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

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 :** Mullets, 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	F***ield 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/**.