

MSL 654: Benthic Ecology

Instructor: Sarah L. Mincks

College of Fisheries and Ocean Sciences

Office: 233 Irving II

907-474-7616

smincks@alaska.edu

Meeting time: T/Th 2:00 – 3:30

Location: 214 O'Neil

Office hours: TBD

Course type: In-person lecture

Course Catalog Description

Ecology of marine benthos, including micro- and macroscopic fauna, from the subtidal to hadal zone, with emphasis on subtidal environments. Organic matter deposition and cycling in marine sediments. Life strategies of benthic organisms, including animal-sediment relationships, feeding, reproduction and growth. Large scale spatial and temporal patterns in distribution and biodiversity of benthic organisms. Current topics in benthic biological oceanography and ecology.

Learning Objectives

1. Understand the role of key environmental parameters that influence the biology, ecology, diversity, and distribution of benthic species.
2. Track the fate of primary production as it is deposited to sediments, including microbial metabolic pathways, chemical transformations, preservation and/or uptake into the benthic food web.
3. Identify large-scale spatial and temporal patterns in the distribution of benthic organisms, ecological and evolutionary drivers of these patterns, and challenges associated with characterizing benthic communities in soft sediments.
4. Become familiar with field and laboratory approaches to the study of benthic ecosystems.
5. Critically evaluate and discuss current research topics in benthic ecology / biological oceanography.

Course Format and Instructional Methods

This course is lecture-based, but will also include group discussions of the primary literature.

Readings

You are not required to purchase a text book. Where possible, you will be assigned book chapters, review papers and/or other relevant peer-reviewed literature to support the material discussed in lectures. Readings will be provided as pdf files. A **reading list** organized by topic will be shared as a Google Doc and updated periodically throughout the semester. This list contains full citations for all references cited in lectures, as well as classic literature and additional readings of interest. You are not expected to read all the papers on this list! It is merely provided as a resource for use during this course, as well as in the future when you want to recall material that was covered.

Group Discussions

Be prepared to discuss as many as three readings from the primary literature approximately every two to three weeks. Readings will generally be selected by the instructor and provided at least one week before the date that they will be discussed. *All students are expected to be prepared for and to participate in discussions.* Points for participation will be applied toward the final grade, as indicated below. Key ideas presented in group discussions may appear on exams.

Exams

Two **midterms** and one **final exam** will be given during the course. These exams will be written, closed-book, short-answer and/or essay exams that must be completed during the normal class period

(although format is subject to change). The final exam will include material presented throughout the semester, but will be weighted more heavily toward material covered after the second midterm.

Study questions

Two to three study questions will be assigned during the semester to help stimulate further thought and reading on the course material. These assignments will require students to synthesize some of the literature on a particular topic and prepare a short essay (~2 – 3 pages), including citations of literature used in preparing the essay. Additional details will be provided in class. Late assignments will not be accepted unless prior approval is obtained from the instructor.

Grading

Grades will be determined based on the absolute points awarded for the following:

| | <u>Possible points</u> |
|---|------------------------|
| Participation (attendance, group discussions, etc.) | 50 |
| Midterm 1 | 100 |
| Midterm 2 | 100 |
| Study questions | 100 |
| Final exam | 125 |

Semester grades will be assigned according to the following scale (percentages will be rounded to the nearest whole number):

| | | | |
|------------|----------|-----------|--------|
| A+ 98-100% | A 93-97% | A- 90-92% | |
| B+ 87-89% | B 83-86% | B- 80-82% | |
| C+ 77-79% | C 73-76% | C- 70-72% | |
| D+ 67-69% | D 63-66% | D- 60-62% | F <60% |

Course Policies

(1) Attendance: Students will not be penalized for poor attendance; however, students are expected to attend all scheduled classes and will be held responsible for all material presented in lecture, discussion, and assigned readings. Students who miss class should work with classmates to obtain missed material; the instructor will not be responsible for providing lecture notes. Lectures will be presented using PowerPoint and copies of slides will be made available after lecture. It is important to note that these slides contain only an outline of the material covered; you are unlikely to be successful in this course if you fail to attend class and take notes.

(2) Support and Disability Services: The Office of Disability Services can be reached by phone- (907) 474-5655, or email- fydso@uaf.edu, and can be located in WHIT 203 on the UAF campus. The Office of Disability Services is available for students with physical or learning disabilities. If you feel that you are differently abled and need these services, please contact the office or ask the instructor to make arrangements.

(3) Courtesy: Please turn off all audible sounds to any electronic devices (phones, laptops, tablets etc.) while in lecture. Refrain from using your laptops for activities not related to lecture during class time, e.g. emailing or browsing the web. Use of these items is strictly prohibited during exams. Students are free to record lectures. You may bring food or drink in the classroom unless otherwise instructed, for example when shared computers are in use.

(4) Plagiarism and academic integrity: Plagiarism will not be tolerated in any way during this course. All assignments are expected to consist of students' original ideas and/or information from properly cited published sources. Students may seek assistance with proper referencing of scientific literature from the instructor as needed. Students are expected to conduct themselves according to the UAF Student Code of Conduct, which can be found in the course catalog. Failure to comply with these guidelines will result in a failing grade, and the student may face consequences at the university level, depending on the severity of the offense.

(5) Student protections and services statement: Every qualified student is welcome in my classroom. As needed, I am happy to work with you, disability services, veterans' services, rural student services, etc. to find reasonable accommodations to support your learning and participation. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. As required, if I notice or am informed of certain types of misconduct, I am required to report it to the appropriate authorities. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: www.uaf.edu/handbook/.

UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: alaska.edu/nondiscrimination.

(7) Effective communication: Students who have difficulties with oral presentations and/or writing are strongly encouraged to get help from the UAF Department of Communication's Speaking Center (907-474-5470, speak@uaf.edu) and the UAF English's Department's Writing Center (907-474-5314, Gruening 8th floor), and/or CTC's Learning Center (604 Barnette st, 907-455- 2860).

Course Schedule

*Schedule is subject to change and will be updated frequently throughout the semester.

| Week | Lecture Topic |
|------|--|
| 1 | Course Overview |
| | Physical environment |
| 2 | Marine sediment: Characteristics and transport |
| | Particulate flux |
| 3 | DISCUSSION |
| | Benthic-pelagic Coupling |
| 4 | Sediment diagenesis |

| | |
|----|---|
| | Sediment diagenesis (continued) |
| 5 | Sediment Biogeochemistry |
| | DISCUSSION: <i>Biogeochem topics</i> |
| 6 | Sediment Biogeochemistry (continued) |
| | <i>Guest lecture: Habitat Mapping</i> |
| 7 | MIDTERM |
| | Microbial communities in sediments |
| 8 | Microbial communities (continued) |
| | DISCUSSION: <i>pH conditions in sediments</i> |
| 9 | Benthic eukaryotes |
| | Benthic eukaryotes (continued) |
| 10 | Reproductive Ecology of Benthic Organisms |
| | Feeding and Trophic Ecology |
| 11 | Feeding and Trophic Ecology (continued) |
| | DISCUSSION: <i>Topics in food web ecology</i> |
| 12 | Characterizing Benthic Community Structure |
| | MIDTERM |
| 13 | DISCUSSION |
| | <i>NO CLASS—Thanksgiving</i> |
| 14 | Organic Enrichment Effects |
| | Bathymetric Gradients |

| | |
|----|--|
| 15 | DISCUSSION: <i>Current topics: Polar benthos</i> |
| | The big picture: Final thoughts, wrap-up |
| | FINAL EXAM |