OEB 130 - Patterns and Processes in Fish Diversity

Spring Term 2023

Monday and Wednesday 12 noon - 1:15 pm
MCZ Classroom Room 101

Professor: George V. Lauder
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TF: Connor White, OEB grad student: connor.white@gmail.com

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Course staff weekly **office hours** will be set the second week of class, with additional meetings by appointment.

GENERAL COURSE INFORMATION

This course will consist of **2 lectures** a week, each **1 hour and 15 minutes long**. In addition we will have **laboratory experiences** which vary from dissections to demonstrations to tours to the study of fish biodiversity. Laboratory times and experiences will probably be Wed., Thurs, and Friday afternoons (2 – 4pm).

The main text will be the **Encyclopedia of Fishes (= EOF)**, Second Edition (John R. Paxton; Academic Press), which is no longer available! However, we have scanned the relevant chapters from the book, and will post them on the course web page which is only accessible from a Harvard computer. In addition, there will be weekly readings of selected articles and a final book to read (see the last page of this syllabus) during reading period.

Additional useful supplemental texts include (but are **not** required):

1. **The Diversity of Fishes: Biology, Evolution, and Ecology**
   Gene Helfman, Bruce B. Collette, Douglas E. Facey, Brian W. Bowen
2. **Bond's Biology of Fishes**, Michael Barton
3. **Fishes: An Introduction to Ichthyology (5th Ed)**, Peter B. Moyle and J J. Cech

Lecture Schedule

January 23 **Monday:** Introduction: the diversity of fishes (Lauder)

January 25 **Wednesday:** The early evolution of fishes (Lauder)

January 30 **Monday:** Sharks, Skates and Rays: the Chondrichthyan fishes (Lauder)

February 1 **Wednesday:** Overview of ray-finned fish diversity (Lauder)

February 6 **Monday:** Feeding mechanisms I (Lauder)

February 8 **Wednesday:** Feeding mechanisms II (Lauder)

February 13 **Wednesday:** Feeding mechanisms III (Lauder)

February 15 **Monday:** Overview of teleost evolution and diversity (Lauder)

February 20 **Monday:** NO CLASS – President's day

February 22 **Wednesday:** Buoyancy and the gas bladder (Lauder)

February 27 **Monday:** **EXAM #1**

March 1 **Wednesday:** Locomotion I (Lauder)

March 6 **Monday:** Locomotion II (Lauder)

March 8 **Wednesday:** Locomotion III (Lauder)

March 11 – March 19: SPRING BREAK

March 20 **Monday:** Sensory systems of fishes I (Lauder)

March 22 **Wednesday:** Sensory systems of fishes II (Lauder)

March 27 **Monday:** Otocephala diversity (Lauder)

March 29 **Wednesday:** **EXAM #2**

April 3 **Monday:** Acanthomorpha diversity (Lauder)

April 5 **Wednesday:** Biology and diversity of pelagic fishes (Connor White)

April 10 **Monday** Fish respiration: water and air (Lauder)

April 12 **Wednesday:** Cardiovascular system of fishes (Lauder)

April 17 **Monday:** Coral reef fishes (Lauder)

April 19 **Wednesday:** Deep sea fishes (Lauder)

April 24 **Monday:** Fishes as evolutionary model systems (Dave Matthews)

April 26 **Wednesday:** **LAST CLASS:** Fish ecology and zoogeography (Lauder)

READING PERIOD ***April 27 (Thurs.) – May 3 (Wed.)***

Don't forget to read your fish book! See syllabus page 7.

FINAL EXAM date and time TBD

Grades in OEB 130 will be calculated as follows:

20% Exam #1

20% Exam #2

25% Lab participation and exercises

35% Final Exam

Lab Schedule
Biolabs B063 (in the basement)

Labs and/or discussion sessions will run on **Wed., Thurs., and Friday** afternoons (students will section into one of these days). The fish diversity labs will most likely be in the MCZ Fish Dept. Note the schedule below, and that there is a break between three groupings of labs, so that the labs match the lecture schedule. Labs should run around 2 hours each maximum.

Lab 1 (FEB 1, 2, 3): Looking at a fish – read the Agassiz fish story document

Lab 2 (FEB 8, 9, 10): tour of the Fish Collections (MCZ basement) in the Harvard Museum of Comparative Zoology.

Lab 3 (FEB 15, 16, 17): Dissection of fish head

NO Labs week of Feb 20th
NO Labs week of Feb 27th

Lab 4 (March 22, 23, 24): Dissection of fish body

Lab 5 (March 29, 30, 31): Maybe a fun dissection of a tuna and/or other interesting pelagic fishes

Lab 6 (April 5, 6, 7): Fish diversity lab #1

Lab 7 (April 12, 13, 14): Fish diversity lab #2

Charles River "Field Trip": Week of May 1 weather permitting

Course Readings

Readings will consist of chapters from the book **Encyclopedia of Fishes** (**EoF**) and selected scientific articles. In addition, each student will choose & read one of the three books listed on page 6.

Week of Jan 23	**Encyclopedia of Fishes** (**EoF**), pages 14-53 Article: Martini, Secrets of the slime hag. Article: Clack: Getting a leg up on land.
Week of Jan. 30	**EoF** Pages 54-95 Article: Turner: New ideas about old sharks.
Week of Feb. 6	**EoF** Pages 96-122
Week of Feb 13	**EoF** Pages 123-134
Week of Feb. 20	no readings (exam on Mon. the 27th)
Week of Feb. 27	**EoF** Pages 135-164
Week of March 6	Articles: (1) Shadwick: How tunas and lamnid sharks swim; (2) Triantafyllou: An efficient swimming machine.
Week of March 13	Spring break: no readings this week
Week of March 20	**EoF** Pages 165-194 Article: Fields: The shark's electric sense Catania electric eel (2014) article.
Week of March 27	No readings this week
Week of April 3	Carey and Teal, 1966, 1984; Opah paper;
Week of April 10	**EoF** Pages 195-231
Week of April 17	Article: Lema: The phenotypic plasticity of Death Valley's pupfish. Article: Stiassny: Cichlids of the rift lakes.

Week of April 24	Articles: (1) FitzGerald: The reproductive behavior of the stickleback. (2) Zorpette: To save a salmon.
	Articles: (1) Pauly: The last fish. (2) Hogan: Imperiled giants of the Mekong.

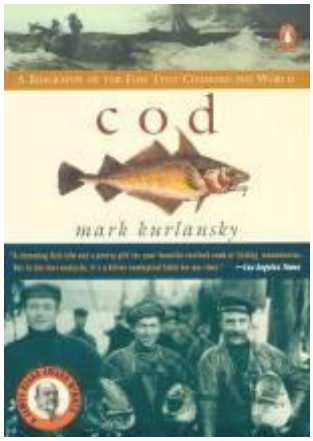
Field Trips

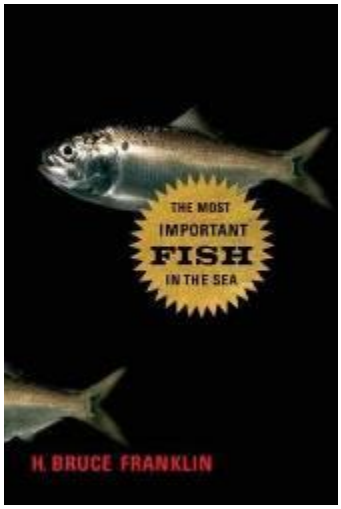
1. New England Aquarium: We're working to get everyone tickets so that you can visit and complete a short work sheet during your visit.

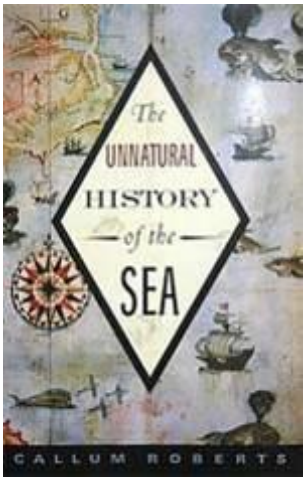
2. Collecting in the Charles River: during reading period, and weather permitting. We may do a staff collecting trip and stream on Zoom or Twitter so you can see what's in the Charles River remotely.

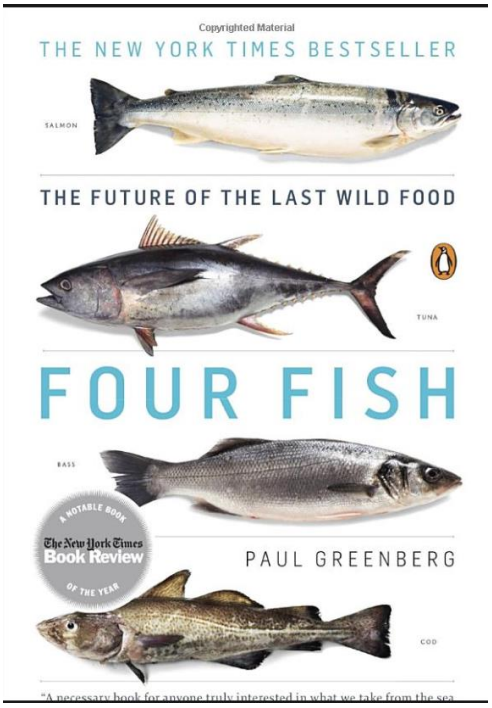
Book reading

Students will read their choice of <u>one</u> of the four books listed below, in preparation for an essay question on the final exam. Each student should pick one of the following four books and order their copy on-line (Amazon.com, or similar web site). Students can share a book if they would like to and are free to purchase a used book or borrow one from the library, but should be sure to have the book available for study.









1. Kurlansky, M. (1997). **Cod: a Biography of the fish that Changed the World**. New York: Penguin Books.

2. Franklin, H. B. (2007). **The Most Important Fish in the Sea**. Washington: Island Press.

3. Roberts, C. (2007). **The Unnatural History of the Sea**. Island Press.

4. Greenberg, P. (2011). **Four fish: the future of the last wild food.** Penguin.