COURSE OVERVIEW:
Experiments in Microbial Ecology and Diversity
11:680:492
Spring, (Only Odd Years)
Friday 9:15-3:30
Food Science Lab 201

CONTACT INFORMATION:
Lecturer: Dr. Jessica Lisa
Office Location: Lipman Hall, Room 118
Phone: 848.932.5672
Email: jesslisa@sebs.rutgers.edu
All office hours will be available upon request. All requests must be sent from an official Rutgers University email.

COURSE WEBSITE, RESOURCES AND MATERIALS:
• Canvas

COURSE DESCRIPTION:
Microbial Ecology and Diversity Laboratory is a 3-credit laboratory course that meets once, weekly, for 5hrs 40min. The lab offers students the experience to perform in-depth analyses of a microbial community from local ecosystems. Students in this course will build upon the basic principles and skills gained in introductory and mid-level courses. Laboratory exercises focus on microbial functions in ecosystems, examining the interactions between microbial communities and their environments and the impact of these relationships on biogeochemical cycles. The course explores ecological principles as they apply to microorganisms, while emphasizing the molecular, biochemical and evolutionary diversity in the microbial world.

This laboratory course is offered alternating spring semesters and is intended for upper-level undergraduate students in microbiology, biochemistry, biotechnology, environmental sciences, oceanography, and graduate students in the biosciences.

SAS/SEBS CORE CURRICULUM LEARNING GOALS ASSESSMENT:

Writing and Communication

WCR. Communicate complex ideas effectively, in standard written English, to a general audience, and respond effectively to editorial feedback from peers, instructors, &/or supervisors through successive drafts & revision.

WCD. Communicate effectively in modes appropriate to a discipline or area of inquiry; evaluate and critically assess sources and use the conventions of attribution and citation correctly; and analyze and synthesize information and ideas from multiple sources to generate new insights.

COURSE LEARNING GOALS

Students will explore how the environment shapes microbial communities and how microbes affect the environment. Upon completion of the course, students will have acquired the basic skill set for participation in contemporary microbial ecology research and employment in related industries and organizations. Students will
be capable of investigating microbial interactions using a multifaceted approach including culture-independent & culture-dependent analyses, bioinformatics, molecular biology, phylogeny, and ecosystem ecology. Through this course, students will develop analytical skills by applying the scientific method; including hypotheses and goals settings, experimental design, collection and analyses of data, and synthesis of data to form conclusions. This skillset includes the ability to:

1. Communicate how environmental conditions drive community structure and assess metabolic capabilities of microbial communities.
2. To develop and present a research proposal which summarizes background knowledge, identifies knowledge gaps, research questions, constructs hypotheses, and outlines experimental approaches and methods to answer questions and test hypotheses.
3. Summarize, evaluate, critically assess, and communicate primary research articles in the field of microbial ecology
4. Synthesize community structure and metabolic capability data to form conclusions related to microbial interactions with each other, with their environment, and/or their host.

ASSIGNMENTS/RESPONSIBILITIES, GRADING & ASSESSMENT:

Class Participation (15%)
Students are expected to participate in group discussions which will occur regularly throughout the semester.

Prospectus and presentation (20%)
The prospectus paper and presentation should be prepared in a way to provide the audience with a coherent and concise description of your proposed research project. The prospectus paper and presentation should address the following:

1. What is already known and what information gaps are present in this area of research?
2. What are the main hypotheses and research question of this project? What are the goals of the project?
3. Why are these questions and goals important?
4. What methodologies will be used to answer the research question?
5. What criteria will you use to either accept or reject your hypotheses?

Journal Club Paper and Presentation (20%)
Students will choose a seminal paper related to their research project that they conduct in the lab. Students will present the paper to the class in journal a club format. A written document will accompany the presentation. Paper selection will be done in consultation with course faculty. The submitted paper and presentation should include:

1. A concise summary of the work being discussed
2. A critical evaluation of the research
3. An explanation of how the paper relates to the student’s project

Students will also be expected to participate in the discussion of other research articles during journal club. To facilitate this activity, student will prepare one question about the paper ahead of lab. Question submissions count towards 5% of the class participation grade).
Final Report (45%)
The report will be prepared in a journal article format as specified by journals’ “Instruction to authors” webpages. Students will choose the appropriate journal to which they wish to submit their paper and will be assisted by course faculty in this selection.

Papers will introduce and summarize the findings of research experiments conducted throughout the semester and will include three suggested reviewers selected from scientists who perform research on the topic of the paper. Students should become familiar with these scientists through their readings for their project.

Report will be subject to peer-review by other students in the class. Each student will review one report by a fellow student as will be arranged in class at the appropriate time. Performing this review and quality of the review will account for 5% of the grade allotted to the final report.

Important Information Regarding Assessment
Assignments turned in late will result in a 10% loss in points for each day late.

Assessment for each assignment is outlined in more detail in the attached rubrics.

Standard Semester Grades: Students are graded at the end of each course, in accordance with the grades and symbols authorized by the University Faculty Senate, as follows:
- A= Outstanding (90-100)
- B+ (85-89)
- B=Good (80-84)
- C+ (75-79)
- C=Satisfactory (70-74)
- D=Poor (60-69)
- F=Failing (0-59)
- W=ASSIGNED BY REGISTRAR to students who officially withdraw from a course

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES
Please follow the procedures outlined at https://ods.rutgers.edu/students/registration-form. Full policies and procedures are at https://ods.rutgers.edu/

ABSENCE POLICY
Class attendance is mandatory. Make-up classes are not possible.

COURSE SCHEDULE:
Please see attached course schedule.

ACADEMIC INTEGRITY
The university's policy on Academic Integrity is available at http://academicintegrity.rutgers.edu/academic-integrity-policy. The principles of academic integrity require that a student:
- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.

• treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.

• uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

• everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.

• all student work is fairly evaluated and no student has an inappropriate advantage over others.

• the academic and ethical development of all students is fostered.

• the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

To help protect you, and future students, from plagiarism, we require that all papers be submitted through TurnItIn.

STUDENT WELLNESS SERVICES

Just In Case Web App  http://codu.co/cee05e Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)
(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ www.rhscaps.rutgers.edu/
CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students’ efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)
(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/
The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services
(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / https://ods.rutgers.edu/
Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus’s disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the
accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.

Scarlet Listeners
(732) 247-5555 / https://rutgers.campuslabs.com/engage/organization/scarletlisteners
Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.
# Proposed Course Schedule

## Experiments in Microbial Ecology and Diversity Laboratory Schedule

### Topic 1: Student-Led Enrichment Experiment

**Date** | **Lab #** | **Topic 1** | **Topic 2** | **Topic 3** | **Presentations** | **Field Trips**
--- | --- | --- | --- | --- | --- | ---
1 | | Topic selection and discussion | | | | 
2 | | Enrichment set-up | Observation/Pictures/Lab Notebook recording | | | 
3 | | DNA extraction and Respiration set-up | Observation/Pictures/Lab Notebook recording | | | 
4 | | | Observation/Pictures/Lab Notebook recording | Journal Club (1 presenter) | Microbiology Symposium (full day) 
5 | | Respiration set-up | Observation/Pictures/Lab Notebook recording | Journal Club (2 presenters) | 
6 | | Respiration titrations, Calculations and Summary | Observation/Pictures/Lab Notebook recording | Journal Club (2 presenters) | Ban (1/2 day) 
7 | | Biomass assessment | | Journal Club (3 presenters) | Gene Wiz (1/2 day) 
8 | | | | | 
9 | | | **Spring Break** | | 
10 | | Sequence analysis Data Analysis and Writing | Experiment Set-up | Discussion | Prospector (4 presentations) | 
11 | | Data Analysis and Writing Day | Counts, Weights, LOI, class discussion | | | 
12 | | | Summary | | Pinelands Field Trip (3/4 day) | 
13 | | | | | Cheesecouke Field Trip (full day) | 
14 | | Class Peer Review Presentations and Pizza! | | | | 
15 | | Class Peer Review due | | | Meadowlands Field Trip with Riverkeeper (3/4 day) | 
Final Exam | | Manuscript Submission | | | |