



MSCI 479/479L: Marine Benthic Ecology

Spring 2022. **LECTURE** = MW 4-5:15, Brittain Hall 110;

LAB SCI2 125 = 479L-01: F 11:30-2:20

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Office: SCI2 226
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Office Hours: M 10:30-1:30, W 10-1, and by appointment.

Webpage: Moodle course management system.

Text: None required. *Relevant required readings will be posted on Moodle in advance of each lecture.*

COURSE DESCRIPTION: (Prereq: A grade of C or better in MSCI 302 and MSCI 302L or BIOL 370 and BIOL 370L) (Coreq: MSCI 479L) This course presents a comprehensive review of the structure and function of coastal and oceanic benthic ecosystems. The relationships between primary producer and consumer form and function in benthic habitats are discussed including hydrothermal vents, seamounts, continental shelf, rocky intertidal, and nearshore and estuarine soft bottom communities. The relevance of benthic community production to ecosystem function, fisheries, and modern living resource management topics are evaluated. Three lecture hours per week (S, even years).

OBJECTIVES: Upon completion of this course, students should have a thorough understanding of the trophic structure and ecosystem dynamics for coastal and oceanic marine benthic habitats. Students should be able to identify relevant guilds, trophic processes, and environmental structuring features associated with each community type and evaluate how changes in one or more factors might influence community function at relevant temporal and spatial scales. Students should be able to interpret and discuss current research in marine benthic ecology and be able to make informed decisions about related management, policy, and social issues.

STUDENT LEARNING OUTCOMES: Upon the completion of this lecture and laboratory, students should be able to:

1. Identify the major trophic guilds associated with representative marine benthic communities.
2. Describe and discuss the ecological roles of marine microbes, macroalgae, plants, invertebrates, and vertebrates across major ecosystems with specific examples of their influence on trophic structure, bioenergetics, and biogenic structure.
3. Relate marine benthic life history and reproductive strategies to observed ecological processes as well as ambient seasonal, environmental, and oceanographic conditions and explain how these factors interact to affect the persistence of a species within selected habitats in the context of examples from current literature.
4. Complete basic production and bioenergetic calculations to quantify the importance of selected guilds within their communities.
5. Use current conceptual frameworks to discuss and evaluate historic, current, and proposed management options.
6. Think, write, and communicate critically about this topic using the primary literature as a foundation.
7. Collect, analyze, and synthesize data using critical thinking, quantitative, and effective professional communication skills.

EXPECTATIONS: This is a 400 level specialty course, and as such the effort you must apply in order to receive a grade of C or better in this course is substantially greater than for a 100 level course. I expect that you already have the ability to take notes, pay attention in class, synthesize your notes with reading

material, organize and manipulate data in Microsoft Excel, make high quality graphs in Microsoft Excel, as well as read primary (peer-reviewed) literature AND retain the content in your own words. Marine benthic ecology is a diverse and constantly evolving field so most of our reading material will be from the recent peer-reviewed literature. I also expect that you will be actively involved in the course.

Students are also expected to have mastered the concepts covered in the pre-requisite courses including (but not limited to) food webs and trophic descriptions, the Linnaean taxonomic system, relevance and use of primary diagnostic characters, and the primary diagnostic characters associated with the major animal phyla including invertebrate (e.g., Porifera, Cnidaria, Ctenophora, Annelida, Mollusca, Arthropoda, Echinodermata, and Chordata) and vertebrate classes (Agnatha, Chondrichthyes, Osteichthyes, Reptilia, Aves, Mammalia). This course builds on these foundation concepts.

Coastal Carolina University is an academic community that expects the highest standards of honesty, integrity and personal responsibility. Members of this community are accountable for their actions and reporting the inappropriate action of others and are committed to creating an atmosphere of mutual respect and trust

GRADING POLICY: The lecture and laboratory are separate co-requisite courses (3 credits and 1 credit, respectively), and you do receive a grade for each, but in practice, a single overall grade will be based on the combination of earned points in the lecture and laboratory combined (you get the same grade for both). Grades are based on 3 tests (including the cumulative final exam), quizzes, attendance, homework assignments, participation, and laboratory activities (discussed below) including an oral presentation. The point breakdown for lecture and lab are below.

2 Lecture tests and a comprehensive final exam (20% each, except the lowest grade which is worth 5%)	45 %
Lecture homework assignments	10 %
Laboratory assignments and presentation	40 %
Attendance & participation in lecture and lab	5 %

- Tests will be on topics covered in the readings, lecture, and laboratory. Regular attendance and completion of readings and assignments is essential to a passing grade in this course. **Lecture tests include only essay questions.** The final exam is cumulative. Required readings are indicated on the course syllabus as well as the course website.
- Assignments may include quizzes, graphing, data analyses, literature synthesis and writing assignments as well as take-home essay questions. All assignments should be typed and submitted as hard copy unless otherwise noted. I reserve the right to return assignments that include incomplete sentences, grammar mistakes, and/or excessive punctuation mistakes without assigning a grade. Homeworks may involve data and/or files that have been assigned and distributed through Moodle. **Students that use data files other than those assigned to them will earn a grade of 0 for the assignment.**
- Each student will present a 12 minute presentation based on a review of relevant literature, synthesis with topics discussed in class, and application to forecast the effects of warming ocean temperatures on the biology, distribution, and ecological services provided by a benthic species in the context of the relevant food web and trophic structure. Additional information will be distributed during the first half of the semester. The presentation proposal with relevant background information annotated bibliography from the primary or peer-reviewed literature is due on 3/19/22.
- The first homework will be submitted through Moodle. Most assignments are due as **typed hard copies** at the **beginning** of class on the date indicated; some assignments will also be submitted simultaneously through the Moodle TurnItIn software with both submission formats (hard copy and TurnItIn) required for grade consideration. Digital submissions other than those requested through Moodle will not be graded.

- *All assignments should be done by individuals without collaboration with other class members unless otherwise directed. Late assignments will be penalized 25% and will not be accepted more than 24 hours after the due date.*
- Please contact me ASAP and provide appropriate documentation if an assignment will be late for reasons related to a CCU approved excused absence. In the event that classes are cancelled because CCU is closed for inclement weather, assignments to make up the time may be added and distributed via Moodle.
- You must pass the laboratory to pass the course. Information from the laboratories can and will be included in lecture tests.
- We will follow all University laboratory safety procedures. Per University requirements: **Closed-toed shoes, socks that cover to your calves, long pants, a top that has sleeves, and a top that can be tucked in to your pants are required for all lab days.**
- Food and beverages cannot be brought into University laboratories. *Please plan accordingly and eat before you come to lab.* We will always be in lab for the full lab period.
- Active participation in field trips, including those scheduled outside of the regular lab period, is required. Trip dates will be identified during the first day of lecture so that students can plan their schedules accordingly.
- Grading scale: A (≥ 90), B+ (88.0-89.9), B (80.0-87.9), C+ (78.0-79.9), C (70-77.9), D+(68-69.9), D (60-67.9), F (0-59.9).

HONESTY AND BEHAVIOR POLICIES: Violations of the Student Code of Conduct (including but not limited to plagiarism, cheating, and other forms of academic dishonesty) will result in a grade of 0 for the assignment, filing of the required report to the University Academic Integrity Office, and, potentially, removal from the course with an F. Poor grades earned due to cheating or plagiarism cannot be removed through the Repeat Forgiveness Policy. For information on the Code of Student Conduct, please see your Student Handbook or <http://www.coastal.edu/judicialaffairs/codeofconduct.pdf>. With the exception of students who have a documented reason for needing a computer to take notes and/or students who have talked with me ahead of time about using a computer, ***there will be no other electronic devices of any kind visible in the classroom during lecture or laboratory.*** If you require special accommodations, please make an appointment to talk with me within the first two weeks of the semester.

UNIVERSITY POLICIES FOR ACCESSIBILITY AND DISABILITY SERVICES: Coastal Carolina University is committed to equitable access and inclusion of individuals with disabilities in accordance with the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act. Individuals seeking reasonable accommodations should contact Accessibility and Disability Services (843-349-2503 or <https://www.coastal.edu/disabilityservices/>). The ADA indicates "title II and title III entities must permit service animals to accompany people with disabilities in all areas where members of the public are allowed to go." As such, service animals are permitted in lab settings at CCU. Emotional support animals are not permitted in lab settings unless it is approved as a classroom accommodation. Students with service animals are strongly encouraged, but not required, to inform lab instructors of the use of a service animal. This communication provides both the student and the instructor with an opportunity to discuss and plan for the safety of the service animal as well as any other safety concerns. Students should contact Accessibility and Disability Services regarding any potential accommodations for support and assistance.

ATTENDANCE POLICY: On time attendance is mandatory. I expect you to be seated and ready to write at the beginning of lecture (4:00) and lab (11:30) **without your phone or any other electronic device.** Phones should be turned off or in silent mode at all times when we are together. Student phone and/or electronic device(s) (tablet, computer, etc.) use, including production of sound, during class without prior approval by the instructor will result in the loss of attendance points for that day.

As per the University Catalog, unexcused absences in excess of 25% of the regularly scheduled classes may result in an F for the course. Excused absences are defined in the University Catalog. I may excuse additional types of absences, but only if you clear it with me ahead of time. If you miss a class, it is **your** responsibility to inform me within 24 hours, get the notes from another student, and make up the material if it is an excused absence. There are no make-up opportunities for missed tests or assignments that do not have an excused absence.

Participation is essential for both lecture and lab. I reserve the right to take off participation points for any day due to tardiness, early exit, or incomplete participation. Each unexcused laboratory absence will result in the loss of 7% of your total grade (separate from participation points above). ***There will be no make-up opportunities for missed laboratories and/or field trips.***

FIELD TRIPS: We will go on several field trips during the semester. Most of these activities have to be synchronized with the tidal stage (so we can get to the benthos!). The field trip schedule will be available during the first week of classes to allow appropriate planning of student schedules around the field trips. We will have a lab activity scheduled on two different Saturdays; students must attend ONE of the Saturdays.

CONTINGENCY INSTRUCTION POLICY: In the event of hazardous weather, natural disasters, widespread illness or other unexpected event that disrupts normal class and/or lab activities, listen to local radio and television stations or visit the Coastal Carolina University homepage for official University closing announcements. If the University closes unexpectedly, we will follow the University opening and closing schedule as well as the stated guidelines/expectations for contingency instruction. The syllabus, course plans, and assignments may be modified to allow completion of the course. If this occurs, an addendum to the syllabus and/or course assignments will replace the original materials. Modifications may include remote or online delivery of course materials and modifications of the original course schedule.

HEALTH RELATED CLASS ABSENCES: Please evaluate your own health status regularly and refrain from attending class and other on-campus events if you are ill. Students who miss class due to illness will be given opportunities to access the course online. You are encouraged to seek appropriate medical attention for treatment of illness. In the event of contagious illness, please do not come to class or to campus. Instead, notify me by email about your absence as soon as possible, so that accommodations can be made. Please note that documentation for excused absences may be required. However, you should not come to a face to face class if you are feeling sick, even if you have not seen a doctor.

COVID-19 SAFETY MEASURES: A core tenant of our class as a learning community is respect for one another. In following University and CDC guidelines, all members of the learning community (faculty and students) are required to properly wear a face mask before entering the classroom and for the duration of class. In addition, students will practice social distancing in the classroom by keeping a minimum of 6 feet between themselves and others. Any student not complying with any of these safety measures will be asked to leave and will be counted as absent for the day. Repeated or widespread refusals to wear a mask in learning spaces may result in the entire class moving online and a referral to the Dean of Students for violators of this policy. See the Contingency Instruction notes.

TENTATIVE SCHEDULE

Subject to Change

Date	Day	Lecture Topic/Activity	Related Reading	Laboratory Topic/Activity ¹
Jan 13	M	Introduction, ecology review	Levinton 2009: Ch 3: 46-47, 56-61,77-78;	
Jan 15	W	Guilds and a conceptual framework, trophic spectra, trophic cascades; HWK 1 due via Moodle	Levinton 2009 Ch 10:258-261 Hagy & Kemp 2013	
Jan 17	F			1 - Introduction, Safety, Basic data processing
Jan 20	M	Martin Luther King Jr. Holiday	No class	
Jan 22	W	Trophic relays, benthic pelagic coupling, Trophic interactions.	Levinton Ch 3: 48-56, 68-77; Dame et al. 2001, Kneib 1997	
Jan 24	F			2 - Guilds and Food webs, HWK 2 due
Jan 27	M	Keystone species; Life history	Levinton Ch 6: 123-136, Whitlatch et al. 2001	
Jan 29	W	Physical factors and fauna: Temperature; Scope for growth	Levinton 2009 Ch 4	HWK 3 due
Jan 31	F			Lab Redirect for Saturday FIELD TRIP
Feb 1	SAT	Benthic Pelagic coupling: early spring	BMFL	
Feb 3	M	PFF: salinity, light, latitude	Levinton 2009 Ch 13	
Feb 5	W	PFF: sediment, biogenic structure	Coleman & Williams 2002, Levinton 1995	
Feb 7	F			3: FIELD TRIP: Cherry Grove
Feb 10	M	Relevant benthic dynamics	Levinton Ch 5: 113-117, TBD	HWK 4 due
Feb 12	W	TEST 1		
Feb 14	F			4: Data analyses - Cherry Grove
Feb 17	M	Hydrothermal vents	Fisher et al. 2007, Micheli et al. 2002	
Feb 19	W	Vents/Seamounts	Koslow 1997, Moore et al. 2004.	
Feb 22	F			5: Benthic macrofauna, HWK 5 due
Feb 24	M	Seamounts	Koslow et al. 2016	
Feb 26	W	Hard bottom shelf habitats, HWK 6 due	Weaver & Sedberry 2001, Goldman & Sedberry 2011	
Feb 28	F			6: Benthic population dynamics
Mar 2	M	Hard bottom shelf habitats	Garrison & Link 2000	
Mar 4	W	Kelp forests	Schiel & Foster 2015	
Mar 6	F	No lab: Redirect -- benthic-pelagic coupling weekend.		
Mar 7-15		SPRING BREAK - NO CLASSES		
Mar 16	M	Kelp forests	Estes et al. 2016, Schiel & Foster 2015: Ch 9	
Mar 18	W	Rocky intertidal	Little et al. 2009: Ch 3	
Mar 20	F			7: Seagrasses through time
Mar 21	M	Rocky intertidal	Little et al. 2009: Ch 10	
Mar 26	W	TEST 2		
Mar 28	F			Lab Redirect for Saturday FIELD TRIP
Mar 29	SAT	Benthic Pelagic coupling: late spring	BMFL	
Mar 30	M	Soft bottom shelf	Wilson & Fleeger 2013	
Apr 1	W	Soft bottom shelf, HWK 8 due	TBD	
Apr 3	F			8: Benthic-pelagic coupling data collection & analyses
Apr 6	M	Estuarine soft muddy bottom	Feller et al. 1992,	
Apr 8	W	Estuarine soft sandy bottom	Beseres & Feller 2007, 2008	
Apr 10	F	No lab: Student holiday		
Apr 13	M	Seagrass beds	Orth et al. 2006	
Apr 15	W	Seagrass beds	Heck et al. 2008,	
Apr 17	F			9: Benthic-pelagic coupling presentations
Apr 20	M	Estuarine hard bottom - oyster reefs	Soniat et al. 2004	
Apr 22	W	Estuarine hard bottom - oyster reefs	TBD	
Apr 24	F	10- EVENING FIELD TRIP (required): Meet at 4 PM, return ~9:30 PM. Tidal creek nekton		
Apr 27	M	Estuarine - Saltmarshes	Teal 1972?; Silliman & Bertness 2002	
Apr 29	W	Estuarine - Saltmarshes	Silliman & Newell 2003	
May 5	TBD	FINAL COMPREHENSIVE EXAM		8:30-10:30 AM, BRTN 240