Shoals Marine Laboratory
Marine Environmental Science (BIOSM 1620)
June 29- July 24, 2020

**Course Syllabus and Schedule**

**Faculty:**
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**Teaching Assistants:**
Rachel Howard
Jacob Huelskamp

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

**Credit:** 3 credits through Cornell

**Course Objectives/Goals:**
Environmental studies have become an integral component of high school programs all around the country; however, opportunities to apply this course work to the marine environment are limited. Marine Environmental Science will explore the diversity of marine habitats and ecosystems and the tools scientists use to study them, with an emphasis on topics related to human impacts and environmental health.

The course is organized into four one-week modules, each linked either to an active research program at the Shoals Marine Laboratory or the expertise of the instructors. Additionally, each student will work in small groups to conduct a substantive research project using scientific methods to explore their own hypotheses developed through observations of behavior within the tern breeding colony on the adjacent Seavey Island within the Isles of Shoals. We are particularly excited about our ability to continue offering a robust research component during remote learning. This is feasible because of a network of video cameras currently deployed throughout the nesting colony, combined with a database with years of monitoring observations.

Virtual “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. 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.
Modules:

1. Science and Seabirds
   I. Introduction to the scientific method
   II. Introduction to the group research projects
   III. Seabird biology and ecology

2. Intertidal Zone
   I. Ecological adaptation and basic taxonomy of intertidal organisms
   II. Ecological physiology
   III. Environmental monitoring

3. Pelagic Systems
   I. Physical and biological oceanography
   II. Ecological physiology
   III. Science technology

4. Conservation and Conclusions
   I. Marine conservation and natural resource use – sustainable fisheries
   II. Data analysis and project presentations

Course Materials:
A computer and internet connectivity are required for connecting to class and team meetings, writing papers, completing lab exercises, and working with data. Our learning management system will be Canvas, by Instructure. It will be our platform for distributing instructional materials, tracking assignments, and returning feedback. Specific activities will require that you also record observations, objectives, protocols, results, and analyses in a physical lab notebook. Any notebook is sufficient. We will periodically ask you to submit scans or photos of your notebook progress.

Assignments & Grading:
Grades for this course will be based upon student mastery of learning objectives within each of the four units plus the research project. Overall performance will be weighted across these units as follows:

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<th>Unit</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Module 1: Seabirds</td>
<td>20%</td>
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<tr>
<td>Module 2: Intertidal</td>
<td>20%</td>
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<td>Module 3: Pelagic</td>
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<td>Module 4: Conservation</td>
<td>15%</td>
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<tr>
<td>Research Project</td>
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At the start of each unit, students will receive a comprehensive rubric of expectations and weights for individual assignments and expectations. These will include categories such as: lab notebook entries, lab reports, reading reflections, homework assignments, peer editing, oral presentations, scientific writing, preparation for synchronous meetings, debates, data analysis, contribution to group discussion (live and virtual), tests/exams, attendance at Shoals “Rock Talks” (SML guest lectures on various topics), and other work as may be assignment by the instructors.

Expectations and Conduct:
Students are responsible for fully understanding all 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 own behavior - specifically maintaining a safe experience for themselves and others, and in being respectful and collegial to other students and with instructors. Students are responsible for fully understanding and adhering all of the information presented in the
Expectations during Zoom meetings – Etiquette & Conduct

- Your Zoom screen name must match the name under which you are enrolled in the course (although you may append a nickname you prefer)
- Your webcam adds value to our class experience. Please keep it on to the maximum extent appropriate. If it is off, we will assume you have stepped away from the classroom.
- Muting of your microphone can be helpful if there are distractions on your end, but it reduces the spontaneity of discussion and verbal feedback. Different instructors may have different preferences for your default mic setting. Please respect those stated preferences.
- No recording or sharing of zoom calls or other information without permission.
- Attire, language, and backgrounds should be professional and respectful.
- Minimize distractions and "be present" by putting away phones and unrelated work.
- Improve clarity by speaking deliberately and use good lighting (behind your camera).
- Be explicit and animated with your non-verbal communication: nodding, thumbs up, hand-raising.
- Participate with grace & humor. Suspend judgement and be willing to try new things!
- Personal Technology During the Workday. Please do not plan on taking notes on a laptop as there ample research showing it inhibits learning compared to taking notes by hand (even compared to not taking notes at all, although that will not be acceptable for this course either; e.g. Muler and Oppenheimer 2014). Allowances are made for any student with a learning plan that specifies accommodations for typing class notes. In this case it will be expected that you have a second screen/monitor for Zoom and note-taking windows.

Transmission of Course Materials:

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

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. Students must adhere to the policies of Cornell and UNH for Academic honesty, plagiarism and discrimination.

Cornell: [http://theuniversityfaculty.cornell.edu/academic-integrity/](http://theuniversityfaculty.cornell.edu/academic-integrity/)

UNH: [https://www.unh.edu/student-life/09-academic-honesty](https://www.unh.edu/student-life/09-academic-honesty)

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](https://www.unh.edu/studentaccessibility) prior to start of class for confidential discussion of needs and for registration to verify eligibility for academic accommodations.

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.

Schedule:

Students should expect to devote about 2 hours per day, Monday – Friday, in the virtual classroom and another 1-2 additional hour per day working on their assignments and research projects.

Synchronous activities will typically occur between 9am and 12pm Monday – Friday. In addition, students are expected to attend SML Rock Talks on Tuesday nights at 7:30pm (EDT). Under extenuating circumstances, a student who misses a synchronous meeting may review a recording of that session.
accessible on Canvas. We are unable to record breakout rooms during synchronous classes, so this is only a partial solution.

Weekends will mostly (but not entirely) include asynchronous work and time to complete research projects. Asynchronous activities have deadlines and due dates but may otherwise be completed at the student's pace and schedule.

Instructors will present the students with a more specific schedule for synchronous meetings at the beginning of each week.

**Schedule of Events: Marine Environmental Science 2020**

**Week 1: Science and Seabirds (week of June 29)**
**Summary of Objectives:** During the "Science and Seabirds" module, students will get an overview of the course structure, the scientific method, and seabird biology. Students will learn how to navigate and operate in the virtual classroom and come to understand course expectations including the syllabus and schedule. During this week students will also be introduced to the scientific method and the differences between experimental and observational research. Students will use the scientific method to design an observational study using video footage of SML’s breeding tern colony. Lastly, in order to aid their observational study, a series of guest lectures from researchers working at SML will provide background information on seabird ecology, conservation, behavior and anatomy.

**Week 2: Intertidal Zones (week of July 6)**
**Summary of Objectives:** During the “Intertidal Zones” module, students will learn the basics of rocky intertidal ecology. They will consider environmental stressors and interactions that may contribute to observed patterns in zonation of habitats and form and function of organisms. Students will also learn how to identify common organisms in the intertidal via photographs and video footage. Students will use this information and scientific method to investigate patterns of organisms’ distribution and abundance at various SML intertidal monitoring stations on Appledore Island.

**Week 3: Pelagic Zones (week of July 13)**
**Summary of Objective:** During the "Pelagic Zones" module, students will learn the basic of epipelagic (i.e., surface layer) and deep-sea ecology. As in the intertidal module, students will consider environmental stressors and interactions that contribute to the observed patterns in habitat zonation and organismal form and function in each pelagic zone. Students will complete several “at-home” laboratory exercises and case-studies that investigate physical oceanography, ecological groupings of pelagic organisms, and unique adaptations that allow some animals to exploit wide-ranging food resources. Students will also learn how scientists study physical oceanography, as well as organisms in the epipelagic and deep-sea.

**Week 4: Conservation and Closing (week of July 20)**
**Summary of Objectives:** During the "Conservation and Closing" module, students will explore topics relevant to conservation in the modern world. Special attention will be given to fisheries sustainability. In addition, students will receive additional time and support to complete their research projects and to present their research to their instructors and peers.
# NOAA/NOS/CO-OPS Tide Predictions at 8427031
Gosport Harbor, Isles of Shoals NH

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- Subordinate Station | Ref. Station (Portland 8418150) | Time offsets (high: 2 min. low: -2 min.) | Height offsets (high: *0.93 ft. low: *0.93 ft.)

Saturday, Jul 25 2020, 9:14 AM LST/EDT
Predictions: ~0.747 ft.