Microbiology for Health Sciences (BIOL 233)
University of Wisconsin–Stevens Point at Marshfield
Spring 2022, 4 Credits

Lecture Instructor:
Dr. Kristine Prahl
Office: Room 285-B in Wausau
E-mail: kprahl@uwsp.edu
Office Hours: 8:00AM to 10:00AM on Mondays and Wednesdays in room 285-B in Wausau or by Zoom (https://wisconsin-edu.zoom.us/j/9042747100).
Other times by appointment.

Lab Instructor:
Dr. Paul Whitaker
Office: Room 285-C in Wausau
E-mail: pwhitake@uwsp.edu
Office Hours: 3:00PM to 4:00PM on Tuesdays in lab room 526 in Marshfield
Other times via Zoom by appointment.

Lecture: 1:00PM – 1:50PM on Mondays, Wednesdays and Fridays in room 135 in Marshfield

Laboratory: 12:00PM – 2:50PM on Tuesdays in room 526 in Marshfield

Textbook: *Nester's Microbiology: A Human Perspective* 10th edition (2022), McGraw Hill
By Denise Anderson and Sarah Salm and Mira Beins and Eugene Nester. ISBN13: 9781260735505
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 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. Respect should be shown for property of the university. Laboratory safety guidelines will be given to students and must be followed completely. The instructors and students are expected to show respect for everyone in the class. Avoid activities during class that would distract others such as phone use and side conversations. Textbook reading assignments should be completed before the designated class meeting time. Laboratory safety guidelines will be given to students and must be followed completely. Students should come to the labs prepared, having read the introductory material (if any) before the designated 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 during class at 1:00 PM). In addition, there will also be a comprehensive, in-person final exam on May 18 at 2:45 PM. All four of these exams are closed-book and closed-notes. 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
Comprehensive Final Exam	100 points
Total	400 points

2) **Lecture and Lab Assignments (600 points)**

a. **Pathogen Project (100 points)**: Each student will make a PowerPoint presentation, 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 the presentation, peer commenting, and paper, students should review the assignment guidelines that are posted on Canvas.

b. **Beneficial Microbes Poster (50 points)**: Each student will prepare a poster presentation about the benefits of microorganisms to humans. In preparation for this assignment students should review the assignment guidelines that are posted on Canvas.

c. **Other Assignments (450 points total)**: Various problem sets, writing assignments, lab assignments and discussion assignments will be given and graded throughout the semester to be done in lecture and in lab and as homework. These assignments are meant to guide students through a review of some concepts and learning strategies discussed presented in class, and they will give students an opportunity to apply what they are learning. Students are required to participate in the lab exercises prior to submitting the lab-associated assignments. Many of the lab exercises will involve hands-on activities.

Dates and Topics of Examinations

- Wednesday, February 23 (Lecture material covered January 24 through February 21)
- Wednesday, March 30 (Lecture material covered February 25 through March 28)
- Wednesday, April 27 (Lecture material covered April 1 through April 25)
- Wednesday, May 18 (All lecture material covered throughout the entire semester)

Laboratory Safety

Closed-toe shoes that cover the top of the foot are required for participation in all of the laboratory sessions this semester. You must also wear long pants or leg coverings during lab classes. Beginning on February 1, students are required to have chemical splash safety goggles for use in some of the laboratory sessions this semester. You may bring your own goggles or use goggles available in the lab room. You will not be able to participate in the lab class without having appropriate shoes, functional clothing that completely covers legs and, when required, goggles.

Lab coats are required for most of the laboratory session this semester. Students may bring their own or use a lab coat available in the lab room. The coats must be long-sleeved and cover the entire torso of the body. Personal lab coats should be kept in the lab room throughout the semester and must be sterilized before being removed from the lab room at the end of the semester.

Students who are pregnant, may become pregnant, are immune-compromised, care for someone who is immune-compromised, or live with someone who is immune-compromised should consult with their physician about working with microorganisms. If your physician suggests alternative accommodations for working in the microbiology laboratory, please let your laboratory instructor know. The following is a list of microorganisms/samples that you may be working with this semester:

Aquaspirillium serpens
Bacillus megaterium
Clostridium sporogenes
Escherichia coli
Halobacterium salinarium
Kocuria rhizophila
Lactobacillus acidophilus
Yogurt
Lactococcus lactis
Pond water
Pseudomonas fluorescens
Rhodospirillum rubrum
Sauerkraut juice
Serratia marcescens D1
Vibrio fischeri

Face Coverings

At all UW-Stevens Point campus locations, the wearing of face coverings is mandatory in all buildings, including classrooms, laboratories, studios, and other instructional spaces. Any student with a condition that impacts their use of a face covering should contact the Disability and Assistive Technology Center to discuss accommodations in classes. Please note that unless everyone is wearing a face covering, in-person classes cannot take place. This is university policy and not up to the discretion of individual instructors. Failure to adhere to this requirement could result in formal withdrawal from the course.

Health Guidance

1. Please monitor your own health each day. If you are not feeling well, do not come to class; email your instructor. As with any type of absence, students are expected to communicate their need to be absent and complete the course requirements as outlined in the syllabus.
2. Students and employees who are not fully vaccinated must use this screening tool each day before coming to campus.
3. Wash your hands or use appropriate hand sanitizer regularly and avoid touching your face.
4. Please maintain these same healthy practices outside the classroom.

Tutoring-Learning Center (TLC)

The Tutoring-Learning Center promotes and supports the academic environment by providing free, confidential, student-centered academic support. The TLC offers one-on-one tutoring services via Zoom, and one-on-one academic coaching appointments.

Academic Coaching is available through the TLC. The Academic Coach partners with students to evaluate strengths and weaknesses, identify organizational skills and together work to develop tools to help students achieve academic success. Faculty can refer students, or students can seek help on their own.

For additional information please visit the website or contact Laurie Petri, Room 404B, email lpetri@uwsp.edu or phone 389-6512.

DUO Center

The DUO Center, located in room 107 on the Marshfield campus, is open to first-generation students, Pell Grant-eligible students, and students with disabilities on the Marshfield and Wausau campuses. It provides students with access to professional tutors in Math and writing. DUO staff meet one-on-one with students to answer questions, prepare for assignments/exams/papers, and simply as a resource to students. Students can meet with the tutor/s regularly or on an as-needed basis – in other words, they support individual students in individualized ways. To learn more about DUO, contact your adviser or stop by the DUO Center.

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

Equal Access for Students with Disabilities

The University has a legal responsibility to provide accommodations and program access as mandated by Section 54 and the Americans with Disabilities Act (ADA). The university's philosophy is to not only provide what is mandated but also convey its genuine concern for one's total well-being. If accommodations are needed, please contact the instructor as well as the Disability and Assistive Technology Center (DATC), located on the Stevens Point campus. Students can also pick up an application for accommodations packet in the Solution Center on the Marshfield campus. DATC contact information:
(715) 346-3365 (Voice)
(715) 346-3362 (TDD only)
or via email at datctr@uwsp.edu

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.

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 for the assignment per day.

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 for BIOL 233 are protected intellectual property at UW-Stevens Point. Students in this course may use the materials 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 Notification)

January 24	Course introduction; history and scope of microbiology (Begin chapter 1)
January 26	Overview of bacterial taxonomy (Finish chapter 1)
January 28	Biological chemistry and molecules – water, proteins, carbohydrates, nucleic acids, and lipids (Chapter 2)
January 31	Microscopy and staining; bacterial morphology (Begin chapter 3)
February 2	Microbial cell structure/composition of bacteria (Continue chapter 3)
February 4	Microbial cell structure/composition of eukaryotes (Finish chapter 3)
February 7	Bacterial growth – lab techniques, growth curves (Begin chapter 4)
February 9	Factors affecting growth, measurement of growth (Finish chapter 4)
February 11	Control of bacterial growth (Chapter 5)
February 14	Begin metabolism – enzymes, glycolysis, pentose phosphate pathway, transition step, and tricarboxylic acid cycle (Begin chapter 6)
February 16	Continue metabolism –the electron transport chain, other sources of energy, fermentation (Continue chapter 6)
February 18	Continue metabolism – Overview of photosynthesis (Continue chapter 6)
February 21	Carbon fixation (Finish chapter 6)

February 23	**Lecture Exam 1**
February 25	Characteristics of DNA and RNA; DNA replication (Begin chapter 7)
February 28	Transcription and translation (Continue chapter 7)
March 2	Regulation of gene expression, environmental effects on gene expression, natural selection, and genomics (Finish chapter 7)
March 4	Genetic mutations, repair of mutations, mutant selection (Begin chapter 8)
March 7	Transformation; transduction; bacterial conjugation; plasmids transposable elements; genomic islands (Finish chapter 8)
March 9	Genetic engineering of microorganisms (Begin Chapter 9)
March 11	Applications of genetic engineering (Begin Chapter 9)
March 14	Microorganisms and biotechnology (Finish Chapter 9)
March 16	Identification and classification of prokaryotes – taxonomy (Begin Chapter 10)
March 18	Identification and classification of prokaryotes – genotypic and phenotypic characteristics (Continue chapter 10)
March 28	Identification and classification of prokaryotes – strain identification (Finish Chapter 10)
March 30	**Lecture Exam 2**
April 1	The diversity of prokaryotes (Begin chapter 11)
April 4	The diversity of prokaryotes, continued (Finish chapter 11)
April 6	The diversity of eukaryotes, especially microbial eukaryotes and those that transmit pathogenic microbes to humans (Chapter 12)
April 8	Viruses, viroids, and prions (Chapter 13)
April 11	First-line defenses of the human immune system, cells of the immune system; complement system, phagocytosis, the inflammatory response, and fever (Chapter 14)
April 13	Lymphocytes, antigens, antibodies, natural killer cells, the lymphatic system (Chapter 15)
April 15	Host-microbe interactions – health, disease, probiotics and prebiotics, how microbes and viruses can cause disease (Chapter 16)
April 18	Hypersensitivities (Begin chapter 17)
April 20	Transplant rejection, autoimmunity, immunodeficiency (Finish chapter 17)
April 22	Vaccines, immunity, CDC vaccination schedule (Begin chapter 18)
April 25	**I**mmunological testing (Finish chapter 18)
April 27	**Lecture Exam 3**
April 29	Epidemiology – terminology, methods of study, surveillance, trends, nosocomial infections (Chapter 19)
May 2	Antimicrobial drugs and antibiotic resistance (Chapter 20)
May 4	Student Pathogen Presentations
May 6	Finish Student Pathogen Presentations; Tuberculosis (Pages 551-556); Influenza (Pages 558-561); HIV/AIDS (Pages 750-758)
May 9	Microbial ecology (Chapters 28)
May 11	Environmental microbiology (Chapter 29)
May 13	Microbiology of food production and food spoilage (Chapter 30)
May 18	**Final Exam** (Comprehensive; Note the start time – 2:45 PM)

Laboratory Schedule (Subject to Reasonable Change with Notification)

January 25	Laboratory safety; Ubiquity of microorganisms; Making media
February 1	Aseptic technique; Microscopy and scale of the microbial world
February 8	Simple staining and Gram staining
February 15	Negative staining and endospore staining
February 22	Evaluation of growth media; Isolation techniques and selective media
March 1	Anaerobic growth; Cell concentration estimations
March 8	Effects of temperature, osmotic pressure and pH on bacterial growth
March 15	Metabolic tests; Snyder agar test; Blood agar test
March 29	Survey of eukaryotes
April 5	Simulated epidemic with candy; CDC's "Solve the Outbreak"
April 12	Antibiotic sensitivity of microorganisms; Work on pathogen project
April 19	Most probable number tests
April 26	Simple staining of microorganisms in food; Continue most probable number tests
May 3	Begin microorganisms of the soil
May 10	Finish microorganisms of the soil; Wrap up beneficial bacteria poster assignment