

CAS BI 531: Ichthyology

Instructor Name: Prof. Phillip Lobel

Office Location: BRB 3rd floor

Arranged

Contact Information: plobel@bu.edu

Office Hours: Arranged

Course Dates: December

Course Time & Location:

Course Credits: 4

TF Name:

Course Description.

Lectures will review the evolution, ecology and behavior of fishes. Introduction to the course begins with an overview of fish evolution and the principles of phylogeny. Understanding phylogeny is essential to an appreciation of the many special ecological and behavioral adaptations exhibited by fishes. Other lectures will focus on aspects of behavior and ecology of fishes and will include a review of relevant general principles of ecology and behavior. Topics include: trophic diversity and adaptations, color patterns, life history scenarios, spawning behaviors, communication modalities, migrations, community structure and, of course, sharks. Lectures will include slide and video shows of fishes from around the world and descriptions of what it is like to do field science. Laboratory exercises will include methods in fish anatomy such as skeleton preparation and dissection. We will study fishes in aquaria; observing behavior including recording sounds and electric signals. The companion course is 'Shark Biology and Conservation' BI5xx taught in the spring semester. These two courses together are a comprehensive introduction to all fishes.

Course Specific Learning Outcomes

- Students will apply principles of phylogeny to understand fish adaptations
- Students will become familiar with principals of ecology and behavior of fishes
- Students will become familiar with fish anatomy

Training students will receive in BI531

- How to identify a fish to the correct taxonomic species designation.
- How to dissect and to identify the soft anatomy and the osteology of fishes.
- How to study fish life history and fish biodiversity within the conceptual context of phylogeny and evolution

Hub Learning Outcomes

Scientific Inquiry II

In this course, you will to apply scientific knowledge to further understand marine systems and global fisheries dynamics.

- Students will dissect and analyze fish morphology as part of your original research project. Students will demonstrate an understanding not only of your own selected species, but what it means within a larger context of fish biodiversity.

Oral and/or Signed Communication

In this course, you will participate in group discussions, informal presentations, and formal presentations of your work. With feedback from your instructor, you will develop an understanding of delivering responsible, considered, and well-structured arguments. Additionally, you will engage in other students' presentations by asking questions and participating in discussions surrounding other's research.

- Students participate in discussions held in class. All students are expected to be able to communicate effectively the ideas presented in the assigned readings. Students are also expected to be able to answer questions from peers at the end of their final presentations.

Research and Information Literacy

As part of your research process, you will learn to search for, select, and use appropriate information sources. You will gain a deep understanding of how to answer a question through research.

- Students' conduct and original research project on the skeletal anatomy of a fish. The student starts first by exploring Boston fish markets for any dead fish. They are required to gather and analyze morphological data, interpret their findings and identify the species. They then dissect and reconstruct the fish skeleton and identify the bones. Finally, They present their fish skeleton model and a description of the species in a symposium-style lecture.

Books and Other Course Materials

Recommended Course Texts (copies on reserve in the BUMP classroom):

- The Diversity of Fishes: Biology, Evolution, and Ecology by Gene Helfman, Bruce B. Collette, Douglas E. Facey, and Brian W. Bowen. ISBN: 978-1-4051-2494-2 736 pages, May 2009, Wiley-Blackwell, price \$129.95
- Bond's Biology of Fishes 3rd edition by Michael Barton (ISBN:0120798751 approx. list price \$132.95)
- Cailliet, G., M. Love, A. Ebeling 1986 Fishes, a field and laboratory manual on their structure, identification and natural history. Waveland Press, Ill.
- Gregory, W. 1933 Fish Skulls – copies of this book will be on reserve and in our lab.

Fish Stories: get to know the Professor,

- Listen to the radio comedy talk show "You're the Expert" interview talk (2014) <https://soundcloud.com/youre-the-expert/s2ep2-fish-noises>
- Talk show "You're the Expert" spotlight article <https://theexpertshow.com/blog/2014/3/25/expert-spotlight>

Assignments and Grading

- Written & practical exams, topic papers, research proposals (70%)
- Laboratory exercises including fish skeleton preparation (25%)
- Laboratory etiquette & participation.... Proper and clean laboratory hygiene and clean-up after every exercise is required (5%)

Resources/Support/How to Succeed in This Course:

1. If you need help outside of regular meetings, please make an appointment with either Prof Lobel or the TF.
2. Accommodations for Students with Documented Disabilities: If you are a student with a disability or believe you might have a disability that requires accommodations, please contact the Office for Disability Services (ODS) at (617) 353-3658 or access@bu.edu to coordinate any reasonable accommodation requests. ODS is located at 19 Deerfield Street on the second floor (19 Buick Street as of September 1, 2018).

Academic Conduct Code:

<https://www.bu.edu/academics/policies/academic-conduct-code/>

Outline of Class Meetings: Date, Topic, Readings Due, Assignments Due

Tentative Lecture and Lab Schedule: lectures by the Teaching Assistant will be added to the schedule.

Day 1 - Introduction: review syllabus, course organization, grading, & projects.

Why fishes are interesting - World-wide Biodiversity

Finding your fish for the skeleton project & market survey

Day 2 – Introduction to basic fish anatomy and meristics- how to identify species, the terminology of shapes and morphological features.

Lab: Meristics lab- fish dissection

Day 3 - Intro to phylogeny -Review taxonomic hierarchy nomenclature

Fish evolution; geological time and evolutionary trends

A cladistic review of the evolution and morphology of fishes

Lab: NEW ENGLAND AQUARIUM FIELD TRIP

Day 4 - Fish phylogeny continue

Fish skull skeleton prep see Cailliet pages 31 to 38,

Lab: Specimen examination by phylogeny and skeleton;

Making a fish skull skeleton (to be done over the next few weeks).

*****Fish skeleton get started and find a fish this weekend****

Day 5 - Evolution of the cranial structures and trophic functional morphology,

Lab: examine fish skeletons; comparative examination caudal fin structures, videos and slides.

Discussion of the market survey results

Gyotaku –making fish prints; using the fish you found for your project.

Day 6 – Sharks, Skates and rays – behavior, ecology and conservation.

Lab: Shark (dogfish) dissection

Day 7 - Evolutionary biology of herbivorous fishes; anatomy, behavior and ecology, Body shapes and color patterns

Lab: examine specimens.

Day 8 – Exam – progress to date

Lab: Reefs and Fishes of Belize: slides & video show

Day 9 - Reproduction, dispersal and recruitment

Lab: videos and photo review of fish spawning

Day 10 - Fish acoustics & behavior

Lab: observing fish behavior- methods and technologies

Day 11 - continue behavior, ecology and physiology

Lab: discussion, Biodiversity conservation lessons: seahorses (video)

Day 12 – continue behavior, ecology and physiology

Day 13 - Fish otoliths: biology and technology

Lab: Fish specimen anatomical examinations, count otolith rings

Day 14 - Review of life histories; slides continued

Lab: observing fish behavior (aquarium study)

Larval fish specimen identification, larval fish biology- Otolith Lab.

Day 15 - Review lecture in preparation for exam

Day 16 - Final Exam

Day 17 - Fish skull / skeleton presentations