Appledore Island, Isle of Shoals, Kittery, Maine
t: 603.964.9011 • shoals.lab@unh.edu • shoalsmarinelaboratory.org

Whales, Seabirds, and Fish:

Marine Vertebrates of the Gulf of Maine

(BIOSM 1650)
Summer 2025

Course Syllabus and Schedule

Faculty: Dr. Sara Morris (sara.morris@unh.edu)

Course Description:
This course will introduce students to the biology and conservation of marine vertebrates of the Gulf of Maine based on field observations, fishing, dissection, study of skeletons, and first-hand reports from fishermen, ornithologists, and mammalogists. Open-water cruises will give students the opportunity to observe fish, whale, seal and bird behavior. Lecture and lab material is organized phylogenetically: instruction begins with a consideration of early vertebrates, hagfishes and lampreys; continues with the study of cartilaginous and bony fishes; migratory sea turtles, sea- and shorebirds; and ends with an overview of marine mammals, seals and whales.

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

Class enrollment limit: 18

Credit hours: 2

Course Objectives/Goals:
Students will be able to:

- Describe the evolutionary relationships among the marine vertebrates, including morphological similarities due to common ancestry
- Describe specific adaptations to the marine environment among different groups of vertebrates
- Identify common species of marine vertebrates in the Gulf of Maine and describe basic information about their natural history and behavior
- Address current conservation issues and management efforts for marine vertebrate species

Course Materials:

1. Background readings (will be provided in the LMS)
2. Laboratory notebook (each student must provide their own)
3. If possible, we highly recommend bringing a laptop computer for writing papers and a notebook for use during lecture, lab and field activities.

Cornell University

University of New Hampshire

4. We also require sturdy, close-toed shoes for work on research vessels and in the lab. Snorkeling gear and binoculars are optional and suggested if you have them. Also, bring sun protection and layers for wind and rain. A flashlight or headlamp is also useful.
5. Reading assignments will include a variety of types of literature from both popular media and scientific literature.

Assignments & Grading:

Final grades will be determined by a variety of assignments

Quizzes:	25%
Exam:	25%
Notebook:	15%
Experimental Design Activity	15%
Outreach project & presentation:	20%

1. Quizzes: There will be four quizzes to assess your knowledge of the key topics and taxa in the course.
2. Exam: A final exam will cover the range of material covered in the class to gauge your knowledge of the topics, your use of appropriate vocabulary,
3. Notebook: All lab and field work should be chronicled in your
4. Experimental Design Activity: After reviewing what we know and don't know about vertebrates it's time to think about what sort of experiment you could design to address one of the unanswered questions. *Note: This project should be completed on a taxa different than the outreach project.* This is a group project.
5. Outreach Project: It's time to get creative! To complete this project, you will choose a topic related to marine vertebrate natural history or conservation and produce your own form of media to communicate information to the general public or specific audiences like local community, tourists, fishermen or tourism operators. Types of media include infographics, videos, guides and more! As a part of this project you will give a presentation explaining why what you have created is useful and how it is effective. *This project should be completed on a taxa different than the experimental design project.* This is a group project. The ideal projects would be able to be used on future trips on the Heiser or Kingsbury.

Grade scale:

- A 94-100%
- A- 90-93.9%
- B+ 87-89.9%
- B 84-86.9%
- B- 80-83.9%
- C+ 77-79.9%
- C 74-76.9%
- C- 70-73.9%
- D 60 – 69.9%
- F less than 60%

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 *Appledore Island Handbook*

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
    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 https://www.unh.edu/diversity-inclusion/student-accessibility/students/request-accommodations) 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

Tentative Course Schedule (Timing subject to change based on sea conditions, weather, and opportunities):

Day 1 (Monday)

Orientation to Shoals Marine Lab
Orientation to the island
Orientation to the course & field/lab notebook
Lecture on introduction to the vertebrates, evolution of and phylogenetic relationships among vertebrates

Day 2 (Tuesday)

Morning
Lecture/Lab – Adaptation, Homology and Homoplasy, Comparative morphology
Lab – lab/field notebook preparation
Afternoon
Lecture/Lab – Vertebrate solutions to the marine environment (discussion of problems and solutions --similar and different adaptations)

Lecture/Lab – Common Fishes in the Gulf of Maine

Evening

Lecture - Rock Talk (all-island seminar)

Lab - Open Lab (review morphology)

Day 3 (Wednesday)

Morning

Lecture/Lab – In depth: hagfish biology, adaptations, behavior and slime

Introduction to Experiments and Experimental Design

Lecture –Amphibians (why no marine ones), Reptiles, and into birds

Afternoon

Lab – Dissections (fish, bird, mammal)

Evening

Quiz 1 morphology, taxonomy

Lecture/Lab – Seabird Identification, Natural History, and Reproduction

Day 4 (Thursday)

Morning

Field - Fishing trip (topics for inclusion: niche partitioning, adaptations for different niche in a marine environment)

Afternoon

Lab - Review fish

Lecture/Lab – Marine Mammal Identification, Natural History, and Strategies

Evening

Quiz 2 fishes

Lab – Seabird Identification and adaptations (con't)

Lecture – Seabird behavior

Day 5 (Friday)

Morning / Afternoon

Lecture - Cetacean behavior

Field - Whale watch/seabird cruise

Evening

Quiz 3 birds

Lab - Review mammals

View - Signals for Survival

Day 6 (Saturday)

Morning

Field - Seal Survey

Group time for outreach projects

Afternoon

Presentation of outreach projects

Evening

Quiz 4 mammals

Lecture-connection of vertebrate phylogenetics to behavior and conservation

Day 7 (Sunday)

Morning

Lecture – challenges facing marine vertz; science and citizen science opportunities

Open lab to review

Afternoon

Final Exam

Evening

Experimental Design projects due after dinner