**Syllabus**

**Course:** Microbial Ecology

**Instructor**: Dr. Sierra Jech ([sierra.jech@nau.edu](mailto:sierra.jech@nau.edu))

**Communication**: You can reach me by email. Please allow 24 hours for me to respond.

**Course Summary**: Microbial ecology is the study of microbes in the environment, their roles in ecosystem processes, and their interactions with one another and other biota. In this course, the Mountain Research Station becomes our outdoor laboratory as we explore microbial habitats, quantify microbial contributions to key ecosystem processes, and discuss emerging tools for microbial research. We will practice field techniques that students do not typically encounter in lab-based microbiology courses while also developing common microbiology techniques. This course is intended for anyone curious about ecology and microorganisms with an interest in building both field and laboratory skills.

**Course Objectives**:

1. Describe the variety of microbial habitats in the Rocky Mountains including their abiotic and biotic components and the adaptations necessary for survival.
2. Identify key microbial interactions with plants, insects, soil biota, amphibians, and others that impact the ecology of Rocky Mountain ecosystems.
3. Understand and quantify microbial processes in the ecosystem and in the laboratory.
4. Observe, illustrate, photograph, write about, or otherwise connect with microorganisms in their environmental context, ask a question and develop a mini research project to test your ideas.
5. Communicate your scientific work with peers.

**Course Structure:** The course will meet July 7-24th on Mondays, Tuesdays, Wednesdays, and Thursdays only. Each day will include time in the field, and a combination of lab and lecture. The latter part of the course will be devoted to projects which may have both field and lab components.

**Course texts**: You are not required to purchase a textbook for this course. Readings will be made available. Please bring a notebook to record both field and laboratory exercises. The notebook will be exposed to field conditions, so please bring a notebook that you do not care about getting wet or dirty.

**Required field equipment**: We will be hiking every day. Please be prepared with a backpack, water bottle, rain jacket, close toed shoes, sun protection, and snacks. Please bring a hand lens or other type of magnification device for the field. A cheap jeweler’s loupe can be purchased online for $5-20. A light on the loupe is not necessary. Please reach out if you have questions.

**Course schedule (subject to change)**:

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| --- | --- |
|  | **Topics & Activities** |
| **Week 1** | Introduction to microbial ecology  Microbiology tools, techniques, and sterile technique  Habitat characterization & sampling |
| **Week 2** | Microbial functions & ecosystem processes  Experiential learning cycle  Experimental design & statistical approaches |
| **Week 3** | Projects  Scientific literature  Scientific communication |

**Assignments & Grading**:

Reflective Journals: Each day we will set aside time for reflective journaling. These journal entries can be handwritten or typed and can include any style of reflection which helps you process the information you are learning each day. I encourage you to start or end your day with a reflection so that you don’t have a bunch to finish at the end of the course. **20 pts**

Notebook: Both field and laboratory observations will be recorded in your notebook. Include an entry for each per day. Each entry should begin with date, time, and purpose. Include drawings, notes about your observations, methods, and results. **50 pts**

Assignments: There will be a few assignments to be completed in small groups on specific topics. These will be handed out in class. **60 pts**

Project:

*Idea generation*: Write a short narrative about your idea generation process. Include your observations, drawings, initial questions. Include the development of a scientific question (this can be simple or complex). Did you find this process easy or hard, why? **10 pts**

*Methods*: Design and write up the methods that you will use. **20 pts**

*Annotated bibliography*: Engage with existing scientific literature on your topic of interest and produce an annotated bibliography of at least 6 relevant sources for the project. **30 pts**

*Presentation*: You will present your project on the last day of class. This presentation should be 12 minutes + 3 minutes for questions. **50 pts**

Participation and attendance at guest lectures: Everyone will start the class with 120 pts of participation credit. Missing a day is an automatic loss of **10 pts**. Please come to class prepared and engage fully with the material and with other students. This means active listening, asking and answering questions, engaging with the material, attending guest lectures, and respectfully collaborating with peers.

**Letter Grade Assignments:**

94-100 (A)

90-93 (A-)

87-89 (B+)

83-86 (B)

80-82 (B-)

77-79 (C+)

73-76 (C)

70-72 (C-)

67-69 (D+)

63-66 (D)

60-62 (D-)

< 60 (F)

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| **Assignment** | **Points** |
| Reflective Journals | 20 |
| Notebook | 50 |
| Assignments | 60 |
| Project idea generation | 10 |
| Project methods | 20 |
| Project annotated bibliography | 30 |
| Project presentation | 50 |
| Participation | 120 |
| **TOTAL** | **360** |

**Mountain Field Station Topics List**

* Mycorrhizae & plants
* Bark beetle & blue stain fungus mutualism
* Snow algae & snow molds
* Chytrid fungus & amphibian decline
* Fungal food resources for other animals
* Microbe interactions with biota (ants, worms, microarthropods, macroarthropods, birds, mammals, amphibians)
* Diversity & habitat complexity
* Decomposition & organic matter & carbon sequestration
* Metabolism, growth rate & activity
* Biogeochemical cycles
* Natural production of antibiotics and antifungals
* Desiccation tolerance
* Dormancy
* Dispersal strategies & colonization
* Biofilms
* Disturbance & succession
* Climate change
* Microbial disease ecology

## **Honor Code**

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the[Honor Code](https://www.colorado.edu/sccr/media/229). Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course’s syllabus is a vital part in adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: [StudentConduct@colorado.edu](mailto:StudentConduct@colorado.edu). Students found responsible for violating the[Honor Code](https://www.colorado.edu/sccr/media/229) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit [Honor Code](https://www.colorado.edu/sccr/media/229) for more information on the academic integrity policy.

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## **Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation**

## If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed.  Disability Services determines accommodations based on documented disabilities in the academic environment.  Information on requesting accommodations is located on the [Disability Services website](https://www.colorado.edu/disabilityservices/). Contact Disability Services at 303-492-8671 or [DSinfo@colorado.edu](mailto:DSinfo@colorado.edu)  for further assistance.  If you have a temporary medical condition, see [Temporary Medical Conditions](https://www.colorado.edu/disabilityservices/students/temporary-medical-conditions) on the Disability Services website.

If you have a temporary illness, injury or required medical isolation for which you require adjustment, please contact the instructor as soon as possible to discuss your needs.

## **Accommodation for Religious Obligations**

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please communicate the need for a religious accommodation as soon as possible with the instructor. Please see the [campus policy regarding religious observances](https://www.colorado.edu/compliance/policies/observance-religious-holidays-absences-classes-or-exams) for full details.

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## **Preferred Student Names and Pronouns**

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

## **Classroom Behavior**

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy.

For more information, see the [classroom behavior policy](https://www.colorado.edu/compliance/policies/student-classroom-course-related-behavior), the[Student Code of Conduct](https://www.colorado.edu/sccr/media/230), and the [Office of Institutional Equity and Compliance](https://www.colorado.edu/oiec/).

## **Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation**

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits [protected-class](https://www.colorado.edu/oiec/policies/discrimination-harassment-policy/protected-class-definitions) discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner abuse (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email [CUreport@colorado.edu](mailto:CUreport@colorado.edu). Information about university policies, [reporting options](https://www.colorado.edu/oiec/reporting-resolutions/making-report), and [OIEC support resources](https://www.colorado.edu/oiec/support-resources) including confidential services can be found on the [OIEC website](http://www.colorado.edu/institutionalequity/).

Please know that faculty and graduate instructors are required to inform OIEC when they are made aware of incidents related to these concerns regardless of when or where something occurred. This is to ensure that individuals impacted receive outreach from OIEC about their options and support resources. To learn more about reporting and support for a variety of concerns, visit the [Don’t Ignore It](https://www.colorado.edu/dontignoreit/) page.

## **Mental Health and Wellness**

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact [Counseling and Psychiatric Services (CAPS)](https://www.colorado.edu/counseling/) located in C4C or call (303) 492-2277, 24/7.

Free and unlimited telehealth is also available through [Academic Live Care](https://www.colorado.edu/health/academiclivecare). The [Academic Live Care](https://www.colorado.edu/health/academiclivecare) site also provides information about additional wellness services on campus that are available to students.

## **Acceptable Use of AI in this Class**

Generative artificial intelligence tools—software that reproduces text, images, computer code, audio, video, and other content—have become widely available. Well-known examples include ChatGPT for text and DALL•E for images. This statement governs all such tools, including those released during our semester together.

Keep in mind that the goal of gen AI tools is to reproduce content that seems to have been produced by a human, not to produce accurate or reliable content; therefore, relying on a gen AI tool may result in your submission of inaccurate content. It is your responsibility—not the tool’s—to assure the quality, integrity, and accuracy of work you submit in any college course.

If gen AI tool use is suspected in completing assignments for this course in ways not explicitly authorized, I will follow up with you. I may contact the Office of Student Conduct & Conflict Resolution to report suspected Honor Code violations. In addition, you must be wary of unintentional plagiarism or data fabrication. Please act with integrity, for the sake of both your personal character and your academic record.

You may use gen AI tools in this course however you see fit. However, keep in mind your own and others' privacy implications and security risks when using gen AI tools. If you use gen AI tools on assignments in this class, document your usage with the [Chicago Manual of Style](https://www.chicagomanualofstyle.org/qanda/data/faq/topics/Documentation/faq0422.html) or other appropriate citation guidelines for this course. Include an explanation of AI’s role in the completion of the assignment.

Chicago Manual Citation Style:

1. Text generated by ChatGPT, OpenAI, March 7, 2023, <https://chat.openai.com/chat>.
2. ChatGPT, response to “Explain how to make pizza dough from common household ingredients” edited for style and content, OpenAI, March 7, 2023.