



Appledore Island, Isle of Shoals,, Maine
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Shoals Marine Laboratory
Marine Environmental Science (BIOSM 1620.801)
July 3rd-17th, 2023

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Course Syllabus and Schedule

Credits: 3 credits via Cornell

Prerequisites: Two year-long high school courses in science; completion of grades 10, 11, or 12

Course goals:

Environmental studies have become an integral component of high school programs all around the country, however, opportunities to gain hands-on experience while observing, measuring, and characterizing ecosystem health and diversity are limited.

Marine Environmental Science at Shoals Marine Lab will explore the diversity of coastal marine habitats and ecosystems as well as the tools scientists use to study them. An emphasis will be placed on topics related to human impacts and environmental health.

Fieldwork will include explorations along Appledore's rocky intertidal zone, excursions to neighboring islands to observe seal and seabird colonies, and offshore trips to practice oceanographic sampling techniques and observe whale foraging grounds. Laboratory exercises will include observation and identification of plankton under the microscope, and familiarization with invertebrate and vertebrate adaptations through observation and dissection. Lectures and discussions will expose students to topics in marine ecology, oceanography, and climate science. Finally, we will study how humans have impacted the ocean and discuss how we can be stewards of marine ecosystems.

A major component of this course is a group project in which students are expected to apply the scientific methods they have practiced in the field and lab to answer a question centered around a key component of the course. Students will be responsible for creating a paper and presentation to communicate results and conclusions to peers and instructors effectively.

Course Materials:

Students should bring a laptop computer to write papers, complete lab exercises, create presentations, and work with data. Google Classroom will be used as a learning management system and as a way to distribute instructional materials to reduce excessive printing. We require sturdy, close-toed shoes (or muck boots) for work in the intertidal zone and recommend rain gear as we will head into the field, rain or shine, to complete activities.

Assignments & Grading:

- a. Assignments: Grades for this course will be based upon student mastery of learning objectives within each topic plus the research project. All assignments will be turned in via Google Classroom, where rubrics and descriptions will also be available. Overall performance will be weighted across these units as follows:

Lab Notebook: 15%

Classwork: 30%

Participation: 15%

Research Project (paper, presentation, and data files): 40%

**Full and active participation, including the reading of assigned scientific articles and preparation for in-class exercises, are required. Failure to prepare for activities will result in a loss of classwork points and a low participation score.*

Additional Expectations and Conduct:

Students are responsible for fully understanding all of the information presented in this syllabus. If there are any questions regarding this information, it is the student's responsibility to bring it to the instructor's attention. In addition, students are responsible for attending all activities associated with this course and completing all assignments. Students are responsible for asking questions anytime they need clarification. Every student is responsible for their behavior- specifically maintaining a safe experience for themselves and others, and being respectful and collegial to other students and with instructors. Students are responsible for fully understanding and adhering to all of the information presented in the SML Appledore Handbook as well.

- a. Personal Technology During the Workday.

Do not use cell phones, iPads, headphones, laptops, or similar devices in the classroom or during course activities unless instructed to do so. Please do not plan on taking notes on a laptop as there is ample research showing it inhibits learning compared to taking notes by hand (even compared to not taking notes at all, e.g. Muler and Oppenheimer 2014).

Allowances are made for any student with learning a plan specifying an accommodation for typing class notes, in which case it will be expected that wireless access during lectures.

- b. Computing.

Shoals Marine Lab has a modest computer facility in Leighton Library. Please treat this shared facility with respect. Printers are available, but please limit printing and be sure to upload your completed assignments to Google Classroom. See also, Course Materials and Personal Technology sections above.

- c. Transmission of Course Materials.

Students are not authorized to copy, record, replicate, reproduce, or transmit any course materials presented, or derivative materials including class notes, for sale or free distribution to others without the written consent of the instructor who is either the source of the materials or is using them with permission of their original authors.

- d. Academic Integrity:

Any work submitted must be your own. Uncredited use of another person's words, data, or

images is considered plagiarism, a serious violation of the Code, whether the material comes from another student, a website, or a published paper. Students must adhere to the policies of Cornell and UNH for Academic honesty, plagiarism, and discrimination.

Cornell: <http://theuniversityfaculty.cornell.edu/academicintegrity/>

UNH: <https://www.unh.edu/student-life/09-academic-honesty>

e. Disabilities & ADA Accommodation:

Students with a disability must contact Cornell's (420 CCC building; 607-254-4545) or UNH's Student Disability Services <https://www.unh.edu/studentaccessibility> before the start of class for a confidential discussion of needs and for registration to verify eligibility for academic accommodations. No retroactive accommodations can be made.

f. Mental Health:

Shoals Marine Laboratory cares about you and your well-being. If you experience unusual personal or academic stress during the course or need to talk with someone about a personal problem, seek support from your instructors as soon as possible. In addition, any SML staff is available for consultation 24/7. Find staff in the office in the Hamilton House between 8 am – 7 pm or knock on the door of Bartels House after hours.

Schedule:

Daily schedules at Shoals Marine Laboratory are flexible to accommodate predictable events (e.g. tides), and unpredictable events (e.g. weather) to take advantage of unforeseen opportunities to experience the marine environment and to participate in campus-wide marine science lectures and field opportunities. As a result, MES's daily routine may include early morning field or lab work.

Three meals are served on the island each day, except Sunday, when schedules are more relaxed and begin after a mid-morning brunch. Between meals, students should expect to be fully engaged in lectures, fieldwork, and laboratory exercises each day. After dinner and outside of formal class hours, students may be expected to work on research projects or attend guest lectures and films.

Island Life:

Days on Appledore are filled with academic endeavors, but students do have free time around meals when they can use the island's volleyball court, swimming area, or library. SML encourages MES participants to interact with the entire island community. Additionally, one morning or afternoon each week, students join in general cleaning of the island and its facilities.

Schedule of Events:

*Note: This schedule is subject to change to accommodate predictable events, unpredictable events, or to take advantage of unforeseen opportunities.

Day/Topic	Overview
Mon, 7/29	<i>2:45 pm: Depart Portsmouth</i> <i>~4 pm: Arrive on Appledore Island</i>

	<p>~4:30 – 5:30 Welcome & Orientation, “Fire and Water” talk with SML Staff</p> <p>6:00 pm Dinner</p> <p>7 pm: Introductions and Course Overview</p> <p>8 pm: Appledore sunset orientation hike + icebreakers (flashlights needed)</p>
Tues, 7/30	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • Intro to the Gulf of Maine • How do we ask scientific questions? Experimental vs observational research studies/scientific method • Seabirds and Science Activity <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> • Animal Behavior and Ethogram Introduction • Gull Ethogram Activity <p>6:00 pm: Dinner</p> <p>Prep for Rock Talk</p> <p>8-9 PM Rock Talk, Dr. Rebecca Atkins</p>
Wed 7/31	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • Using Animal Behavior for Conservation - Scientific Paper Reading and Class Discussion • Introduction to White Island <p>12:30-1:30 Lunch</p> <ul style="list-style-type: none"> • GOM Introduction Video • Environmental Changes in the Gulf of Maine <p>4:00 pm – 4:30 pm Help with Food Run</p> <p>6:00 pm – 7:00 pm: Dinner</p> <ul style="list-style-type: none"> • Tern Scientific Paper
Thurs, 8/1	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • White Island Trip (Tentative) <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> • Environmental Changes Continued (Climate Change and Human Impacts) • Project Introduction • Introduction to the Open Ocean <p>6:00 pm – 7:00 pm: Dinner</p> <ul style="list-style-type: none"> • Introduction to the Intertidal/Activity
Fri, 8/2	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • Introduction to Intertidal Ecosystems • Abiotic Interactions • Biotic Interactions <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> • Lab set up and prep, discussion around the touch tank • Great Tide Pool Exploration (Low Tide: 1.0 ft @ 4:36 pm) • Lab: Identification of various invertebrates

	<p>6:00 pm: Dinner</p> <p>7:00- 8:30: Work on Project Proposals</p>
Sat, 8/3	<p>7:30: Breakfast</p> <ul style="list-style-type: none"> ● Biotic Interactions Continued ● Competition and Invasive Species <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> ● Lab: Intertidal Sampling Methods and Equipment ● Great Tide Pool for Data Collection (<i>Low Tide: 0.9 ft @ 5:25 pm</i>) ● Return/Clean equipment, Data Share and Assessment <p>6:00 pm: Dinner</p> <ul style="list-style-type: none"> ● Work on Project Proposals
Sun, 8/4	<p>9:00 am – 10:00 am: Tidy Dorms and Common Spaces</p> <p>10:00 am: Brunch (Different time!)</p> <ul style="list-style-type: none"> ● Lecture and Activities: Other Ecosystems <ul style="list-style-type: none"> ○ Mangroves <ul style="list-style-type: none"> ■ Mangrove Research and Presentations ○ Salt Marsh <ul style="list-style-type: none"> ■ Mapping Sea Level Rise in Salt Marshes ○ Coral Overview ○ Kelp Forests/Seagrasses <p>5:00 pm: Dinner (Different time!)</p> <p>Faculty meeting after dinner to 7 pm</p> <p>7:30 pm: Proposals Due!</p>
Mon, 8/5	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> ● Lecture and Activities: Plankton, Microbes and Food Webs <ul style="list-style-type: none"> ○ Plankton Lab! ● Lecture and Activities: Keystone species, Community Ecology <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> ● Proposal Feedback Per Group ● Work on Projects <p>6:00 pm: Dinner</p> <ul style="list-style-type: none"> ● Work on Projects/Revise Proposals
Tues, 8/6	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> ● Lecture: Seawater Chemistry ● Prep for Boat Trip ● Plankton Sampling and CTD Deployment <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> ● Lecture: Seawater Chemistry Continued / CTD Data Discussion ● Project Time

	<p>6:00 pm: Dinner</p> <ul style="list-style-type: none"> • Intro to Rock Talk Speaker <p>8:00 pm – 9:00 pm: Rock Talk, Dr. Ingrid Ackermann</p>
Wed, 8/7	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • Fishes • Project Time <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> • Tracking Pelagic Species Activity <p>4:00 pm – 4:45 pm: Help with Food Run</p> <ul style="list-style-type: none"> • Tuna Readings and Activity <p>6:00 pm: Dinner</p> <ul style="list-style-type: none"> • Movie Night!!! :)
Thurs, 8/8	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • Lecture: Stock Assessments and Fisheries Management • Tentative Fishing Trip <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> • Surprise Activity • Project Time <p>6:00 pm: Dinner</p> <ul style="list-style-type: none"> • Activity Discussion • Marine Policy
Fri, 8/9	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • Guest Speaker - Samantha Bengs from GMRI • Sandlance and Humpbacks • Other Marine Megafauna <p>12:30 pm – 1:30 pm: Lunch</p> <ul style="list-style-type: none"> • 2 Megafauna Papers and Discussion • Project Time <p>6:00 pm: Dinner</p> <ul style="list-style-type: none"> • Project Time, Papers are due at midnight!
Sat, 8/10	<p>7:30 am: Breakfast</p> <ul style="list-style-type: none"> • Last Entry for Lab Notebooks – Notebooks Due • Tentative Whale Watch • Finalize Project Presentations!! <p>6:00 pm: Dinner</p> <ul style="list-style-type: none"> • Practice Presentations
Sun, 8/11	<p>9:00 am – 10:00 am: Tidy Dorms and Common Spaces</p> <p>10:00 am: Brunch</p>

	<ul style="list-style-type: none"> • Presentations (15 min + 10 min Q&A)!!! • <i>Course Evaluations and Packing</i> <p>5:00 pm: Dinner</p> <p><i>End of Course Reflection and Celebration! :)</i></p>
Mon, 8/12	<p>7:30: Breakfast</p> <ul style="list-style-type: none"> • <i>Have luggage ready on your dorm porch for pick-up</i> • <i>Gather on the dock for departure :(</i> <p>9:45 am: <i>Departure from Appledore Island</i></p> <p><i>~10:30 am – 11:00 am: Expected Arrival Back in Portsmouth</i></p>



Cornell University



University of
New Hampshire

Shoals Marine Laboratory on Appledore Island, Isles of Shoals, Maine: Dedicated to undergraduate education and research in marine science since 1966