

Microbiology for Health Sciences (BIOL 233)
University of Wisconsin – Stevens Point at Wausau and
University of Wisconsin – Stevens Point at Marshfield
Spring 2021, 4 Credits

Lecture Instructor and Wausau Lab Instructor:

Dr. Kristine Prah
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Marshfield Lab Instructor:

Dr. Terese Barta
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Lecture: 1:00PM – 1:50PM on Mondays and Wednesdays by Zoom

<https://uwsp.zoom.us/j/91354258564?pwd=REtCcU5FdUFIWklqcUtVTXIFZ0t6QT09>

Meeting ID: 913 5425 8564

Passcode: 5s533e

Laboratory: Asynchronous online activities in Canvas will be used for the laboratory component of the course (more information below and posted on Canvas).

Office hour links:

Dr. Prah: Virtual office hours 8:00-10:00 AM on Mondays and Thursdays, and other times by appointment

<https://uwsp.zoom.us/j/93894175052?pwd=aWd1WGRtSkI6cmErU3hMemNWaWZ2Zz09>

Meeting ID: 938 9417 5052

Passcode: 323443

Dr. Barta:

Virtual office hours by Zoom: Tuesdays 4-5 pm; Thursdays, 9-10 am; other times by appointment. Office hours are subject to change and any changes will be posted on Canvas and announced.

Please use my personal meeting room link (also posted in Canvas announcements):

<https://uwsp.zoom.us/j/4267592847>

Textbook: *Nester's Microbiology: A Human Perspective* (Ninth Edition) by Anderson, Salm, and Allen (published by McGraw Hill, ©2019). Additional readings which offer more information and additional perspectives will also be given.

Course Catalog Description

Morphology, physiology, classification, cultivation of bacteria and viruses, with emphasis on microbial diseases, epidemiology, and immunology. Recommended for nursing and dietetics majors. Does not fulfill requirements for the biology major or minor. Lecture, lab, and may also include demonstrations, discussion and field trips.

Prerequisites

BIOL 101, BIOL 110, BIOL 130, or BIOL 160; and either CHEM 101 or CHEM 105

Course Learning Objectives and Proficiencies

1. Students are able to apply course concepts and their knowledge to real life (health/medicine).
 - a. Students can explain how microbes help to promote health in a human.
 - b. Students are able to explain how some microbes contribute to disease.
 - c. Students can explain ways to control the growth of microorganisms.
 - d. Students can use the vocabulary of microbiology in new contexts.
 - e. Students can assess the validity of scientific reports in the news media.
2. Students appreciate the importance of microbes to the environment, to the food industry and to biotechnology.
 - a. Students can explain how microbes are used in the food industry and in biotechnology.
 - b. Students can explain the role microbes play in environmental nutrient cycling.
 - c. Students can also describe the connection that some plants and fungi have with bacteria.
3. Students will become familiar with techniques used in a microbiology laboratory or clinic and how they are useful in medical testing.
 - a. Students can think of new applications for lab techniques.
 - b. Students can interpret the results of a lab test and determine if the results make sense in a given context.
 - c. Students can determine the reason for unexpected results and make adjustments as necessary.
 - d. Students can design and carry out a well-controlled experiment.
 - e. Students are adept at using aseptic technique in the laboratory.
 - f. Students can describe lab results clearly, concisely and accurately.
4. Students appreciate the similarities and differences among microbial species.
 - a. Students can differentiate between different groups of microbes in terms of growth requirements, nutritional needs, cell structure and metabolism.
 - b. Students can explain the importance of each group of microbes (the microbes' role in health, disease, industry, and the environment).
 - c. Students can explain the metabolism and genetics of microorganisms.
5. Students are able to communicate effectively.
 - a. Students can prepare reports that are clear, concise and scientifically accurate.

Course Expectations

Students are expected to be present at all virtual lecture class sessions. Some discussion-based assignments will be done in some lecture meetings. So, unexcused class absences may negatively affect a student's course grade. Please discuss with your instructor in advance the reason for any absences which you feel should be excused, so that you can be given the opportunity to make up any in-class work that you will miss. The instructors and students are expected to show respect for everyone in the class. Textbook reading assignments should be completed before the designated class meeting time. Students should also complete online lab activities on time. Students are encouraged to discuss assignments together unless indicated otherwise, but the work that each student hands in should be in his or her own words. Examinations should be completed

independently. The policies found in chapter UWS 14 of the Wisconsin Administrative Code will be used in the case of suspected academic misconduct. For effective communication, students are expected to type and spell-check your work on assignments unless notified otherwise. Students are encouraged to daily check their student email account and Canvas as some class announcements and some handouts will be given using these technologies. Scores on assignments and examinations will be posted on Canvas, and an estimation of your course grade will be kept updated during the semester on Canvas.

Letter Grades

Percentage points will be converted to letter grades using the following table:

≥ 92% = A	72-77% = C
90-91% = A–	70-71% = C–
88-89% = B+	68-69% = D+
82-87% = B	60-67% = D
80-81% = B–	< 60 % = F
78-79% = C+	

Evaluation of Student Work

1) **Lecture Examinations (400 points)** There will be three lecture exams (scheduled on lecture period days). In addition, there will also be a comprehensive final exam. Point values on each of the exams are as follows:

Lecture Period Exam 1	100 points
Lecture Period Exam 2	100 points
Lecture Period Exam 3	100 points
<u>Comprehensive Final Exam</u>	<u>100 points</u>
Total	400 points

2) **Lecture Assignments (175 points)**

- a. **Pathogen Project:** Each student will make a presentation (PowerPoint presentation or Zoom recording), accompanied by a written paper, about a pathogen of their choice, after receiving approval of the topic from the lecture instructor. Each student will also comment on the presentations of four of their classmates. In preparation for this presentation, peer commenting, and paper, students should review the assignment guidelines that are posted on Canvas. The presentation, paper, and peer commenting are together worth 75 points.
- b. **Beneficial Microbes Poster:** Each student will also prepare a poster presentation about the benefits of microorganisms to humans. This assignment is worth 50 points. In preparation for this assignment students should review the assignment guidelines that are posted on Canvas.
- c. **Other Assignments:** Various problem sets and discussion assignments will be given and graded throughout the semester as homework for a total of 50 points. These assignments are meant to guide students through a review of some concepts and

learning strategies discussed presented online and in lecture class sessions, and they will give students an opportunity to apply what they are learning.

3) Laboratory Components (425 points)

The lab component of the course is based on virtual lab simulations provided by McGraw Hill Connect. Students will need to set up their Connect accounts (no cost, use code provided) during the first week of class. Weekly lab activities involve a video lab introduction, a background handout, two or more simulations, and a weekly review quiz. The labs are designed to take the equivalent amount of time as would a three to four hours of in-person lab sessions, not including study time. A lab schedule with specific week by week activities is posted on Canvas. The lab points are distributed as follows:

- a. Week 1 Introduction (Virtual Lab Tutorial)= 5 points for completion
- b. Weekly Connect Simulations or other lab exercises: 13 @20 points = 260 points
- c. Week 16 Lab exercise (lab report): 10 points
- d. Lab Quizzes (Five 30-point quizzes on three weeks of material) = 150 points

Please note: McGraw Hill is allowing students in the course to use the McGraw Hill Connect Labs at no cost this semester on a trial basis. McGraw Hill requests feedback on their virtual labs. A survey will be one of the assignments in week 15.

Schedule of Examinations and Quizzes

Dates and Topics of Lecture Examinations:

- Monday, February 22 (Lecture material covered January 25 through February 17)
- Wednesday, March 31 (Lecture material covered February 24 through March 29)
- Wednesday, April 28 (Lecture material covered April 5 through April 26)

Dates and Topics of Laboratory Quizzes:

- Thursday, February 18 (Lab material covered January 25 through February 12)
- Thursday, March 11 (Lab material covered February 15 through March 5)
- Thursday, April 8 (Lab material covered March 8 through April 2)
- Thursday, April 29 (Lab material covered April 5 through April 23)
- Friday, May 14 (Lab material covered April 26 through May 14)

Date and Topics of Final Examination:

- Monday, May 17 (All lecture material covered throughout the entire semester)

Academic Support Resources

UWSP students have academic support resources available to them for FREE. The Tutoring-Learning Center (TLC) offers tutoring services including one-on-one and drop-in tutoring services.

The tutors are UWSP students who have done well in their classes and who are here to share their successful study habits and biology content knowledge to help others succeed.

Discussing biological concepts and processes together clarifies and solidifies knowledge, and the tutors are eager to study with you. The TLC will offer two main forms of biology tutoring during Spring 2021:

- **Drop-In Tutoring.** Tutors are waiting in a Zoom room where students can “drop-in” for assistance. No appointment or registration is required and attendance is flexible. The

schedule and Zoom links can be found here:

<http://www.uwsp.edu/tlc/Pages/dropInTutoring.aspx>.

- **One-on-One Tutoring.** Tutors are available for weekly, recurring appointments. Weekly attendance is required, as this service is designed for long-term assistance. To sign up, students can submit a request form through the TLC webpage: <https://www.uwsp.edu/tlc/Pages/Mathandscischedules.aspx>. Appointments are made based upon tutor availability – the TLC cannot guarantee that every student will be matched with a tutor. One-on-One Tutoring is **FREE** for all UWSP students during Spring 2021!

For additional information please contact:

- *Marshfield* – Marie Janz, the Academic Success Coordinator, via email mjanz@uwsp.edu or phone 715-898-6036.
- *Wausau* – Maysee Cha, the Academic Success Coordinator, via email mcha@uwsp.edu or phone 715-261-6148.

Care Team

The University of Wisconsin-Stevens Point is committed to the safety and success of all students. The Office of the Dean of Students supports the campus community by reaching out and providing resources in areas where a student may be struggling or experiencing barriers to their success. Faculty and staff are asked to be proactive, supportive, and involved in facilitating the success of our students through early detection, reporting, and intervention. As your instructors, we may contact the Office of the Dean of Students if we sense you are in need of additional support which individually we may not be able to provide. You may also share a concern if you or another member of our campus community needs support, is distressed, or exhibits concerning behavior that is interfering with the academic or personal success or the safety of others, by reporting here:

<https://www.uwsp.edu/dos/Pages/Anonymous-Report.aspx>.

Title IX

UW-Stevens Point is committed to fostering a safe, productive learning environment. Title IX and institutional policy prohibit discrimination on the basis of sex, which includes harassment, domestic and dating violence, sexual assault, and stalking. In the event that you choose to disclose information about having survived sexual violence, including harassment, rape, sexual assault, dating violence, domestic violence, or stalking, and specify that this violence occurred while a student at UWSP, federal and state laws mandate that we, as your instructor, notify the Title IX Coordinator/Office of the Dean of Students. Please see the information on the Dean of Students webpage for information on making confidential reports of misconduct or interpersonal violence, as well as campus and community resources available to students. Dean of Students:

<https://www.uwsp.edu/DOS/sexualassault> Title IX page:

<https://www.uwsp.edu/hr/Pages/Affirmative%20Action/Title-IX.aspx>

Disability and Accommodations

In accordance with [federal law and UW System policies](#), UWSP strives to make all learning experiences as accessible as possible. If you need accommodations for a disability (including mental health, chronic or temporary medical conditions), please visit with the

[Disability and Assistive Technology Center](#) to determine reasonable accommodations and notify faculty. After notification, please discuss your accommodations with your instructor(s) so that they may be implemented in a timely fashion. **DATC contact info:** datctr@uwsp.edu; 715/346-3365; 609 Albertson Hall, 900 Reserve Street

Academic Integrity

Academic Integrity is an expectation of each UW-Stevens Point student. Campus community members are responsible for fostering and upholding an environment in which student learning is fair, just, and honest. Through your studies as a student, it is essential to exhibit the highest level of personal honesty and respect for the intellectual property of others. Academic misconduct is unacceptable. It compromises and disrespects the integrity of our university and those who study here. To maintain academic integrity, a student must only claim work which is the authentic work solely of their own, providing correct citations and credit to others as needed. Cheating, fabrication, plagiarism, unauthorized collaboration, and/or helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. Failure to understand what constitutes academic misconduct does not exempt responsibility from engaging in it. For more information on UWS chapter 14 visit: <https://www.uwsp.edu/dos/Pages/Student-Conduct.aspx>

Recording of Lectures

Zoom recordings of the class lecture periods will be made and posted on our class Canvas site.

Absences and Tardiness

You are responsible for material covered in all class sessions, including class sessions that you miss partially or entirely. If you miss a lecture session, please watch the Zoom recording. You are responsible for material covered in all class sessions, including class sessions that you miss. Please contact your lecture instructor in-advance about making up in-class work that you will miss. Assignments must be handed in on time (this includes lecture and laboratory assignments that were given or due in your absence) unless your instructor has given you permission beforehand to hand in the assignment late.

Make-Up Exams

Notify the lecture instructor in advance if you are unable to complete a lecture examination on the scheduled date. An acceptable reason must be given for needing to reschedule the testing time. Your instructor will determine if the reason for rescheduling the examination is acceptable. Make-up examinations must be taken within 48 hours of the original test date unless unusual circumstances exist. If you have a reason to reschedule the final exam, please notify your instructor by May 10.

Policy on Late Lecture Work

Hand in lecture assignments on time. If you are unable to hand in a lecture assignment on time, notify the instructor prior to the time it is due. You must have an acceptable reason for handing in an assignment late. You will not be allowed to make up in-class discussion assignments unless you have an acceptable reason for missing the class session. Your instructor will determine if an absence is excused. Failure to hand in assignments on time may delay the grading of your work. You may lose some or all of the points from a late

assignment if your instructor has not given you permission to hand in the assignment late. The standard late penalty will be a loss of 10% of the points per day.

Policies on Late Lab Work

Lab simulations, assignments, and weekly review quizzes are due each Friday of each week by 11:59 pm (with the exception of the week of April 26 because this is an exam week). McGraw Hill Connect Lab simulations and associated quizzes must be submitted by the due date or you will receive a zero for that week. If you become seriously ill (for example, with COVID-19) or have an unavoidable emergency that interferes with timely completion of lab components, please contact your instructor as soon as possible.

Participation in Co- and Extracurricular Activities

You are encouraged to participate in co- and extracurricular activities as you are interested and able. You are responsible for material covered in class sessions that you miss because of participation in co- or extracurricular activities. You are also responsible for assignments given and/or due during class sessions that you miss because of such activities. These assignments must be handed in on time. If you must miss an exam because of participation in co- or extracurricular activities, you are responsible for notifying the instructor in advance of the exam. The terms of make-up exams and late assignments as stated in above sections of this syllabus apply.

Proper Use of Course Materials

Course materials and recordings for BIOL 233 are protected intellectual property at UW-Stevens Point. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. Students may not copy or share course materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

Incomplete Grade

If you are unable to complete your work in a course due to extenuating circumstances or if you need to extend your research or performance beyond the normal limits of a term, you may ask for a temporary grade of "incomplete" in the course. An "incomplete" should be reserved for the completion of a definable amount of work (for example, one term paper or one exam) that occurs near the end of the semester. The "incomplete" gives you more time to complete a limited amount of missing work defined by your instructor.

Navigate Student App

For those of you looking to connect with other students in the course for study groups, the Navigate student app has a feature called **Study Buddies**. Here, you can find a list of other students who have indicated they are interested in forming a study group. If you are the first, you will be sent notifications when other students join. You can select who you want

to connect with and can leave the group at any time. Additionally, the Navigate student app can help you with the following at UWSP:

- Schedule appointments
- Remove Holds from your account
- Find important resources
- Learn of key dates and important to-dos on campus
- View your class schedule

Accessing the Navigate student app: For students who have already downloaded the Navigate smart phone app, choose the **Study Buddies** icon, and a full list of your courses will appear. Each section shows how many buddies are in the group. The free Navigate app is available to download from any mobile operating system. For students without a smart device, a desktop version of the app is available here: <https://uwsp.navigate.eab.com/app>

Lecture Schedule (Subject to Reasonable Change) with Textbook References

January 25	Course introduction; history and scope of microbiology; overview of bacterial taxonomy (Chapter 1)
January 27	Biological chemistry and molecules – water, proteins, carbohydrates, nucleic acids, and lipids (Chapter 2)
February 1	Microscopy and staining; bacterial morphology (Begin chapter 3)
February 3	Microbial cell structure/composition – bacteria and eukaryotes (Finish chapter 3)
February 8	Bacterial growth – lab techniques, growth curves, factors affecting growth, measurement of growth (Chapter 4)
February 10	Bacterial growth (Chapter 5)
February 15	Begin metabolism – enzymes, glycolysis, pentose phosphate pathway, transition step, and tricarboxylic acid cycle (Begin chapter 6)
February 17	Continue metabolism –the electron transport chain, other sources of energy fermentation, overview of photosynthesis and carbon fixation (Finish chapter 6)
February 22	Lecture Exam 1 (Online, two-hour time limit)
February 24	Characteristics of DNA and RNA, DNA replication, transcription and translation (Begin chapter 7)
March 1	Regulation of gene expression, environmental effects on gene expression, natural selection, and genomics (Finish chapter 7)
March 3	Genetic mutations, repair of mutations, mutant selection
March 8	Transformation; transduction; bacterial conjugation; plasmids transposable elements; genomic islands (Chapter 8)
March 10	Genetic engineering of microorganisms; applications of genetic engineering (Begin Chapter 9)
March 15	Microorganisms and biotechnology (Finish Chapter 9)
March 17	Identification and classification of prokaryotes – taxonomy, genotypic and phenotypic characteristics (Begin Chapter 10)
March 29	Identification and classification of prokaryotes – strain identification (Finish Chapter 10)

March 31	Lecture Exam 2 (Online, two-hour time limit)
April 5	The diversity of prokaryotes (Chapter 11)
April 7	The diversity of eukaryotes, especially microbial eukaryotes and those that transmit pathogenic microbes to humans (Chapter 12)
	Viruses, viroids, and prions (Chapter 13)
April 12	First-line defenses of the human immune system, cells of the immune system; complement system, phagocytosis, the inflammatory response, and fever (Chapter 14)
April 14	Lymphocytes, antigens, antibodies, natural killer cells, the lymphatic System (Chapter 15)
April 19	Host-microbe interactions – health, disease, probiotics and prebiotics, how microbes and viruses can cause disease (Chapter 16)
April 21	Hypersensitivities, transplant rejection, autoimmunity, immunodeficiency (Chapter 17)
April 26	Vaccines, immunization, the CDC vaccination schedule, immunological testing (Chapter 18)
April 28	Lecture Exam 3 (Online, two-hour time limit)
May 3	Epidemiology – terminology, methods of study, surveillance, trends, nosocomial infections (Chapter 19)
May 5	Tuberculosis (Pages 551-556); Influenza (Pages 558-561); HIV/AIDS (Pages 750-758)
	Antimicrobial drugs and antibiotic resistance (Chapter 20)
May 10	Microbial ecology; Environmental microbiology (Chapters 28 and 29)
May 12	Microbiology of food production and food spoilage (Chapter 30)
May 17	Final Exam (Online, Comprehensive)
	You will have three hours to complete the exam.

BIOL 233 Tentative Lab schedule
(Subject to reasonable change with notification)

Labs are McGraw Hill Connect Virtual Labs unless otherwise specified (**)

Week	Topic	Lab pts
1 (1/25)	Lab Introduction, Virtual Lab Tutorial	5 pts
2 (2/1)	Lab Safety and Handwashing (2 simulations) Sampling from surfaces	20 pts
3 (2/8)	Operation of a Brightfield Microscope, Use of oil immersion Survey of Microorganisms**	20 pts
4 (2/15)	Lab Quiz 1 on weeks 1-3 (due 2/18) Smear Preparation and Introduction to Staining The Gram Stain	20 pts
5 (2/22)	Staining, continued: acid-fast stain, endospore stain, capsule stain	20 pts
6 (3/1)	Aseptic Technique & Isolation methods, part 1 (transfers to media; isolation streak plate)	20 pts
7 (3/8)	Lab Quiz 2 on weeks 4-6 (due 3/11) Quantitation of bacteria: serial dilution plating and optical density; Most Probable Number Method** (post lab homework)	20 pts
8 (3/15)	Bacterial Nutrition and Growth Media** Selective Media** Post lab report & review quiz	20 pts
9 (3/22)	SPRING BREAK (3/22-3/26)	
10 (3/29)	Environmental factors affecting microbial growth: oxygen, temperature, pH, osmotic pressure	20 pts
11 (4/5)	Lab Quiz 3 on weeks 7-10 (due 4/8) Control of Microbial Growth: Ultraviolet light Control of Microbial Growth: Antiseptics/Disinfectants	20 pts
12 (4/12)	Control of Microbial Growth: Antibiotic sensitivity (Kirby Bauer test) Antibiotic Resistance in Bacteria	20 pts

13 (4/19)	Medical Microbiology: Identification of unknown bacteria from a patient (choose 2 exercises, 10 pts each)	20 pts
14 (4/26)	Lab Quiz 4 on weeks 11-13 (due 4/29) Bacterial Genetics: Transformation and PCR (due <u>Mon 5/3</u>)	20 pts
15 (5/3)	Epidemiology CDC's "Solve the Outbreak"*** with post-lab review quiz (20 points total); McGraw Hill Survey (5 points)	25 pts
16 (5/10)	Lab Quiz 5 on weeks 14-16 (due Friday 5/14) Water and Food Microbiology** (post lab report, 10 pts)	10 pts

Note: Lab activities are worth 20 points per week, except for week 1 and week 16. The number of simulations each week may vary but the lab curriculum is designed to have a *comparable* amount of work each week, equivalent to three to four hours of in-person lab.

All lab simulations and post-lab review quizzes are due by Friday each week, except for the week of April 26. Because there is a lecture exam and lab quiz that week (*sorry, unavoidable!*), the deadline for completing the labs is noon, Monday (5/3). Nevertheless, it is recommended you should start the lab activities before Friday that week.