Shoals Marine Laboratory
Marine Environmental Science (BIOSM 1620; Section 2)
July 6-20, 2015

Course Syllabus and Schedule

Faculty: Mark Johnson

Teaching Assistants: Andrew Swafford, Chelsea Friend

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

Class enrollment limit: 20

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 coastal marine habitats and ecosystems and the tools scientists use to study them, with an emphasis 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 research project, in which students are expected to apply the scientific methods they have practiced in the field and lab to address a research question of their own design on Appledore.

Course Materials:
If possible, we highly recommend bringing a laptop computer for writing papers. Lecture notes can be taken on a laptop or by hand, but should be kept in a single file or notebook for access during the Final Exam. We also require sturdy, close-toed shoes (or muck boots) for work in the intertidal zone.

Assignments & Grading:
a. Required Assignments: Each student will write one Laboratory Report, constituting 20% of the final grade. Within small groups, each student will also design and carry out a research project that will constitute 30% of the final grade (20% based on individual research paper, 10% based on group oral presentation). Rubrics will be provided for all required assignments so all expectations for grading are clear.

b. Exams: There will be a Laboratory Practical exam, constituting 20% of the final grade, and a Final (open-note) Exam also constituting 20% of the final grade. Mandatory group study sessions will precede both exams.

c. Full and active participation, including active reading of four articles and preparation for a class debate, constitutes 10% of the final grade.

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 (remember, there is no such thing as a bad question).

Every student is responsible for their own behavior- specifically 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 SML Appledore Handbook (http://www.sml.cornell.edu/sml_forms.html)

1. Personal Technology. Do not use cell phones, smart phones, iPads, mp3 players, headphones, or similar devices in the classroom or during course activities. If you take notes with your computer, disable wireless access during lecture.

2. The lab has a modest computer facility in Laighton Library; please treat this shared facility with respect. Printers are available, but please limit printing to your FINAL document (if required).

3. 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 the instructors who are the original source of the materials.

4. 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 Cornell’s and UNH’s Policy for Academic Honesty/Plagiarism and Discrimination
   i. Cornell: http://cuinfo.cornell.edu/aic.cfm
   ii. UNH: http://www.unh.edu/vpsas/handbook/welcome-university-new-hampshire

5. Disabilities & ADA Accommodation: Students with a disability must contact Cornell’s (420 CCC building; 607-254-4545) or UNH’s Student Disability Services(http://www.unh.edu/disabilityservices) four weeks prior to start of class for confidential discussion of needs and for registration to verify eligibility for academic accommodations. No retroactive accommodations can be made.

6. 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 8am – 7pm or knock on the door of Bartels House after hours.

Schedule: Daily schedules at Shoals Marine Laboratory are flexible in order to accommodate predictable events (e.g. tides), to take advantage of unforeseen opportunities to experience the marine environment, and to participate in campus-wide marine science lectures and field opportunities. MES’s daily routine may include early morning collecting trips to the intertidal zone.

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 study for the lab practical, work on research projects, or attend guest lectures.

**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. Musicians should feel free to bring an instrument to the island and share a song with other students, faculty and staff. Additionally, one morning or afternoon each week, students join in a general cleaning of the island and its facilities.

**Schedule of Events: Marine Environmental Science, Section 2, 2015**

**Day 1: Monday the 6th of July**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>3:00</td>
<td>Student arrival unpack-dorm</td>
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<tr>
<td>3:30</td>
<td>Island Intro: Fire and water/Facilities tour</td>
</tr>
<tr>
<td>5:00</td>
<td>Lecture: Course introduction/The nature of science</td>
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<tr>
<td>6:00</td>
<td>Dinner</td>
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<tr>
<td>7:00</td>
<td>Walk-a-bout: Geo walk-get to know the Island</td>
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<tr>
<td>8:30</td>
<td>Lab/lecture Descriptive Writing Activity Scientific Method</td>
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<tr>
<td>10:00</td>
<td>Dorm Sleep - on – it : Plans for research project</td>
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**Day 2: Tuesday the 7th of July**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>7:30</td>
<td>Breakfast</td>
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<tr>
<td>8:30</td>
<td>Lab Group projects intro- Problem, Hypothesis, experimental diagram</td>
</tr>
<tr>
<td>9:30</td>
<td>walk-a-bout Intertidal collection</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>1:30</td>
<td>Lab Biotic and Abiotic Factors</td>
</tr>
<tr>
<td>3:00</td>
<td>Lecture Zones of the ocean-in Ham</td>
</tr>
<tr>
<td>6:00</td>
<td>Dinner</td>
</tr>
<tr>
<td>7:00</td>
<td>On the boat: Environmental testing</td>
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<tr>
<td>9:00</td>
<td>Lab Work on backgrounds</td>
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<tr>
<td>10:00</td>
<td>Dorms Sleep-on-it : Differences between life on the exposed vs. the sheltered</td>
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**Day 3: Wednesday the 8th of July**

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<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>7:30</td>
<td>Breakfast</td>
</tr>
<tr>
<td>8:30</td>
<td>Lab Identify intertidal species Introduce adaptations</td>
</tr>
<tr>
<td>10:30</td>
<td>Walk-a-bout Intertidal zones &amp; Intertidal Transects Trip #1</td>
</tr>
<tr>
<td>12:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>3:30</td>
<td>Lab lab practical study session Work on backgrounds</td>
</tr>
<tr>
<td>6:00</td>
<td>Dinner</td>
</tr>
<tr>
<td>7:00</td>
<td>On-the-boat Fishing trip: ocean adaptations</td>
</tr>
<tr>
<td>8:30</td>
<td>Lab Plankton and the sea –let’s see what we got!</td>
</tr>
<tr>
<td>10:00</td>
<td>Dorms Sleep-on –it: Group Project Implementation</td>
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</tbody>
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**Day 4: Thursday the 9th of July**

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<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>7:30</td>
<td>Breakfast</td>
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<tr>
<td>8:30</td>
<td>Lect/Lab: Marine Debris/Plastic Jellyfish Debris Collection /analysis</td>
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<tr>
<td>11:00</td>
<td>Lecture/ Lab: Ocean systems Experimental set up: running first data sets</td>
</tr>
<tr>
<td>12:30</td>
<td>Lunch backgrounds due</td>
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<tr>
<td>1:30</td>
<td>On-the-boat: hagfish retrieval</td>
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<tr>
<td>6:00</td>
<td>Dinner</td>
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</tbody>
</table>
Day 5: Friday the 10th of July
7:30 Breakfast
8:30 LAB: Group experimental work-note tides SET UP
10:00 Lecture: Ocean Verbs Survey
11:00 On-the-boat: seal viewing and census
12:30 Lunch
1:30 Walk-a-bout: intertidal transect visit #2
4:00 Lecture/Lab Oil spills
                Oil spill clean up challenge-SAVE THE BIRDS
6:00 Dinner
7:00 Lab: Lab Practical
10:00 Dorms Sleep-on-it: What is the state of the local fisheries

Day 6: Saturday the 11th of July
7:30 Breakfast
8:30 On the boat: Seal viewing
10:30 Lecture: Marine fisheries
12:30 Lunch
2:30 Walk-a-bout Echolocation activity
3:30 Lab: Analysis Transects-write-up format
          Research Project Time
6:00 Dinner
7:00 Lab: Dissection Rotation-Dog fish- Mackerel –Squid
10:00 Dorms Sleep-on-it: Why are wetlands an important habitat?

Day 7 Sunday the 12th of July
10:00 Brunch
11:30 Lecture: Estuaries and wetlands
                Water pollution
                Project time
2:00 On the boat: Salt Marsh Communities-Why do we need wetlands?
5:30 Supper
7:00 Lab: Why Protect the wetlands?
          Project time
10:00 Dorms sleep-on-it: What would your character do?

Day 8: Monday the 13th of July
7:30 Breakfast
PROJECT TIME
9:30 Lecture: Marine mammals of the Gulf of Maine
PROJECT TIME
12:30 Lunch
2:00 Lecture: Marine mammal in captivity debate-research
          Town meeting-MMCD---Out of character
PROJECT TIME
6:00 Dinner
Transect reports due:
emailed to MarineEnvironmentalScience@gmail.com or handed to Chelsea by 7:00.
7:00 Lecture: Marine conservation
PROJECT TIME
10:00 Dorms Sleep-on-it: How do we reestablish displaced populations?

Day 9: Tuesday the 14th of July
7:30 Breakfast
9:00 Lecture: Reestablishing habitat and gull behavior
PROJECT TIME
12:30 Lunch
1:30 Lecture: Gull research and behavior
3:00 On the boat: Tern nesting site-White Island- wet landing
6:00 Dinner
7:30 Lect/lab Snowy egret proposal
10:00 Dorms Sleep-on-it: Bring back the egrets?

Day 10: Wednesday the 15th of July
7:30 Breakfast
9:00 Lect./Lab Plan to bring back the Snowy Egrets
9:30 Build decoys
10:00 Walk-a-bout Egret nesting site
11:00 Walk –a-bout High tide Snorkel Log/data set
12:30 Lunch
2:00 Lecture Saturation Diving and studying the deep
PROJECT TIME —Final data set or drawing conclusions and discussion of error
*******LOOK AND LISTEN FOR THE FOOD RUN***************
6:00 Dinner
7:00 Lect/Lab Meet to check in on projects
PROJECT TIME —Final data set or drawing conclusions and discussion of error
10:00 Dorms Sleep-on-it: Save the whales and the beaches?

Day 11: Thursday the 16th of July
7:30 Breakfast
9:00 Lab Project Time—prepare and practice presentations
9:30 sign-ups
10:00 on the boat Whale watch, returning around 2:00
12:30 Lunch on the boat
PROJECT TIME
6:00 Dinner
7:00 Lectwalk The sustainability of the Shoals Marine Lab.
10:00 Dorms Sleep-on-it: Presentations tomorrow—you will do great!

Day 12: Friday the 17th of July
7:30 Breakfast
9:00 Lecture: TA Talk
10:30 Lecture: Project Time from sign-ups—prepare
practice presentations (in lecture hall)
12:30 Lunch
1:30 Lecture: Project Time from sign-ups—prepare (Computers)
practice presentations (in lecture hall)
3:30 Lecture: Presentations: self designed experiments Part I
6:00 Dinner
7:00 Lect/ lab Presentations: self designed experiments Part II
10:00 Dorms Sleep-on-it: What happens at night?

Day 13 Saturday the 18th of July
7:30 Breakfast
9:00 Lecture: Global Warming: Carbon footprint
11:00 Walk-a-bout: Calculation the Island’s Carbon output
12:30 Lunch
2:00 Lecture: Solutions to global warming
4:00 Lecture: Project time-finish write-ups—computers
6:00 Dinner
8:30 On the boat: Environmental Testing at night.
10:00 Dorms Sleep-on-it: Are your course logs in order?

Day 14: Sunday the 19th of July
9:00 Lab: Plankton and Bioluminescence
10:00 Brunch
11:00 Lecture: Log Final EXAM part 2
2:30   Lab:  Experimental write-ups due
       Fish print class shirts

4:00   Walk-a-bout  Final island hike-what have not seen.
5:00   Super  Ice cream social
7:00   On the boat:  To Star Island for ice cream!
8:30   Lecture: Slide show-a look back!
       Movie:  “Something ocean like”
             Popcorn
10:00 or so Dorms  Sleep-on-it:  What a Trip we had!

Day 15: Monday the 20th of July

7:30   Breakfast
8:30   Lecture: Evaluations/info exchange
9:00   Depart Final good-byes-sniff–sniff

###BOAT TIME MAY BE CHANGED DUE TO WEATHER OR OTHER BOAT USES.