Shoals Marine Laboratory
Sustainable Fisheries (BIOSM 2800/MEFB 702)
12 - 26 June 2017

Course Syllabus and Schedule

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Prerequisites: one semester of college-level biology or equivalent; preferably (but not required) familiarity with Excel and PowerPoint

Class enrollment limit: 12

Credit hours: 3 Cornell / 4 UNH

Course Objectives/Goals:

Students will explore the theory and practice of fisheries sustainability through lectures, readings, laboratory exercises, and groundtruthing in the "real world" (in the field) by interacting with local fishermen. This course will focus primarily on species harvested in the Gulf of Maine, with an emphasis on finfish. Topics and activities included in this course are:

- An overview of commercial fisheries in the Gulf of Maine
- Fish collection and dissections
● Fishing gear types and modifications
● Age and growth techniques (length-frequency distributions, otoliths, scales, maturity)
● Quantitative data collection and analysis (species assemblage, diversity, catch-per-unit-effort, forecasting, stock assessment)
● Current, past and future directions in fisheries management strategies (including sector and ecosystem based, community-based and adaptive management)
● Collaborative research and 'conservation' fishing gear
● Environmental changes like ocean acidification and global warming
● Perspectives from different stakeholders in today’s New England fisheries
● Hands-on demonstrations with commercial fishermen from different industries
● Sustainable seafood and the market-place
● Human dimensions of sustainable fishing (cultural and socio-economic issues)
● Creative thinking and collaborative problem-solving skills
● Public communication skills

Course Materials:

Students will be provided pdf copies of all reading materials before the course begins. Students are expected to participate in group discussions of reading assignments.

Recommended materials: composition book or notebook, clipboard, laptop computer (desktop computers will be available but students might prefer their own laptops if they have one), foul weather gear, water shoes, waterproof boots, binoculars.

Assignments & Grading:

This course utilizes project-based assignments, lectures, demonstrations and hands-on experiences spending time with fishermen on their boats. Grades will be based on student participation and performance in the projects, in-class discussions, quizzes, and exercises.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Course participation and preparedness</td>
<td>20%</td>
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<tr>
<td>Quizzes (4)</td>
<td>20%</td>
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<tr>
<td>Field projects (2)</td>
<td>30%</td>
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<tr>
<td>Mid Course Synthesis Case</td>
<td>10%</td>
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<tr>
<td>Final Project (Presentation and Paper)</td>
<td>20%</td>
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Course participation: Success at SML requires a positive attitude and the 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 Shoals. Students must be on time to all course meetings. They must actively engage by means of asking questions, actively listening, and working with team members when instructed. 5% will be deducted for any missed activity without instructor’s permission.

Readings will be assigned throughout the course. Readings will be used to frame group discussions on focus topics that will be facilitated by instructors. The reading list will include selections from:

- Cod: A biography of a fish that changed the world by Mark Kurlansky
Guest lectures are an important component of this course. These will provide the perspectives and realities that collectively comprise a “fishery”. Students are expected to attend all guest lectures and must actively engage guest speakers. Every student must ask two questions of every speaker that pertains to their course project (and how it relates to the speaker’s expertise). Students are free to ask as many questions as they want.

Four quizzes will be given during the course on topics covered by the core faculty and guest lecturers. These quizzes will include a combination of essay questions, lab reports, and fisheries problems.

Demonstration fishing trips also are critical to this course because it is an opportunity for students to appreciate the realities of working as a fisherman. During these trips, students will participate in “collaborative research” projects while participating in (or simulating) demersal trawl net, gill net, lobster, and possibly harpoon fishing operations. In addition, a survey for seabirds and marine mammals will be conducted to demonstrate the importance of other components of the marine ecosystem to fishing practices.

Field/Lab Reports Three fishing trips will be organized as a scientific study with data collected, analyzed, and written up as individual reports. The reports will be produced in small groups and individuals will be asked to contribute some part of the report for each project. These will be due two days after each field trip or lab exercise.

Mid Course Socio-Environmental Synthesis Case Halfway through the course, students will participate in a two part case study using oyster aquaculture siting as an example of the complex social-environmental systems at play in coastal and ocean issues. Students are expected to fully engage in all discussions, activities, and assignments associated with the case.

Fisheries Project A comprehensive fisheries project will be completed during the course in which a student will identify a current fishery in the Gulf of Maine and will outline the history, current fishing practices, management, relevant biology and ecology, as well as economic, cultural, and social issues related to the fishery. Students will focus on the most recent assessment for their stock. A draft outline will be due part way through the course for peer and faculty feedback. At the end of the course, students will give a 15-minute presentation about their fishery. Students are expected incorporate principles of public communication in their presentations and to ask questions of their peers just as they would a guest speaker.

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
   A. Cornell: http://cuinfo.cornell.edu/aic.cfm
   B. 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 Bartell House after hours
Final Schedule as of 6/25/17:

Details, updates, and corrections to the schedule, assignments and readings will be provided daily: check the whiteboard in Kiggins early and often!

(breakfast 7:30; lunch 12:30 unless otherwise noted; dinner 6pm; Sun. brunch 10am, dinner 5pm)

[1] MONDAY 6/12  Welcome: Life at SML and Course Introduction

Afternoon:
4:00 Arrive on Appledore: welcome

Evening:
7 PM Introductions and course overview (ON/LW)
Brief overview of Creative Thinking (CT) module (SJ/JS)
Syllabus review, discussion of fisheries project and lab expectations, island community expectations

Read selection from Cross-Grained and Wily Waters.


Morning/Afternoon:
9 AM Lecture/Discussion: (ON)
   Physical setting of the GOM & Appledore
   Oceanography of the Gulf of Maine
   Introduction to Gulf of Maine fisheries and global fishing trends

Project/reading time
Read: NMFS 2015 Status of the Stocks overview

Optional - Capitol Hill Oceans Week streaming (past NOAA leadership panel 10:30-12)

Afternoon:
1:30 PM CT: Introduction to Creative Thinking & Collaborative Problem Solving (SJ)

3:00 PM Fisheries Stock Assessment (ON)

4:00 PM Intro to Fisheries Mgmt institutions (LW)

5:15 Swim/Project time

Evening:
Rock Talk: Amy Knowlton, Research Scientist, New England Aquarium
Reading: Selection from ‘Cod’ (Ch 2 and 3)
Optional Reading: Kjesbu et al. 2014. Synergies between climate and management for Atlantic cod fisheries at high latitudes, PNAS. Vol. 111 No. 9, 3478-3483
[3] WEDNESDAY 6/14   Ecosystem-based management and climate change

Morning:
Intro (LW)
8:30AM - 10AM Lecture/Discussion: “There and Back: The Long Road to Recovery for Newfoundland Cod and Lessons for New England” (Graham Sherwood, GMRI) - video
10:15AM - CT: Art-Inquiry Experience (75 min) - PK Lab
11:30-12:30 CT: Public Communication Skill Building: (Lecture 50 minutes - OPEN TO ALL)

Afternoon:
2:00PM - Reading Discussion - Think, Pair, Share (LW) and quiz expectations prep
3:00PM - Fish biology and anatomy, Gulf of Maine species ID
Food Run 4-4:30 (faculty/students help)
4:45PM - 5:30 PM Fishing Gear Selectivity Intro (ON), lab report expectations
5:30PM - CT: Post Survey
Reading: Goethel Handout
Optional Reading: Selectivity Overview

Evening:
Intro (ON)
7 PM - Chris Glass (UNH/Northeast Consortium) - video
Independent project time


Morning
Intro (ON)
0800-1230 On The Water: Demersal trawl fishery demonstration day (Capt. David Goethel)
Students will evaluate how changing gear configuration impacts fishing efficiency and selectivity

CT: SCAMPER technique...On the boat ride back from the trawling demo

Afternoon
1200-1400 Lecture/Discussion: Fisheries Management overview and Climate change and Gulf of Maine fisheries, Jon Hare, NEFSC (WORKING LUNCH)
2:30-3:30 - Fish filleting and otolith extraction
3:30 - Independent project time

Evening:
7:00 - QUIZ 1 – Practical (Fish of Gulf of Maine), Fisheries Management
Start lab 1 - Trawl
http://www.tandfonline.com/doi/abs/10.1080/14615517.2013.821768

[5] FRIDAY 6/16   Seafood sustainable communities and you: Role of dockside business and consumers

Morning:
Intro (LW)
8:30AM Rachel Feeney (NEFMC) – Social Science and Fisheries Management
10:30AM - Independent project time (ask Rachel questions) / reading time

11:30AM Lab Report Discussion and Reading Time
or https://www.outsideonline.com/1978326/piscivores-dilemma
Read: Greenberg. 2015. Three Simple Rules for Eating Seafood
Skim: Monterey Bay Seafood Watch website, NAMA website, New England Fish Mongers, NH Community Seafood.

Afternoon:
1:30PM - Local Marketing and Fishing Communities, Local markets, role of the consumer: Tim Rider (New England Fish Mongers) and Colles Stowell (One Fish Foundation)
3:30PM project time

Evening:
Lab 1 work and due
Project Time

Morning:
Intro (ON)
Cancelled (boat problems): On The Water: Gillnet demonstration day – on boat (Capt. Tom Lyons)

08:30 - Necropsy with Marine Mammal class (P-K)
10:30 Oyster Aquaculture siting case - Part I (LW)
12:30 Lunch

Afternoon:
1:15 Smuttynose expedition with Archaeology (with MM class)
Cancelled: Lab 2: Data Analysis
Independent project time/reading

Evening:
Optional otolith talk by Owen (w/ MM and archaeology class)
Oyster case assignment
Cancelled: begin Lab 2 - Gillnet
Read one:
http://www.maritimestudiesjournal.com/content/13/1/3 - OR -
http://dx.doi.org/10.1080/08941920.2014.905811

Getting to Yes Chapter 1


Morning:
Dorm clean up 9-10
Brunch
Oyster case work

Afternoon:
11AM - Oyster Aquaculture siting case - Part II (LW)

Evening:
Quiz 2 – trawling, gillnetting, fisheries science
Finish Lab 2 - gillnet - cancelled
Oyster case writing - Negotiation Reflection and Memo Due

[8] MONDAY 6/19  Aquaculture and the Future of Fishing Communities

Morning/Afternoon:
Intro (LW)
8:45AM on dock
On The Water:  Aquaculture (Dr. Michael Chambers, NHSG/UNH) at UNH Marine Facility, New Castle
Bag lunches
Discussion of readings, etc (LW lead)
Discuss draft/outline expectations
2:45 return

Evening:
Discussion:  Mid-course Reflection (LW/ON) - Discussion of how they are feeling about all they’re hearing:

Movie Night – The Perfect Storm


[9] TUESDAY 6/20  Lobster Fishery

Morning:
Intro (ON)
0800 On The Water:  Lobster fishery demonstration day (Capt. Damon Frampton)
Students will evaluate trap catch efficiency with/without escape vents

Afternoon:
1400 Lobster biology and management (Josh Carloni, NHF&G/UNH)
1500 Project time - feedback on assignments so far Begin lab 3 -Lobsters

Evening:
2000 Rock Talk: Merritt Carey, Board, Tenants Harbor Fisherman’s Co-op
Outline/summary for peer editing due
Read one:
OR

[10] WEDNESDAY 6/21  Tuna Day!

**Morning:**
Project time and/or NEFMC Webcast

Intro (ON)
10AM Tuna 101 w/ Walt Golet (greet)
Lecture/dissection

**Afternoon:**
1:30PM - Harpoon boat tour (F/V Merlin, Captain Dave Linney)
230 work time
Food Run 4-4:30 (students/faculty help)
Independent project time

**Evening:**
6:45-10:30PM On The Water:  Recreational Fishing Trip – Captain Mark Godfroy – Eastman’s Fishing Fleet


**Morning**
8:30 AM Check in (Hamilton), then Project Time/Quiz Prep/ NEFMC Webcast - Optional (Coral)
11:00 AM Movement, Home Range, and A Shark Nursery in the Caribbean (Bryan Legare, CCS)

**Afternoon**
1:45 PM Hagfish trip (max 23)
4:00PM When, Where, and Sometimes Why: Environmental Effects on Squid Distribution (ON)

**Evening:**
(Quiz scheduled, moved to Fri am)
Independent project time
Peer edits due
Read: “No Silver Bullet” (Bullard)
2015. Improving knowledge exchange among scientists and decision-makers to facilitate the adaptive governance of marine resources: A review of knowledge and research needs. Ocean and Coastal Management 112:25–35. 10.1016/j.ocecoaman.2015.05.002
Optional: Council Training Overview Laws and Executive Orders

Morning:
9 AM Quiz 3 – Lobster, aquaculture
Project time
Lunch
1:30PM Science in Public Policy / National Ocean Policy (LW)

Evening:
1900 Paper reading and discussion
Final project/presentation expectations review (ON/LW)
2100 Squid lighting

Morning:
8:30AM Check in
Work on presentations/final project
Optional Porpoise Necropsy

Afternoon:
1:30 Quiz 4 – summary/synthesis and reflection questions
2:00 Fisheries/marine mammal interactions (ON/Dre) 1-1.5 hours
3:30 Practice presentations
Independent project time

Evening:
7:00PM Marine Mammal Symposium

Morning:
Dorm clean up 9-10
Brunch
10:45-2 Whale Watch
Evaluations on own btwn whale watch and dinner.

Afternoon:
Project time

Evening:
6:00 Final Project Presentations
8:00PM Star Island Visit

[15] MONDAY 6/26
Morning:
8:30 - Class Review Discussion and Activities - discuss career/education opportunities
9:45AM Depart Island (in town around 11:00AM)