientific based methods 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 **600 total points** in the course.

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 Tuesday, Dec 19 (8:00 AM)

2) Lab quizzes (90 pts). There are six lab quizzes, each worth 15 points. 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 (60 pts).

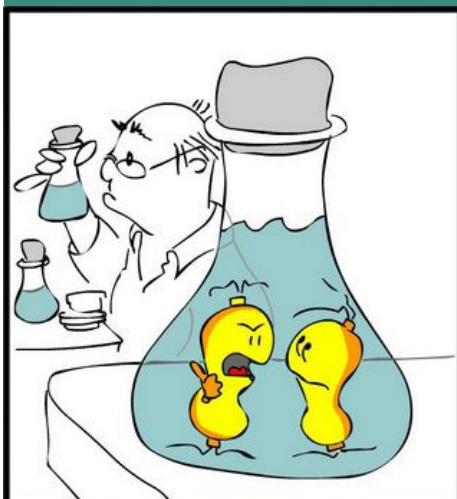
There will be several practical lab exercises that vary in point value: Gram stain unknown (5 pts), Identification Exercise (10 pts), Bacterial Separation and identification (25 pts), Investigation of a skin isolate (10 pts), and dilution plating exercise (10 pts). Further details will be supplied in lab.

4) Pre-Lab Quizzes (100 pts).

Prior to each lab, you must read through the lab exercise and complete a short pre-lab quiz worth 3-5 points each. There are no make-ups on these quizzes.

5) Optional case studies. You may complete two case studies, each worth 10 points. For grading, these will be added to the denominator of total course points. Directions for doing the case studies will be discussed in class. These must be done individually (no group collaboration).

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.



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

GENERAL POLICIES

Attendance. Regular attendance to lab is imperative for success in this course. There is a strong positive correlation between the amount of time a student spends in class and her/his final grade. It is expected that you will attend and be on time for all the lecture and laboratory sessions. Because of room scheduling and the preparation time involved in setting up live cultures, there are no make-up labs. Every effort will be made to save material if there is an avoidable absence due to illness or other emergency, provided you notify me *in advance*. Family vacations or trips are not considered unavoidable emergencies. Absences due to participation in academically sanctioned events such as athletic events or music competitions will be considered excused absences if written documentation is provided in advance.

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.

Communication: UWSP students are expected to check their University e-mail regularly for information from the university and/or instructors. If you are using an e-mail account other than your campus account to contact me, be sure your full name is included in the message. 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 not as frequently evenings and on weekends.

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 3 academic days of the exam key being posted.

Cell phones. Use of cell phones without permission is not permitted. Timers and calculators are provided if needed. A verbal warning will be given the first time; subsequent offenses may result in phone being placed on instructor bench and or loss of points. Exams may not be photographed.

Grading. Grades are based on the percentage of total points. I do not round up or give you a higher grade because you tell me you "worked hard." I have no objective means of measuring anyone's perceived level of effort. Also realize there are no additional points that can be earned after the final exam.

Academic Integrity

I take academic integrity seriously. So should you. 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. Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

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.

Standards and Disciplinary Procedures for the University of Wisconsin can be found at:

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

A concise brochure for students can be downloaded from:

<https://www.uwsp.edu/dos/Documents/AcademicIntegrityBrochure.pdf>

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 happen). Lab coats or aprons are not provided—you will need to provide your own if you wish to wear them. Also provide your own safety goggles (required in some labs). Gloves will be provided for work with Biosafety level 2 bacteria.

EMERGENCY RESPONSE GUIDANCE. Review 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. Sign up for **Pointer Alerts** on the Risk Management page to get active emergency warnings.

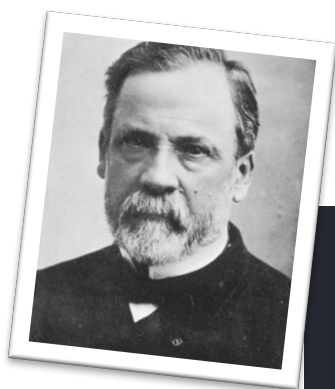
SUCCESS IS A CHOICE!

- **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 prepared everyday.** Be there in mind as well as body. Don't rely on someone else's notes to learn what was important. You are expected to read the text before coming to class.
 - **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.
- Tutoring.** Because this is the first time this class is being offered, there are no previous students available to be peer tutors. To provide extra help, I will be scheduling a weekly study & review session (day and time to be arranged). Attendance is not mandatory but recommended.

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).

Special accommodations. UWSP is committed to providing reasonable and appropriate accommodations to students with disabilities and temporary impairments. 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.

Other. I may have a search & rescue dog in training that could sometimes be in my office. He would probably be in a kennel. If you have allergies or personal objections to this, please notify me as soon as possible. Your objection will be respected and will remain confidential. I do not want to do anything that would discourage students from seeking help from me during office hours.



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

--Louis Pasteur

Lecture Schedule (may be adjusted if needed). Be sure to read the text section (in parentheses) listed in the topic column before coming to lecture.

<i>Week</i>	<i>Date</i>	<i>Topic</i>	<i>Text Reading</i>
1	T 9/5	Course Introduction	
	R 9/7	Microbes Shape Human History (1.1)	Chap. 1
2	T 9/12	Basic Concepts of Disease (Reading assignment and on-line quiz)	Chap. 2
	W 9/14	Chemistry of Life: organic molecules (4.1)	Chap. 4
3	T 9/19	Chemistry of Life, cont., Enzymes and chemical reactions	Chap. 4
	R 9/21	Eukaryotic cells (5.6)	Chap. 5 (5.6)
4	T 9/26	Bacterial Cell Structure (5.1)	Chap. 5 (5.1-5.3)
	R 9/28	Bacterial Cell Structure, cont.	Chap. 5 (5.4-5.5)
5	T 10/3	Bacterial Growth & Nutrition (6.1-pp. 158-161)	Chap. 6 (6.1, 6.3)
	R 10/5	Bacterial Growth & Nutrition, cont. (Environmental Factors)	Chap. 6 (6.4-6.6)
6*	T 10/10	Bacterial Metabolism (Energy, Electron Carriers) (7.1)	Chap. 7 (7.1-7.2)
	R 10/2	Bacterial Metabolism: Sugar Catabolism, TCA cycle and Fermentation	Chap. 7 (7.3)
7	T 10/17	Bacterial Metabolism: Respiration and Lithotrophy	Chap. 7 (7.4)
	R 10/19	Bacterial Genetics: the Central Dogma (pp. 224-top 227)	Chap. 8 (8.2, 8.5, 8.6)
8	T 10/24	Bacterial Genetics: mechanisms of Genetic Change (9.1)	Chap. 9 (9.1)
	R 10/26	Biotechnology	Chap. 8 (8.4)
9	T 10/31	Bacterial Diversity (10.1)	Chap. 10
	R 11/2	Eukaryotic Microbes (Fungi, Amebas, Parasites) (11.1)	Chap. 11
10	T 11/7	Viruses & other non-cellular pathogens (12.1 up to virus structure)	Chap. 12
	R 11/9	The Human Microbiota ("Normal Flora") (14.2)	Chap. 14
11	T 11/14	The Immune System: Innate Immunity (15.1)	Chap. 15
	R 11/16	The Immune System: Adaptive Immunity (16.1)	Chap. 16
12	T 11/21	Vaccination and Immunotherapy (17.6: pp. 553-556)	Chap. 17 (17.6)
	R 11/23	THANKSGIVING—No Class	
13	T 11/28	Antibiotic Therapy & Resistance (13.4)	Chap. 13 (13.4-13.8)
	R 11/30	Microbial Pathogenesis (18.1)	Chap. 18
14	T 12/5	Infections of the Skin, Eye (19.1: pp. 606-608)	Chap. 19
	R 12/7	Infections of the Internal Organs (lung, heart, blood, liver) (pp. 646-left 648; 682-685)	Chaps. 20, 21
15	T 12/12	Infections of the GI, Urinary, and Reproductive Tracts (22.1; 23.1)	Chaps. 22, 23
	R 12/14	Epidemiology: Tracking Disease (pp. 880-883)	Chap. 26

***Lecture Exams will be given during the lab period on Oct. 11 and Nov.13.**

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).

Tentative Lab schedule

Week	Day/Date	Lab exercise
1	W 9/6	Lab Intro; Scientific method (Handwashing Experiment)
2	M 9/11	Surface and Air Sampling
	W 9/13	The Microscope
3	M 9/18	Air and Surface Sampling; Aseptic Technique and Inoculation Methods
	W 9/20	Simple Staining and Cell Morphology
4	M 9/25	Quiz #1 ; The Gram Stain
	W 9/27	Capsule stain, Endospore Stain, Acid-fast stain
5	M 10/2	Motility
	W 10/4	Bacterial Nutrition and Growth Media
6	M 10/9	Oxygen and Growth
	W 10/11	EXAM I
7	M 10/16	Quiz #2 ; Environmental Parameters of Growth
	W 10/18	Quantitating Microbial Populations
8	M 10/23	Effects of Heat and Ultraviolet Light
	W 10/25	Chemical Control of Growth
9	M 10/30	Quiz #3 ; Chemotherapeutic Agent Testing; Antibiotic Resistance
	W 11/1	Biochemical Characterization and Differentiation of Bacteria
10	M 11/6	Complete Biochemical Tests; Medically Significant Bacteria: The Enterics;
	W 11/8	Separation & Identification of Enteric Unknowns
11	M 11/13	EXAM II ; Continue Unknowns (restreak)
	W 11/15	Medically Significant Bacteria: The Cocci; continue enteric unknowns (inoculate media)

12	M 11/20	Quiz #4 (covers through enterics); Complete Enteric unknown tests; Investigation of <i>Staphylococcus</i> from Skin; Microbial Flora of the Mouth
	W 11/22	Bacteriophage; <i>Staphylococcus</i> tests
13	M 11/27	Water Microbiology; Enteric Unknown Report Due
	W 11/29	Quiz #5; Soil Microbiology
14	M 12/4	Food Microbiology; <i>Staphylococcus</i> report due
	W 12/6	Lactic Acid Bacteria and Dairy Fermentation
15	M 12/11	Tracking Disease with ELISA; Finish Dairy Fermentation; Dilution Plating Exercise
	W 12/13	Quiz #6; Turn in dilution plating exercise; Lab Clean up and check out

Modifications may be made to this schedule if they benefit the class. Changes will be announced in advance.

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

FINAL EXAM: Tuesday, December 19, 8:00-10:00 AM. There are no exceptions unless student can document three exams scheduled on the same day.