

EEOB 5930: Ichthyology

Instructors

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Course Logistics

Five-week course held at Stone Laboratory, Put-in-Bay, Ohio, June 18- July 22, 2017.

First Sunday, check-in, orientation, and evening class. Regular class meetings are then every Monday, Wednesday, Friday, 8 am - 5 pm with breaks for lunch and dinner (further evening class activities may also be scheduled); last Friday and Saturday are altered schedules, 8 am - 12 pm.

Course Format

Four semester credit hours consisting of lecture, field work and laboratory time.

Course Description

This course will introduce students to the diversity of fishes. Representative species from ecologically, commercially and phylogenetically important families of the fishes will be studied but emphasis will be placed on fish species of the Laurentian Great Lakes. By exploring the physiological processes that enable the fishes to exploit and interact with their environments and each other the Interconnectedness of fish populations/assemblages and what drives those relationships will be discovered. A survey of behavioral and ecological implications of evolution and morphological differences will be examined, as will a review of anthropological influences and the changes wrought on fish distributions and population assemblages. The field and laboratory portions of the course will enable students to gain hands-on experience in the collection, preservation, identification, anatomy and morphology of fishes found in Lake Erie and nearby streams, rivers, and wetlands. Field and laboratory exercises will also provide opportunities to evaluate natural history and ecological patterns.

Course Objectives:

- Understand relationships between morphology, physiology, and ecology
- Evaluate patterns between phenotypic expression based on fish morphology and behavior
- Use dichotomous keys to identify fishes of the Great Lakes basin
- Learn external and internal fish anatomy and scientific nomenclature
- Become familiar with methods of collecting and studying fishes through hands-on field and laboratory experience

Teaching Approach:

The course will be taught using a combination of lectures, discussions, laboratory exercises, field trips, and group projects. Field experience will enable students to learn about fish preferred habitat, natural history, and behavioral patterns.

Course Materials

Required:

Hubbs, C., and K. Lagler. 2004. Fishes of the Great Lakes Region. Revised edition (revised by G. Smith). University of Michigan Press, Ann Arbor, MI.

Highly recommended if you plan to pursue a career in North American freshwater fish ecology
Available for online purchase in May through the OSU Marion Bookstore website.

Page, Lawrence M., and Brooks M. Burr. 2011. Peterson Field Guide to Freshwater Fishes of North America North of Mexico. Houghton, Mifflin, Harcourt. Boston, New York. 2nd Edition.

Available for online purchase in May through the OSU Marion Bookstore website.

Available for use at Stone Laboratory:

Trautman, M.B. 1981. The Fishes of Ohio. The Ohio State University Press, Columbus, OH.

Etnier, D. A., and Starnes, W. C. Fishes of Tennessee. 2001. The University of Tennessee Press/ Knoxville. ISBN: 0-87049-711-1

Barton, Michael. 2007. Bond's Biology of Fishes. 3rd Edition. Thomson Brooks. ISBN-10: 0120798751

Helfman, Gene S., Bruce B. Collette, Douglas E. Facey, and Brian Bowen. 2009. The Diversity of Fishes. 2nd Edition. Wiley-Blackwell. ISBN-10: 1405124946

Course Outline (Subject to Change)

Day	Time	Description
Sunday:	4:00p - 5:00p	Orientation: Introduction to Stone Laboratory
	5:00p - 5:45p	Dinner
	6:30p – 7:30p	Course intro
Week One		Introduction, Fish Morphology and Lower Fishes
Monday:	7:00a - 7:45a	Breakfast
	8:00a - 9:00a	Lecture I: Introduction to Ichthyology, museums, online resources, external fish morphology and characters
	9:00a - 12:00a	Field Trip: Seining at Alligator Bar, collect fish fauna
	12:00p - 12:45p	Lunch
	1:00p – 3:45p	Lab I: Taxonomy - introduction to methods including use of dichotomous keys, preservation of specimens, sort and identify Alligator Bar fish species
	3:45p – 4:00p	break
	4:00p – 4:45p	Lecture II: Lungfishes, Hagfishes, Lampreys, Sharks, Rays and Chimeras
	5:00p – 5:45p	Dinner
6:00p – 7:00p	Open Review	

Wednes.:	7:00a - 7:45a 8:00a - 9:00a 9:00a - 9:15a 9:45a - 12:00p 12:00p - 12:45p 1:00p - 4:00p 4:00p - 4:45p 5:00p - 5:45p 6:00p - 7:00p	Breakfast Lecture III: Architecture of the fishes – Skeleton, Skin and Scales Break Lab II: Dipnoi, agnathans, elasmobranchs, and holocephalans Lunch Field Trip: Gibraltar Island Beach Lab III: Taxonomy, sort and identify Gibraltar Beach fish species Lecture IV: Soft Anatomy Dinner Open review (student's option)	Instructor: Marc Kibbey
Friday:	7:00a - 7:45a 8:00a - 4:45p 12:00p - 12:45p 5:00p - 5:45p 6:00p - 7:00p	Breakfast Field Trip: Lake sampling aboard <i>R/V GIBRALTAR III</i> (Collect fish samples) and North Bass Island Lunch (sack lunches provided) Dinner Open review (student's option)	Instructor: Brian Zimmerman
Week Two		Physiology, Field Methods and a Step Up in Phylogeny	
Monday:	7:00a - 7:45a 8:00a - 9:00a 9:00a - 11:00a 11:00a - 11:45a 12:00p - 12:45p 1:00p - 3:45p 3:45p - 4:00p 4:00p - 4:45p 5:00p - 5:45p 6:00p - 7:00p	Breakfast Lecture V: Oxygen Requirements, Respiration and Circulation, Metabolism and Energetics Field Trip: Seining at Gibraltar Isle Beach, collect fish and data Quiz I: Lectures I-IV and Labs I-III Lunch Lab IV: Taxonomy, sort and identify Gibraltar Beach, Open Water Trawled and North Bass Island fish species, dissections break Lecture VI: Sturgeon and Paddlefish, Bichirs and Reedfish, Gars and Bowfin Dinner Open Review (student's option)	Instructor: Marc Kibbey
Wednes.:	7:00a - 7:45a 8:00a - 9:30a 9:30a - 9:45a 9:45a - 12:00p 12:00p - 12:45p 1:00p - 4:00p 4:15p - 4:45p 5:00p - 5:45p 6:00p - 7:00p	Breakfast Lecture VII & Lab V: IBI and LIBI, QHEI and LQHEI Break Lab VI: chondrosteans, cladistians, and lower neopterygians (holosteans) Lunch Field Trip: Perry's Monument Beach and Terwilliger's Pond Lab Practical I: Labs I-IV Dinner Open review (student's option)	Instructor: Marc Kibbey
Friday:	7:00a - 7:45a 8:00a - 4:00p 12:00p - 12:45p 5:00p - 5:45p 6:00p - 7:00p	Breakfast Field Trip: Mainland: Miller Blue Hole, Pickerel Creek and Castalia Hatchery Watersheds: Life in cold-water streams, and East Harbor Shock Boat sampling: The Spotted Gar Lives! Lunch (Sack lunches provided) Dinner Open review (student's option)	Instructor: Brian Zimmerman

Week Three

Staying Alive, Spreading the Seed and More Advancements

Monday: 7:00a - 7:45a Breakfast Instructor: Marc Kibbey
 8:00a - 9:00a **Lecture VIII:** Homeostasis, Locomotion and Feeding
 9:00a - 11:45a **Field Trip:** Middle Bass Island
 12:00p - 12:45p Lunch
 1:00p - 3:15p **Lab VII:** Taxonomy: sort and identify Perry's Monument Beach, Terwilligers Pond and Mainland fish species, dissections
 3:15p - 3:30p break
 3:30p - 4:00p **Quiz II:** Lectures V-VII, Labs IV-VI
 4:00p - 4:45p **Lecture IX:** Eels, Bonytongues, Minnows, Tetras and Catfish, Shad, Trout and Cod
 5:00p - 5:45p Dinner
 6:00p - 7:00p Open Review (student's option)

Wednes.: 7:00a - 7:45a Breakfast Instructor: Marc Kibbey
 8:00a - 9:00a **Lecture X:** Sensory Systems, Reproduction and Ontogeny
 9:00a - 9:15a Break
 9:30a - 12:00p **Lab VII:** elopomorphs, osteoglossomorphs, ostariophysans, clupeamorphs, protocanthopterygians and paracanthopterygians
 12:00p - 12:45p Lunch
 1:00p - 4:00p **Field Trip:** Middle Bass Island, collect fish and data
 4:00p - 4:45p **Lecture XI:** Adaptations, Habitats, Zoogeography
 5:00p - 5:45p Dinner
 6:00p - 7:00p Open review (student's option)

Friday: 7:00a - 7:45a Breakfast Instructor: Brian Zimmerman
 8:00a - 4:00p **Field Trip:** Mainland Warmwater Streams: Maumee River at Grand Rapids Dam: Sand Darters galore! and Cranberry Run or Auglaize River: Reintroduction of Pirate Perch a rousing success!
 12:00p - 12:45p Lunch (sack lunch provided)
 5:00p - 5:45p Dinner
 6:00p - 7:00p Open review (student's option)

Week Four

More Sampling Fun, and Ultimate Fishes

Monday: 7:00a - 7:45a Breakfast Instructor: Marc Kibbey
 8:00a - 8:45a **Lab Practial II:** Labs V-VII
 8:45a - 11:45a **Field Trip:** NE South Bass Island Beach, collect fish and data
 12:00p - 12:45p Lunch
 1:00p - 3:45p **Lab VIII:** Taxonomy, sort and identify Mainland, SBI fish species, dissections
 3:45p - 4:00p Break
 4:00p - 4:45p **Lecture XII :** Mulletts, Perches and Puffers
 5:00p - 5:45p Dinner
 6:00p - 7:00p Open review (student's option)

Wednes.: 7:00a - 7:45a Breakfast Instructor: Marc Kibbey
 8:00a - 8:30a **Quiz III:** Lectures VIII-XII and Lab VIII
 8:30a - 11:45a **Lab IX:** acanthopterygians
 12:00p - 12:45p Lunch
 1:00p - 4:00p **Lab XII:** acanthopterygians
 4:00p - 5:00p **Lecture XIII:** Threats to the Diversity of Fishes, Conservation
 5:00p - 5:45p Dinner
 6:00p - 7:00p Open review (student's option)

Friday: 7:00a - 7:45a Breakfast Instructor: Brian Zimmerman
 8:00a – 4:45p **Field Trip:** Mainland Trips – More Warm-water Streams:
 Sandusky River at Tiffin, Ohio Pioneer Mill Dam for River
 Redhorse and Greater Redhorse, and Huron River at Milan
 Nature Preserve for Bigeye Chub
 12:00p - 12:45p Lunch (sack lunch)
 5:00p - 5:45p Dinner
 6:00p - 7:00p Open review (student’s option)

Week Five Field trips and projects to explore applied behavior and ecology of fishes

Monday: 7:00a - 7:45a Breakfast Instructor: Suzanne Gray
 8:00a - 11:45 p Behavior, Ecology and Research Project – experimental design
 12:00p - 12:45p Lunch
 1:00p - 4:45p Snorkeling and Observation
 5:00p – 5:45p Dinner
 6:00p – 7:00p Work on Research Project

Wednes.: 7:00a - 7:45a Breakfast Instructor: Suzanne Gray
 8:00a - 11:45 a Behavior, Ecology and Research Project – data collection
 12:00p - 12:45p Lunch
 1:00p - 4:45p Snorkeling and Observation
 5:00p – 5:45p Dinner
 6:00p – 7:00p Work on Research Project

Friday: 7:00a - 7:45a Breakfast Instructor: Suzanne Gray
 8:00a – 8:30a **Quiz IV:** Applied Behavior and Ecology of Fishes
 8:30a - 11:45a Research Project – analysis and interpretation
 12:00p - 12:45p Lunch

Saturday: 7:00a - 7:45a Breakfast
 8:00a - 9:00a Course review (student’s option), Report Due
 9:00a - 10:00a Laboratory Practical Final
 10:00a - 12:00p Final Exam
 12:00p - 12:45p Lunch

Major Assignments

Quizzes: A written quiz consisting of 10-15 short answer, multiple choice, true and false, and/or fill-in-the-blank style questions. You will be tested on material covered in lectures and the textbook readings.

Research Project Report: A short observational and/or experimental research project developed and carried out by the group from hypothesis building, experimental design, data collection, analysis and interpretation and writing of a short scientific paper. You will work as a team to develop a research question centered on an applied aspect of fish behavior and ecology.

Laboratory Practical: A 45 minute-long examination with questions pertaining to organism identification, structure, and function, performance-based assessments on microscope usage and sampling techniques, and other questions as decided by your instructor on material covered during the lab and field components of this course.

Final Exam: A two-hour long written exam consisting of essay, short answer, multiple choice, true and false, and/or fill-in-the-blank style questions. You will be tested on material covered in lectures and the textbook readings. The final exam will have some questions similar to your quizzes, but will also include more in-depth critical thinking questions.

Grading Information

Grading will be based on laboratory practicals (two midterm and one final for 10% each), written exams (four quizzes 8% each, a final exam 20%), a research project report (10%), and participation (8%). Students will be expected to actively participate in the learning process in all aspects of the course in the field and classroom.

Grading Scale

93-100%	A
90-92.9%	A-
87-89.9%	B+
83-86.9%	B
80-82.9%	B-
77-79.9%	C+
73-76.9%	C
70-72.9%	C-
67-69.9%	D+
60-66.9%	D
<60%	E

Attendance Policy

Students are expected to actively participate in all class sessions, including lectures, fieldwork and laboratory time.

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed: illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Disability Services

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in **089 Baker Hall, 113 W. 12th Ave.;** telephone **614-292-3307, TDD 614-292-0901;** <http://www.slds.osu.edu/>.