



Appledore Island, Isle of Shoals, Kittery, Maine
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Shoals Marine Laboratory
Marine Ecosystem Research and Management (BIOSM 3750/MEFB 508)
June 29 - July 13, 2026

Course Syllabus and Schedule

Faculty:

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Dr. Mike Sigler, mikesigler8@gmail.com
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Prerequisites: One semester of college biology.

Course Credits: 3 Cornell credits / 4 UNH credits

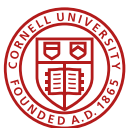
Course Overview/Course Description:

The faculty conduct ecosystem research and apply the results to management of fisheries and conservation of seabirds and marine mammals. We are excited for you to join us in Marine Ecosystem Research and Management (MERM)! Reach out via email with any questions about the material in this syllabus.

Students will conduct field sampling and data analysis to contribute to a research collaboration and final presentation. Field sampling ranges broadly, from ocean conditions, phytoplankton, and zooplankton to fish, terns, and seals. We will incorporate diverse stakeholder perspectives and explain how to effectively communicate results in a professional setting. Students integrate their research findings and recommend specific management actions to an expert panel and public audience. Students acquire skills to effectively address conservation questions with an ecosystem-based approach.

Learning Goals and Objectives:

1. Apply core ecological concepts to marine ecosystems
2. Address a real-world management problem
3. Learn common field sampling techniques for marine systems
4. Collaborate across disciplines to design, conduct, and integrate research projects
5. Effectively communicate research results and advice



Cornell University



**University of
New Hampshire**

Course Materials/Learning Resources:

Shoals Marine Lab is a remote field station off the New England coast. Please bring everything you might need with you to the island. Shoals provides a suggested packing list. A personal laptop is required for this course. There are no required textbooks.

Assessments/Assignments/Grading Overview:

Homework (4): 20%

Quizzes (2): 20%

Paper discussion (1): 20%

Final presentation (1): 40%

A note on rubrics: We use the rubrics to state how we will grade your work.

Homework: There are four homework assignments during the course. The homework will be building blocks of the final project and presentation. In general, homework will be completed in class and due at the end of the class session. Homework will be graded on timeliness (turned in on time) and completeness (each specific question has an answer). We will not grade content because we want students to practice the building blocks and not worry about getting the “right” answer. Instead, students will receive oral/written feedback, which can be applied to the final project. Homework is worth 20% of the final grade.

Quizzes: Two quizzes will each consist of three short answer questions covering the lectures and readings. Quizzes are open notes, in class, and last one hour. Extra time will be given if necessary. Students can use notes and materials from the class. Questions will emphasize broad concepts, not rote memorization. Students will receive oral/written feedback on their answers. Quizzes are worth 20% of the final grade.

Paper Discussion: Pairs of students will act as Discussion Leaders. As Discussion Leaders, students will read and critically evaluate current papers assigned from the primary literature. Results of their interpretation will be presented (~30 minute discussion sections) to the class in the form of an organized discussion: Discussion Leaders will provide an overview of the paper, results, and prompt other students to discuss the paper by providing questions. All students are expected to participate in discussing these papers by asking and answering questions. Grades will be assigned to both the Discussion Leaders and for student participation based on the following rubric. The paper discussion is worth 20% of the final grade.

Points per category (max 10 per category)	Discussion Leaders	Discussion Participants
10	<ul style="list-style-type: none">● Effectively identifies & summarizes main points● Synthesizes concepts from class and demonstrates critical thinking● Provides thoughtful questions for group to discuss	<ul style="list-style-type: none">● Actively listens to Discussion Leaders● Engages on answering multiple questions● Provides thoughtful responses to questions● Supportive of other students'

	<ul style="list-style-type: none"> ● Discussion time split appropriately between partners ● Presentation is clear and effective (strong presentation skills) 	<ul style="list-style-type: none"> ● ideas ● Positive, cooperative attitude
9	<ul style="list-style-type: none"> ● Identifies and summarizes main points ● Some synthesis of class concepts and/or critical thinking ● Provides basic questions for group to discuss ● Discussion time split appropriately between partners ● Presentation skills could be improved (e.g., reading off slides, excessive text on slides) 	<ul style="list-style-type: none"> ● Actively listens to Discussion Leaders ● Engages on answering a few questions ● Intermediate positive, cooperative attitude ● Intermediate support of other students' ideas
8	<ul style="list-style-type: none"> ● Identifies and summarizes some but not all main points ● Limited synthesis of class concepts ● Only 1-2 questions for the group to discuss ● Discussion time split unequally or inappropriately between partners ● Presentation is unclear or hard to follow ● Distracting factual errors 	<ul style="list-style-type: none"> ● Distracted and/or not actively listening to Discussion Leaders ● Engages on answering one question ● Limited participation ● Sometimes supportive of other students' ideas

Project and presentation: Students work as a team to conduct an integrated environmental and biological research project that has direct management implications. The overall project will combine multiple smaller projects focused on sustainable fisheries, marine bird and mammal conservation, community ecology, and biological oceanography. All smaller projects must have a direct link to the dominant forage fish species, Atlantic herring. The final integrated project must then examine and balance multiple objectives (e.g., sustainable fisheries, marine bird and mammal conservation) and make informed management recommendations for 2024. In this sense, the class's integrated project is at the core of ecosystem-based management of the region.

Students will work in small groups to sample a variety of ecosystem components (oceanography, plankton, fish, terns, and seals) and work closely with the instructors to formulate research questions and the appropriate analytical approaches to answer the questions. The project offers students an opportunity to detect patterns, test specific hypotheses, and relate pieces of the ecosystem into a holistic project. Each student will work through all aspects of a research project including hypothesis

formulation, data collection, analysis and interpretation, and communicating conclusions through a public presentation.

The course will culminate in a public presentation to a panel of experts involved in fisheries and marine resources in the Gulf of Maine. Each student pair will present the results of their small group work (5-10 min each) and the class will work together to present an integrated project summary (15 min) that includes providing management recommendations. All students will participate in the oral presentation. Points for this work will be awarded based on the following rubric. The project & presentation is worth 40% of the final grade.

Points per category (max 10 per category)	Project Content	Presentation Skills
10	<ul style="list-style-type: none"> ● Clear research story that is easy to follow and presents the information in a logical sequence ● Data is presented in an easy to understand visual ● Statistical tests are provided & clearly interpreted ● Management suggestions make sense given results ● Student includes at least one ecological concept from the course in the project ● Improves project based on feedback from instructors ● No factual errors 	<ul style="list-style-type: none"> ● Speaker shows preparation and practice ● Speaker uses clear voice and can be heard by audience ● Presentation is easy to read and images are not distracting ● Uses presentation techniques discussed in class (e.g., layering) ● Uses assigned length of time appropriately and time is split appropriately between partners ● Contributes to group project sections (Intro & Conclusions) ● Answers at least one question during the Q&A after the presentation
9	<ul style="list-style-type: none"> ● Research story is easy to follow, presents information in logical sequence ● Data is presented in an easy to understand visual format ● Statistical interpretations are provided but communication could be improved ● Some management suggestions, but not clear how they are supported by the research ● Student includes one ecological concept from the course in the 	<ul style="list-style-type: none"> ● Speaker shows preparation and practice ● Speaker's voice is clearly heard most of the time ● Presentation skills could be improved (e.g., reading off slides, excessive text on slides) ● Presentation is hard to read and/or images are distracting ● Sometimes does not use discussed presentation techniques ● Uses assigned length of time

	<p>project</p> <ul style="list-style-type: none"> ● Improves project based on feedback from instructors ● Minor factual errors 	<p>appropriately, and time is split appropriately between partners</p> <ul style="list-style-type: none"> ● Contributes to group sections (Intro & Conclusions) ● Answers at least one question during the Q&A after the presentation
8	<ul style="list-style-type: none"> ● Research story sometimes is hard to follow ● Data presentation/visual is somewhat difficult to understand ● Data analysis and interpretation sometimes are inappropriate ● Management recommendations not supported by the research ● No ecological concept from the course included in the project ● Only some improvement based on feedback from instructors ● Distracting factual errors 	<ul style="list-style-type: none"> ● Speaker shows little preparation and practice ● Speaker cannot be clearly heard some of the time ● Presentation skills could be improved (e.g., reading off slides, excessive text on slides) ● Presentation is hard to read and/or images are distracting ● Does not use discussed presentation techniques ● Does not use assigned time appropriately, and time is split unequally or inappropriately between partners ● Does not contribute to group sections (Intro & Conclusions) ● Answers no questions during the Q&A after the presentation

Grading Scale

UNH/other institution student grading Scale		Cornell student grading scale	
		100 - 98.00	A+
100 - 94.00	A	97.99 - 94.00	A
93.99 - 90.00	A-	93.99 - 90.00	A-
89.99 - 87.00	B+	89.99 - 87.00	B+
86.99 - 83.00	B	86.99 - 83.00	B
82.99 - 80.00	B-	82.99 - 80.00	B-
79.99 - 77.00	C+	79.99 - 77.00	C+
76.99 - 73.00	C	76.99 - 73.00	C
72.99 - 70.00	C-	72.99 - 70.00	C-
69.99 - 67.00	D+	69.99 - 67.00	D+
66.99 - 63.00	D	66.99 - 63.00	D
62.99 - 60.00	D-	62.99 - 60.00	D-
< 59.99	F	< 59.99	F

Expectations and Code of Conduct:

Students are responsible for fully understanding all the information presented in this syllabus and should discuss any questions with instructors as soon as possible. If there are any questions regarding this information, it is the student's responsibility to bring it to the instructor's attention. Students are responsible for attending all activities associated with this course and completing all assignments—your experience in the course will be most valuable and effective if you are present, enthusiastic, and prepared! Each student is responsible for their own behavior: always be respectful and collegial to other students, with instructors, SML staff, interns, visiting researchers, and other visitors. SML is a community, so please strive to be a positive member of that community. Students are responsible for fully understanding and adhering all of the information presented in the [Appledore Island Handbook](#).

1. *Personal Technology / Electronic Devices.* Do not use cell phones, smart phones, iPads, headphones, or similar devices in the classroom or during course activities, unless approved by your faculty. Device use during lectures and activities is distracting, disrespectful, and detrimental to your learning.
2. *Transmission of Course Materials.* Students are not authorized to replicate, reproduce, copy or transmit lectures and course materials presented, or derivative materials including class notes, for sale or free distribution to others without written consent of SML and the instructors who are the original source of the materials. During the course, you will sign a data sharing agreement related to all data which you may use.
3. *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 web site, or a published paper. It is your responsibility to properly cite any sources used in your work. Students must adhere to Cornell's and UNH's Policy for Academic Honesty/Plagiarism and Discrimination:
 - a. [Cornell Code of Academic Integrity](#)
 - b. [UNH Academic Integrity policy](#)
4. *Use of Artificial Intelligence.* Students must have the express written permission from the faculty member teaching the course prior to the use of artificial intelligence to generate work submitted in a course. Any attempts to deviate from this principle by submitting work that is not independent and original will be construed as acts of academic misconduct.
5. *Disabilities & ADA Accommodation:* Students with a disability should contact Student Disability Services at [Cornell](#) or [UNH](#) four weeks prior to start of class for confidential discussion of needs and for registration to verify eligibility for academic accommodations. No retroactive accommodation can be made.
6. Shoals Marine Lab and its faculty are committed to assuring a safe and productive educational environment for all students and for the university as a whole. To this end, SML faculty members will report to the appropriate Title IX offices (UNH – Civil Rights and Equity Office, unh.civilrights@unh.edu; 603-862-2930; Cornell – Office of Civil Rights, titleix@cornell.edu, 607-255-2242) any incidents of sexual violence and harassment shared by students. If you wish to speak to a confidential support service provider who does not have this reporting responsibility because their discussions with clients are subject to legal privilege, you can contact the SHARPP Center for Interpersonal Violence Awareness, Prevention, and Advocacy at (603) 862-7233/TTY (800) 735-2964. SML also maintains an [Anonymous Incident Reporting Page](#) for students, staff and faculty to communicate incidences of bias and other feedback to SML leadership.
7. *Mental Health and Belonging:* 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 to someone about a personal issue, seek support first from your TAs and faculty. SML staff are available

throughout the daytime, and at any time when there is an emergency. See the following resources for additional assistance:

- a. [UNH Mental Health Emergency Services](#)
- b. [Cornell Mental Health care and emergency services](#)
- c. [SML Supportive Community page](#), which includes a bias reporting and feedback form

Schedule:

Dining hall meal times:

Mon-Sat: Breakfast at 7:30am, Lunch at 12:30pm, Dinner at 6:00pm

Sun: Brunch at 10:00am, Dinner at 5:00pm

Island quiet hours: 10:00pm-7:00am

Rock Talks: All students come to the Tuesday “Rock Talk” (island-wide guest speaker seminar) at 8:00PM in the Commons.

Food Run: Every Wednesday is an Island-wide “Food Run” at ~4:00PM. All students and faculty help unload food from the boat. This food will be used throughout the week.

Cleaning: Sunday mornings before brunch, students are expected to work together to tidy their dorm rooms and shared dorm spaces. Students will help clean the classroom on the final day of the course.

First day of our class:

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|---------|---|
| 1:30 pm | Arrive at the SML dock (315 Market Street, Portsmouth, NH).
Please note there is <i>NO</i> parking available at the SML dock; pick-up/drop-off only.
See email sent by SML for arrival and parking information.
Check-in with SML staff at the SML dock.
Unload luggage from vehicle(s) and load onto SML vessel. |
| 2:45 pm | Depart Portsmouth en route to Appledore Island (trip duration = ~90 minutes) |
| 4:15 pm | Approximate arrival to Appledore Island |
| 4:30 pm | Gather on Kiggins Commons deck for Island Welcome and Orientation led by SML Staff.
Luggage will be delivered to dorms by SML staff while students are in the Commons. |
| 5:00 pm | Participants shown to their dorm rooms |

Tides for Gosport Harbor: Click [here](#).

Daily Schedule: On the first day of class, we will collectively make a set of in-class guidelines and expectations. Our expectation is that in class and on island, students should be respectful and collegial to other students and with instructors. Students are responsible for participating actively in all activities associated with this course and completing all assignments.

The daily schedule is subject to change based on weather, boat availability, tides, instructor's discretion, etc. Instructors will write the most up-to-date schedule in the Commons each morning.

DAY	MORNING 8:30a - 12:30p	AFTERNOON 1:30 - 5:30p	EVENING 7:00 - 8:30p
Sun Jun 28	Boat schedule		6:15 - Faculty meeting
Mon Jun 29		STUDENTS and faculty: Arrive 4:15 pm at Shoals Marine Laboratory	Course Introduction ; Community agreements
Tue Jun 30	8:30 - What does "management" mean to you? (discussion); What is an ecosystem? (E.Siddon); Gulf of Maine overview (Sigler); Lab: Ecosystems	1:30 - Ecosystem Status Reports (E. Siddon); Lab: Ecosystem Indicators ; ~4:00 - Ecosystem component choices ; Discussion paper choices ; Discussion paper instructions	7:00 - Ibis and egret colony walk (wear good shoes) 8:00 - Rock Talk (Ebett Siddon)
Wed Jul 1	8:30 - Write testable hypotheses ; HW1 : Identify your small group question, hypothesis, and mock graph Project template ; available data 11:00 - Set up R ; Basic R skills	1:30 - Steller sea lion foraging (Sigler) 2:30 - Seabird indicators in fisheries management (ESRs, etc.) (Good) 4:00 - Food run	7:15 - Lab: Neuston net sampling (Heiser)
Thu Jul 2	8:30 -11:15 - Herring and Lobster fisheries (C. Siddon) 11:30 - Seal Biology and Conservation (Bogomolni)	1:30 - Work on discussion papers 5:00 - Dry run bird and mammal counts on land (e.g., count gulls from Loughton porch)	7:00 - CTD and bucket sampling (Heiser);
Fri Jul 3	8:30 - Ecosystem data analysis (C.Siddon / Sigler)	3:00 - What I need (WIN) time	7:00 - Quiz 1 (in class, open book)

	10:00 - 3:00 Bird and mammal survey (on dock @ 9:45)		
Sat Jul 4	8:30 - Lab: Seal survey , 8:41 low tide 0.3 ft; seal survey 11:00 - Seasonality and location matters (Sigler); 11:45 - Bird and mammal survey debrief	1:30 - Discuss papers (3); Discussion paper reflection 3:30 - Lab: Data analysis ; Class data sets (took ~2 hrs)	7:00 - Discuss papers (3)
Sun Jul 5	10:00 - Brunch; 11:00 - 1:30 - Prepare project outline (question / hypotheses / plots) 1:30 - 4:30 Lab: White Island visit (high tide 3:41, 8.4 ft);		5:00 - Dinner; 6:15 - Faculty meeting; 7:00 - 8:30 Present your project outline (question / hypotheses / plots)
Mon Jul 6	8:30 - ; Juvenile fish ID ; Lab: juvenile fish (beach seine) sampling, New Castle Beach (Heiser, inflatable); 10:00 low tide 0.4 ft (Heiser)	1:30 - Use available data and make plots for your project; 4:30 - Present your plots	7:00 - Present your plots (cont.); HW2 8:00 - Data management (C. Siddon)
Tue Jul 7	8:30 - Begin data analysis 10:30 - TBD: Gulf of Maine ecosystem model, Lecture and Lab ; NOAA fish distribution app (in person only)	1:30 - Seabird Biology and Conservation (Good) 3:00 - Data analysis; HW3 (1 or 2 groups present)	8:00 - Rock Talk (Tom Good)
Wed Jul 8	8:30 - Trophic control (E. Siddon, remote); Lab prep; 10:30 - Lab: Foraging and energy density ; 11:33 low tide, 0.6 ft	1:30 - Present data analysis 3:00 - Quiz 2 (in class); 4:00-4:30 food run 4:30 - swim call	7:00 - Begin writing story
Thu Jul 9	8:30 - How to prepare a presentation ; Communicating research on a controversial topic	1:30 - Present work 3:00 - Work on slides	7:00 - Community Science, Outreach and Engagement (E. Siddon)

	(rate Mike) (Sigler) 9:00 - small group work 11:00 Artist in Residence (Maesie Halliday)		
Fri Jul 10	8:30 - Brainstorm management implications in original small groups Discuss management implications; HW4	1:30 - WIN	7:00 - Work on integrated presentation
Sat Jul 11	8:30 - Work on integrated presentation	1:30 - Practice integrated presentation and answering questions	7:00 - Practice revised presentation
Sun Jul 12	9:00 - Tidy living spaces; 10:00 - brunch; 11:15 - PRESENTATION to management panel; 2:00 - Course evaluations, classroom and lab cleanup; 3:00 MERM commencement 4:00 - store open		5:00 - dinner; 7:00 - Coffee House
Mon Jul 13	Students clean rooms; Luggage on your dorm deck BEFORE breakfast Depart @10:00am		

Equivalent note:

Cornell students, this course fulfills the following requirements:

- Environment and Sustainability majors: Capstone requirement
- Biology majors, Marine Biology concentration: Meets both Group B - Advanced topics requirement and Fieldwork requirement.

UNH students, this course fulfills the following requirements:

- Marine Estuarine and Freshwater Biology majors: Electives requirement