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**Shoals Marine Laboratory  
Sustainable Fisheries (BIOSM 2800/MEFB 702)  
May 30 - June 13, 2022**

Course Syllabus and Schedule

**Faculty:** Owen C. Nichols ([nichols@coastalstudies.org](mailto:nichols@coastalstudies.org))  
Dr. Lindsey C. Williams ([Lindsey.Williams@unh.edu](mailto:Lindsey.Williams@unh.edu))

**Teaching Assistant:** Nathan Hermann ([Nathan.Hermann@unh.edu](mailto:Nathan.Hermann@unh.edu))

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

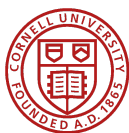
**Class enrollment limit:** 12

**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 and other fisheries experts. 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 marketplace
- Human dimensions of sustainable fishing (cultural and socio-economic issues)
- Creative thinking and collaborative problem-solving skills
- Public communication skills



Cornell University



University of  
New Hampshire

## Course Materials:

Students will be provided pdf copies and/or links for all reading materials during the course. Students are expected to participate in group discussions of reading assignments.

Recommended materials: composition book or notebook, clipboard, laptop computer, 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.

Course participation and preparedness	15%
Quizzes (4)	20%
Field/lab activities (3)	30%
Book review and discussion	5%
Social-ecological Synthesis Case	10%
Final Project (Presentation and Paper)	20%

*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 topics that will be facilitated by instructors.

*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 related 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 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, lobster, or other fishing operations. In addition, a survey for seabirds and marine mammals may be conducted to demonstrate the importance of other components of the marine ecosystem to fishing practices.

*Field/Lab Reports* Fishing trips/activities 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.

*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 students will

work together to explore multiple facets of a current controversial fisheries issue in the Gulf of Maine. This will focus on the history, current fishing practices, management, relevant biology and ecology, as well as economic, cultural, and social issues related to the fishery and intersecting issues. At the end of the course, students will give a presentation about their project. Students are expected to 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 to all of the information presented in the [SML Appledore Handbook](#) as well as the 2022 Operating Plans as they pertain to COVID safety (<https://www.shoalsmarinelaboratory.org/coronavirus>).

1. *Personal Technology*. Do not use phones, tablets, headphones, or similar devices in the classroom or during course activities. If you take notes with your computer, disable wireless during lecture.
2. The lab has a modest computer facility in Loughton Library; please treat this shared facility with respect. Printers are available, but please limit printing.
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 website, 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: [www.unh.edu/vpsas/handbook/welcome-university-new-hampshire](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 06/13/2022:**

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

*Meals: Breakfast 7:30; lunch 12:30 unless otherwise noted; dinner 18:00; Sun. brunch 10:00, dinner 17:00*

**[1] MONDAY 05/30                      Welcome: Life at SML and Course Introduction**

**Afternoon:**

4:00 PM Arrive on Appledore: welcome, time to settle, initial reading

**Evening:**

7:00 PM Introductions and course overview, group agreements, syllabus review, fisheries project and lab expectations, island expectations (clean-up, etc.), book review, class T-shirt, etc.

View "Saving New England Fisheries" -

(<https://www.pbs.org/video/saving-new-england-fisheries-saving-new-england-fisheries/>) discussion.

**[2] TUESDAY 05/31                      Setting the Stage: Gulf of Maine Ecosystem**

**Morning:**

9:00 AM Lecture/Discussion:

Physical setting of the GOM & Appledore  
Oceanography and Ecology of the Gulf of Maine

11:00 AM Activity:

Physical setting: walking lecture with Parasites and Marine Mammal Biology classes

**Afternoon:**

1:30 PM Lecture/Discussion:

Intro to global fishing trends and Gulf of Maine fisheries

3:00 PM Activity:

Fishing gear demonstration / activity

4:00 PM Intertidal Walk w/parasites, marine mammal courses

**Evening:**

8:00 PM Rock talk: Dr. Larry Alade

<https://www.fisheries.noaa.gov/feature-story/meet-larry-alade-research-fisheries-biologist>

**[3] WEDNESDAY 6/01                      Lobster Fishery / Fishing Communities / Fisheries Management and Policy**

**Morning:**

8:30 AM check in / Rock Talk debrief

9:00 AM Activity:

Dockside Lobster Gear Demonstration and Discussion (Capt. Ward Byrne)

9:30 AM Activity: Lobster hauling demo w/ Capt. Ward Byrne (*compare catch with/without escape vents*)

**Afternoon:**

1:30 PM Activity:

Lobster gear modification / innovation  
Lobster lab expectations

2:30 PM Reading Discussion  
3:30 PM Food Run / work time

**Evening:**

7:00 PM Lecture/Discussion:  
Intro to Ocean and Coastal Policy / Fisheries Management Institutions

**[4] THURSDAY 6/02                      Ecosystem-Based Fisheries Management / Lobster cont'd / Fish 101**

**Morning:**

9:00 AM Lecture: Fisheries Management Con't

10:30 Lecture/Discussion (zoom, joint w/Marine Mammals):  
Science for Fisheries Management, Dr. Jon Hare, NOAA NEFSC

**Afternoon:**

1:30 PM Lecture/Discussion: (joint w/ Marine Mammals)  
Lobster biology/ management - Heidi Henninger, Atlantic Offshore Lobstermen's Association

3:00 PM - Guests head to dock for 3:30 PM departure

3:30 PM Lecture/Discussion:  
State of the Ecosystem Report and links to project

4:00 PM Lecture/Activity:  
Fish biology and anatomy lecture/lab

**Evening:**

7:00 PM - QUIZ 1  
7:30 PM IMTA Overview  
Reading/Project Time

**[5] FRIDAY 06/03                      Aquaculture / Trawl Fisheries / Whales**

**Morning**

8:30 AM - New Castle Boat Departure (on docks by 8)  
On The Water: Aquaculture (Erich Berghahn/ Michael Doherty NHSG/UNH), UNH Marine Facility, New Castle

11:00 AM Discussion and Demonstration with Capt. David Goethel (multispecies fishery)

**Afternoon:**

PM Work time / free time / reading time  
Gather items for printing (marine debris - flat things are better)  
Lab 1 Due - Lobster - due before dinner

**Evening:**

Artist in Residence

**[6] SATURDAY 6/04 Boat Handling, Fish/Invert Dissections, Socio-Ecological Systems**

**Morning:**

Reading / work time

10:30 AM Activity:  
Vessel terminology and boat handling discussion / demo w/ Shoals staff

**Afternoon**

1:30 PM Lecture/Activity:

Fish ID /dissections / otoliths w/ Parasites (and Marine Mammals?) class

4:30 PM Lecture/Discussion:

Social-ecological synthesis / Oyster Aquaculture siting case - Part I Aquaculture case prep work

**Evening:**

7:00 PM Readings Discussion

The role of the consumer, community supported fisheries (CSF) and other new models

Project abstract due

**[7] SUNDAY 06/05 Stock Assessments and Surveys for Fisheries Management**

9:00 AM Dorm clean up

10:00 AM Brunch

11:00 AM Necropsy

1:30 PM Lecture

Introduction to Fisheries Stock Assessment

2:30 PM Activity:

Resource Assessment Surveys

4:30 PM Project discussion/ Lab 2 expectations

**Evening:**

6:00 PM Quiz 2

7:15 PM Field Ornithology Symposium - Kiggins

**[8] MONDAY 06/06 Science and Agency Roles in Fisheries Management****Morning:**

9:00 AM Activity:

Oyster Aquaculture siting case - Part II (negotiation and debrief)

11:00 AM Lecture

New England fishing industry social characteristics lecture

**Afternoon:**

1:30 PM Lecture/Discussion:

New England Fishery Management Council (NEFMC) Groundfish Analyst Robin Frede

3:30 PM Lecture/Discussion:

Stakeholder engagement and public participation

PM Project/reading time

**Evening:**

7:00 PM Discussion: Mid-course Synthesis and Reflection

Oyster case writing - Negotiation Reflection and Memo Due

Lab 2 Due - Swedish Fish Survey

**[9] TUESDAY 06/07 Cooperative Research and Science Advising**

**Morning:**

9:00 AM Lecture/Discussion:

Science in a contested setting, disputes / science in public policy

10:00 AM Overview of Research Pre-proposal Lab

10:30 AM Project / Reading Time

**Afternoon:**

1:30 Lecture/Discussion: The NOAA Fisheries Cooperative Research Program, Dr. Anna Mercer (NOAA Fisheries)

~3:00 PM project/reading time, but encourage you to sign in to listen to sessions at one of these two:

- Capitol Hill Ocean Week Viewing: <https://marinesanctuary.org/chow-2022/>
- NEFMC SSC Meeting: <https://www.nefmc.org/calendar/jun-7-2022-ssc-meeting> (link to listen on page)

**Evening:**

8:00 PM Rock Talk: Dr. Ian Owens (ornithologist)

**Project Annotated Outline Due**

**[10] WEDNESDAY 06/08 Tuna Fisheries and Ecology / Fishing Gear Research**

**Morning:**

9AM SSC and CHOW debrief Discussion

AM Project / work time

**Afternoon:**

2:00 PM Lecture/Discussion

Bycatch reduction and gear research w/ Dr. Michael Pol (Responsible Offshore Science Alliance)

3:30 Food Run (at docks)

PM Project / reading time

**Evening:**

730 PM **Movie night**

**Peer edits due**

**Lab 3 Due – Proposal activity**

**[11] THURSDAY 6/09 The Next Generation and Cooperative Extension**

**Morning:**

8:30 AM Project Check Ins

10:30 AM New England Young Fishermen's Alliance Discussion

**Afternoon:**

1:30 PM Lecture/Discussion

Cooperative Extension and engaging the consumer, Dr. Gabby Bradt

3:30 PM Lecture / Discussion  
Management Strategy Evaluation / Applied Research, Dr. Mackenzie Mazur, DFO Canada

**Evening**

7:00 PM Quiz 3

8:00 PM Documentary screening

**[12] FRIDAY 6/10 Community-Based Collaborative Research**

**Morning:**

9:00 AM - Dr. Walt Golet, Gulf of Maine Research Institute (GMRI), Capt. Mike Parenteau (F/V Eileen K) - Tuna research, management, engagement

**Afternoon**

1:30 PM Lecture/Discussion: Community-Based Collaborative Fisheries Research

3:00 PM Lecture/Discussion: Community Science Approaches to Address Marine Mammal and Fisheries Interactions, Dr. Andrea Bogomolni, Northwest Atlantic Seal Research Consortium

4:30 Documentary discussion / communicating complex issues

**Evening:**

7:30 PM All Island career panel discussion

**[13] SATURDAY 6/11 Forage Species, Recreational Fishing and Project Worktime**

9:00 AM Squid: Fisheries Oceanography, Ecology and Biology

10:15 AM at dock

10:30 AM On-water: Mackerel fishing and discussion of recreational fishing in the GOM + Mike and Melanie?

12:00 PM Rec Fishing download

**Lunch**

130 PM worktime

3:00 PM Book review / discussion

4:30 PM Practice Presentations (optional Sat or Sun)

**Evening:**

7:30 PM Marine Mammal Presentations  
Project Work time

**[14] SUNDAY 6/12 Information Integration: Class Review and Discussion**

9:00 AM Dorm clean up

10:00 AM Brunch

11:00 AM QUIZ 4

11:30 AM Free time / project work time



**3:30 PM - Final Project Presentation Due**

3:30 PM Project Presentations

5:00 PM Dinner

6:30 PM Parasites Presentations

**11:59 PM - Final Project Paper Due**

12:00 AM Squid lighting (optional)

**[15] MONDAY 6/13                      Course Wrap Up**

**Morning:**

Luggage on porch before breakfast

8:30 AM - Final Check In

Career Discussions / Course Review / Evaluations

~9:45 AM At docks for departure

10:15 Depart Island (Gulf Challenger)

~11:30 Back at Portsmouth Dock