

BIOL 812: Microbial Diversity

Department of Biology, University of Nebraska at Kearney

Term: Fall 2023

Course Credits: 3

Course Delivery: Online - Asynchronous

Instructor

Dr. Gregory J. Pec, UNK Department of Biology, pecg@unk.edu, office: 308.865.8410

Office hours (zoom link available in Canvas): Mondays 10 AM – 12 PM, Wednesdays 12 PM – 1 PM and Fridays 10 AM – 12 PM Central Time, or by appointment.

Please take advantage of office hours to check-in, ask questions, or follow-up on anything you would like to understand better. Email should be used judiciously to address questions pertaining to course administration/scheduling or urgent matters. I respond to messages as quickly as I can, generally within 24-48 hours. Direct issues related to the course content should be posted to the Canvas forum described below.

Course Description

Microbes are the most abundant and diverse organisms on Earth. Collectively, they play critical roles in biogeochemical cycling, human health, and food production. This course will explore the evolutionary and ecological processes that generate and maintain microbial diversity. Students will also be exposed to molecular and bioinformatic approaches that are used to study microorganisms in a variety of habitats, including freshwater, marine and terrestrial. Per the [UNK Graduate Course Catalog](#).

Course Learning Objectives

This course will introduce the range of biological diversity in the microbial world and provide an understanding of the importance of microorganisms beyond those of medical importance. In addition, this course will introduce students to the tools used to identify and characterize microorganisms.

Important University Dates

- First day of the session: October 18, 2023

- Last day of the session: December 14, 2023
- See the [UNK Academic Calendar](#) for other important University dates

Recommended Texts and Materials

Required Text: Willey, Joanne. Prescott's Microbiology. Twelfth Edition. 2022. ISBN: 9781264088393.

Readings will be assigned from the textbook to complement the lectures and discussions. If you have a previous version of this textbook, please let me know as you may be able to use it in lieu of the latest version.

Required Technology

- As an online course, access to an up-to-date computer and Canvas several times a week is required (checking in daily is encouraged).
- An updated PDF reader will also be needed to read course materials.
- You may need to use software, such as Microsoft Word, Excel, or PowerPoint or another equivalent.
- Microsoft365 software is available to UNK students for free download.
- Ability to use search engines (for example, [Google ScholarLinks to an external site.](#) or [the Calvin Library search engine](#)) to locate scholarly works is expected of graduate students. If you are not already comfortable with this, I encourage you to reach out to me or the [Natural Sciences Librarian](#) at Calvin Library for assistance.
- For issues with Canvas or other technologies associated with your university account, please contact the [University technology help desk](#).

Course Organization

Canvas

For this class we will use an online course management system called Canvas. Course information, updates, and related information, etc. will be posted here. I have also created a forum in Canvas for asking/answering questions about course information.

Participation

The more students are engaged in a course, the more they tend to get out of it. I encourage you to spend at least a little time each day with course material or activities though I recognize this is not always possible.

Communication

Please check course announcements in Canvas frequently. This the primary way I will communicate. Please feel free to reach out to me at any time via Canvas messages, email, or office phone. I will respond as quickly as possible, usually within 24-48 hours.

Emails sent after 3 pm (CST) on Fridays will be answered by the following Monday. If sending an email or leaving a voicemail, please be sure to include BIOL 812 in the subject (email) or message (voicemail) so I can prioritize responding to it.

Course Structure and Assessment

All work is due by 11:59 PM Central Time on the date listed in Canvas and on the course schedule, unless otherwise indicated. This course consists of recorded information sessions, reading assignments, and online discussion boards. All materials for each week will be posted on Canvas. This is not a self-paced course. You will be expected to keep up with the pace of the course, and the course structure is designed to help with this. If this is your first distance class, you will find that these classes can be fast paced. Understandably, everyone in this class has several commitments other than this class. Nonetheless, as a student who has registered for this class, it is your full responsibility to ensure that you can meet the requirements and commit the needed time for this course. Students are responsible for all material covered, even for assignments that are missed. If you start to fall behind, it may be difficult to catch up. Please do not hesitate to contact me.

Information Sessions: Audio/video information sessions, accompanying presentations, and supplementary resources will be posted on Tuesdays to Canvas.

Assignments:

Discussion Boards (D): Discussion boards will begin on Tuesdays and run through to Monday of the following week. Students will be expected to respond to the discussion question(s) and to other students' comments. This will allow us to talk about the information sessions and answer any questions that students might have. There will be a total of 7 weeks of discussion, each week being worth 10 points (70 points total). Participation marks will be based on the following criteria:

- For the initial post, you will reply to the question(s) posted by Friday (5 points).
- The second part of the assignment is to respond to another of your classmates' postings by expanding on what they have written. These responses are due by the following Monday (5 points).

Further details will be provided for each discussion board assignment. In addition to this weekly mechanism for student participation, please become familiar with all other such policies on attendance found in the [University Graduate catalog](#).

Papers (P): You will be assigned two paper topics. Each paper will be 2-3 pages in length and worth 25 points each (50 points total). These will be assigned early in the semester and will cover material that we will have been discussing in lecture. Further details will be provided for each paper topic assignment.

Short-answer follow-ups (SA): This assignment (100 points) will test your understanding of course material, focusing on synthesis of information (i.e., big picture/important concepts). This will be an open resource and an on-going assignment, which means that you will have access to the questions early in the semester. Further details will be provided for this assignment.

In addition to the core material, this course is designed to help improve your critical-thinking skills. As reading and understanding scientific information is critical to the way science, in general, works, my hope is that following this assignment, you are better able to integrate fundamental scientific knowledge and communicate those scientific concepts and analytical arguments clearly and concisely. This assignment must be submitted as a .docx or pdf file format through the Canvas Turnitin function.

Basis for final grade

Assessment	Points
Discussions (7 @ 10 points)	70
Papers (2 @ 25 points each)	50
Short-answer follow-ups (1 @ 100 points)	100
Total	220

Grades will be assigned using the standard grading scale for the Department of Biology, as follows:

A (93-100%), A- (90-92%), B+ (88-89%), B (83-87%), B- (80-82%), C+ (78-79%), C (73-77%), C- (70-72%), D+ (68-69%), D (63-67%), D- (60-62%), and F (below 60%).

Course Policies and Resources

I take my role as your instructor very seriously; I care about how well you do in this course and that you have a challenging and rewarding experience. It is my commitment to you to respond individually to the work you submit in this class and to return your work promptly.

Grading Policy

Scores for each assignment will be posted on the course Canvas page. If you think there was a grading error or do not understand the feedback you receive on graded work,

please contact me as soon as possible. If you would like me to regrade your work, requests should be made within three days after the graded work has been returned to you. Regrade requests may result in a lower grade.

Late Work Policy

As a student enrolled in this course, one of your responsibilities is to submit course work on time. With that said, I recognize there may be times when you are unable to complete or submit these tasks by their due dates. To accommodate this, late assignments will be accepted up to 3 days late. If more than 3 days late, the submission will not be accepted and a grade of 0 (zero) will be recorded for that assignment. Course work will not be accepted late unless prior arrangements have been made due to documented professional or extenuating personal circumstances (e.g., family emergency, participation in university-sanctioned activities, religious observation, etc.). Please contact me as soon as possible to discuss alternative arrangements.

All students at the University of Nebraska Kearney should be aware of the following university-wide course policies and resources.

Attendance Policy

Your instructor may have indicated on their syllabus an attendance policy specific to their class. If so, that is the policy with which you must comply. If no other policy is stated, the University-wide attendance policy will apply.

[Undergraduate Student Attendance Policy](#)

[Graduate Student Attendance Policy](#)

Academic Honesty Policy

Academic honesty is essential to the existence and integrity of an institution of higher education. The responsibility for maintaining that integrity is shared by all members of the academic community. To further serve this end, the University of Nebraska at Kearney has a policy relating to academic integrity.

[Undergraduate Academic Integrity Policy](#)

[Graduate Academic Integrity Policy](#)

Finals Week Policy

The final exam will be administered in the time period scheduled during finals week in accordance with University policy ([Final Exam Schedule](#)). More information about UNK's Finals Week Policy, including when it is appropriate to ask for special accommodations to move a course's final exam, can be found here: [Finals Week Policy](#).

Reporting Student Sexual Harassment, Sexual Violence or Sexual Assault

Reporting allegations of rape, domestic violence, dating violence, sexual assault, sexual harassment, and stalking enables the University to promptly provide support to the impacted student(s), and to take appropriate action to prevent a recurrence of such sexual misconduct and protect the campus community. Confidentiality will be respected to the greatest degree possible. Any student who believes they may be the victim of sexual misconduct is encouraged to report to one or more of the following resources:

- **Local Domestic Violence, Sexual Assault Advocacy Agency** 308-237-2599
- **Campus Police (or Security)** 308-865-8911
- **Title IX Coordinator** 308-865-8655

Retaliation against the student making the report, whether by students or University employees, will not be tolerated.

Students with Disabilities

It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students with documented disabilities. To receive accommodation services for a disability, students must be registered with the UNK Disabilities Services for Students (DSS) office, 175 Memorial Student Affairs Building, 308-865-8214 or by email unkdso@unk.edu

Students Who are Pregnant

It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students who are pregnant. To receive accommodation services due to pregnancy, students must contact the Student Health office at 308.865.8218. The following links provide information for students and faculty regarding pregnancy rights. [https://thepregnantscholar.org/title-ix-basics/Links to an external site.](https://thepregnantscholar.org/title-ix-basics/Links%20to%20an%20external%20site)
[https://nwlc.org/resource/faq-pregnant-and-parenting-college-graduate-students-rights/Links to an external site.](https://nwlc.org/resource/faq-pregnant-and-parenting-college-graduate-students-rights/Links%20to%20an%20external%20site)

UNK Statement of Diversity & Inclusion

UNK stands in solidarity and unity with our students of color, our Latinx and international students, our LGBTQIA+ students and students from other marginalized groups in opposition to racism and prejudice in any form, wherever it may exist. It is the job of institutions of higher education, indeed their duty, to provide a haven for the safe and meaningful exchange of ideas and to support peaceful disagreement and discussion. In our classes, we strive to maintain a positive learning environment based upon open communication and mutual respect. UNK does not discriminate on the basis of race, color, national origin, age, religion, sex, gender, sexual orientation, disability or political affiliation. Respect for the diversity of our backgrounds and varied life experiences is essential to learning from our similarities as well as our differences. The following link provides resources and other information regarding D&I: <https://www.unk.edu/about/equity-access-diversity.php>

Distribution of course materials: Audio or video recording, digital or otherwise, of lectures, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructors or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s). Any further use or dissemination of this material may be in violation of Federal copyright law and University sanctions including failure in the course.

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced on the course Canvas page.

Tentative Fall 2023 Course Schedule

All work due by 11:59PM CT unless otherwise indicated. Required content not listed here may be provided in Canvas.

Week	Video Lecture	Topic	Recommended Readings	Assignment
		The diversity of the microbial world		
1	1	Introduction & what is microbial diversity?	Ch.1	Video introductions
1	2	Microbial taxonomy and the evolution of diversity	Ch.19	Discussion board I
2	3 & 4	Mechanisms of genetic variation	Ch.16	
2	5	Archaea	Ch.20	Discussion board II
3	6 – 9	Introduction to Bacteria Non-proteobacterial gram-negative bacteria;	Ch.21	
4	10 - 12	Proteobacteria Gram-positive bacteria Other bacterial phyla	Ch.22 Ch.23	Discussion board III
5	13 - 15	Protists Fungi Viruses	Ch.24 Ch.25 Ch.26	Discussion board IV
		Ecology and symbiosis		
6	16	Microbial interactions	Ch.27	Paper topic 1
6	17	Biogeochemical cycling Methods in microbial ecology	Ch.28 Ch.29	Discussion board V
7	18 & 19	Microorganisms in marine, freshwater, and terrestrial ecosystems	Ch.30-31	

7	20	The microbe-human ecosystem	Ch.34	Discussion board VI
		Microbial molecular biology and genetics		
7	21	Microbial DNA technologies and genomics	Ch.17-18	
8	Final thoughts	Conclusions: the phylogenetic perspective		Paper topic 2
8		Finals week		Short-answer follow-ups

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