Appledore Island, Isle of Shoals, Kittery, Maine
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Shoals Marine Laboratory
Coastal Habitat Field Research Methods (BIOSM 2500/MEFB 500)
July 18-25, 2016

Course Syllabus and Schedule

Faculty: Dr. Gregg E. Moore (gregg.moore@unh.edu)

Prerequisites: One semester of college-level biology

Class Enrollment Limit: 15

Credit Hours: 1.5 (Cornell credits) / 2 (UNH credits)

Course Description: A one-week introduction to research and assessment methods of terrestrial and aquatic plant communities of the Isles of Shoals. Topics covered will include quantitative surveys methods, GIS-based and aerial (drone) mapping of plant communities, island biogeography, rare species conservation, and the management of invasive species. Through both field and classroom exercises, we will use a variety of sampling protocols to document the existing plant communities, investigate the floristic changes that Appledore and nearby islands have experienced from past and to present, and use these data to predict trends into the future to help preserve their unique flora.

General topics will include:
- Quantitative field vegetation survey approaches (transect/quadrat, point intercept, belt transects, etc.)
- Qualitative survey approaches (random, haphazard, meander, etc.)
- Habitat mapping with corrected GPS and real-time-kinematic [RTK] equipment
- Basic GIS map production using ESRI ArcMap/ArcPad and Google Earth
- Drone-based aerial survey and post-processing of visible and remote sensing data
- Plant taxonomy, including field and lab identification approaches
- Plant collection techniques and ethics and specimen preservation techniques
- Rare species (Natural Heritage) documentation protocols
- Invasive species control approaches, and associated benefits and drawbacks of each

Skills gained will include:
1. Know how to conduct terrestrial and aquatic plant surveys and apply the appropriate methodology for their intended purpose (i.e., applied research, resource management, etc.)
2. Become familiar with the flora of Appledore (and possibly Star) and be able to distinguish native vs invasive species, rare species, and harmful (poisonous) species
3. Document rare plant(s) using Natural Heritage's rare species occurrence forms
4. Map plant habitats using GPS and RTK, and aerial imagery which may include natural communities, limits of invasive species stands, or location of isolated rare species

5. Contribute to an ongoing island-wide floral survey and habitat mapping effort
6. Produce plant habitat map(s) using GIS, Google Earth or other open source software
7. Understand the factors that lead to habitat stability or floristic change over time
8. Completed a modest plant collection and prepare a selection of herbarium specimens to be stored at UNH's Hodgdon Herbarium

Texts and Required Reading

Due to the unique nature of this course, reading will be selected from the literature and compiled into a packet for enrolled students. Links to reference material and primary literature will be made available on Blackboard.

Assignments & Grading

Class/Lab Participation (including daily journal to be handed in on last day)	10 pts
Plant Collection (40 plants required for full credit)	20 pts
Field Book (daily field data and field sketches required)	20 pts
Group Project (written summary and powerpoint)	20 pts
Final Field Test (conducted in field, answers written)	30 pts
TOTAL – 100 pts	

A = 94-100	C+ = 77-79	D- = 60-63
A- = 90-93	C = 73-77	F = 0-59
B+ = 87-89	C- = 70-73	
B = 83-87	D+ = 67-69	
B- = 80-83	D = 63-67	

Participation: Success at SML requires a positive attitude and a willingness to accept changes in the schedule with grace. Island living demands respect for your fellow classmates, and residents on Appledore. Students are expected to actively participate in all facets of this course, and to display good citizenship while at SML. 10% of your grade will be based on the faculty's subjective evaluation of your personal involvement in course activities. If you have any questions or comments about the course, please contact the instructors directly.

Course Expectations and Academic Conduct

Students enrolled in this course will be expected to follow the academic conduct guidelines outlined by the University, several of which are quoted below. The complete guidelines can be found at www.unh.edu/student/rights.

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 *Appledore Island Handbook* (http://www.shoalsmarinelaboratory.org/about-appledore)

1. *Personal Technology.* Do not use cell phones or similar devices in the classroom or during course activities. If you take notes with your computer or tablet, disable wireless access during lecture.
2. *Computer Facilities.* 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: (also see below)
    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 Serviceshttp://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.

Academic Honesty

Honesty is a core value at the University of New Hampshire. The members of its academic community both require and expect one another to conduct themselves with integrity. This means that each member will adhere to the principles and rules of the University and pursue academic work in a straightforward and truthful manner, free from deception or fraud. Any attempts to deviate from these principles will be construed as acts of academic dishonesty and will be dealt with according to the rules of due process detailed in the academic conduct guidelines.

Plagiarism

The unattributed use of the ideas, evidence, or words of another person, or the conveying of the false impression that the arguments and writing in a paper are the student's own. The penalty

for cheating, plagiarism or misrepresentation in this class will be an automatic F for the course, and could result in dismissal from the University.

Daily Schedule (Provisional Outline)

Day 1

Welcome, settle in (arrive 2:30). Get the lay of the land, "Fire and Water" rules of the road presentation, settle in to housing arrangements. Island walkabout before dinner. First class meets after dinner, syllabus and expectations.

Day 2

Morning Lecture on major plant community types present on Appledore and factors that influence their distribution.

Mid-Morning Lab instruction on tools of the trade (e.g., quantitative/qualitative techniques, plant collection/preservation and intro/review of how to use a GPS).

Afternoon Field/Lab to visit major communities, look for rare and/or invasive species and first set of plant collections to familiarize.

Evening Discussion of the day's events, Q&A and set up for next day using drone/aerial images and GIS as needed.

Day 3

Morning Lecture on vegetation sampling design and establish field plan for afternoon Lab. Instruction on data collection, data sheets, estimation techniques and rationale for selecting.

Mid-Morning group project to design autonomous drone sampling plan. Instructional videos on drone use, rules, safety.

Afternoon Lab to mark vegetation transect lines end points and begin sampling plots as a group, comparing different techniques. Depending on weather, conduct test flight of drone.

Evening Discussion of initial data, results, opinions on how to continue sampling.

Day 4

Morning Lecture on rare species, exemplary habitats, and documenting natural heritage sites using examples present on Appledore and nearby locations in the Gulf of Maine with comparable natural communities.

Late-Morning field visit to rare habitats and practice documenting using Natural Heritage Bureau data forms.

Afternoon Field/Lab surveying flora along established sampling plots. Rare habitats and mapping species of concern will be noted using NHNHB data sheets. Drone flights as dictated by wind/weather.

Evening review of day's events, download and reduce data, Q&A, Discussion.

Day 5

Morning Lecture on invasive species and the factors that allow their spread and proliferation, as well as strategies to control them (examples from Appledore and the mainland, such as nearby Odiorne State Park).

Midmorning Lab to determine areas for invasive species survey, data collection and mapping.

Afternoon Field/Lab to document area of invasive species concern.

Evening data review from day and Discussion of preliminary field maps.

Day 6

Morning lecture on mapping habitats, building prior days field activities, including transferring field GPS-based data into GIS and Google Earth™ platforms to document habitats, species of concern (rare or invasive).

Late-Morning computer lab to work on bringing vegetation data into GIS.

Afternoon field surveys using drone and field truth major habitats. Effort focis will be to complete major areas of habitat mapping of the Island.

Evening Discussion and review of results to date (including draft vegetation data layers in GIS).

Day 7

Morning Lecture on history of vegetation changes on Appledore, including natural and anthropogenic influences on vegetation of the Isles, past, present and future.

Mid-Morning through Afternoon data classroom-based analysis and preparation for final presentations, survey results, and revision to GIS-based map layers. Field work to be scheduled as needed.

Late-Afternoon to Evening group project presentations.

Evening Recitation for Field Exam.

Day 8

Morning Field Exam and hand in required course elements (plant collection, field note books, written project summary, the latter via e-mail). Group wrap up and goodbyes.

Morning departure back to Portsmouth.