University of Wisconsin - Madison

Zoology/Environmental Studies 510 - Ecology of Fishes
3 credits https://canvas.wisc.edu/courses/89212

Course designations & attributes
Breadth - Biological Sci. Counts toward the Natural Sci req Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Additional details
CALS Credit – Fulfills honors course requirement

Lectures: Tuesday and Thursday 9:55-10:45 in 168 Noland Hall
Discussion: Thursday 1:30-3:00 in 168 Noland Hall
Field trip #1: Madison lakes ice fishery. Half-day trip on 24 Feb (0830-12:00 ***or*** 13:00-16:30).
Field trip #2: Shedd Aquarium. Full day trip on 21 Apr (06:00-19:00).

Instructional mode
All face-to-face
Face-to-face instruction is central to this course. We expect all students to attend and participate in course meetings three times per week. Meetings may include a variety of formats, ranging from lecture to museum visits to exams. In addition, all students are expected to participate in two Saturday field trips that are the basis for required writing assignments.

Credit hours:
This class meets for two 50 minute class periods and one 90 minute discussion period each week over the spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc.) for about 2 hours out of classroom for every class period, including two field trips. The syllabus includes additional information about meeting times and expectations for student work.

Instructors:
Jake Vander Zanden - office hours: after class, or by appt. 206 Center for Limnology; mjvanderzand@wisc.edu

John Lyons - office hours: after class, or by appt., 443 Noland Hall; jdlyons@wisc.edu

Course description
Interactions of fishes with their physical, chemical, and biotic environment; physiological ecology, community ecology and fisheries sciences. Lake Mendota perch fishery and Shedd Aquarium field trips.

Requisites
Enrollment limited to students that have taken the following courses: Biology/Botany/Zoology 152; or Biology/Zoology 101 and Biology/Zoology 102; or Biocore 381

Course learning outcomes

Students will be able to:

- use facts to guide conceptual thinking and hypothesis tests about ecological systems.
- draw upon aspects of fish evolution, ecology, and conservation to produce an integrated perspective.
- summarize the diversity of fishes on Earth, including phylogenetic and geographic patterns.
- analyze the relationship between form and function of individual fish.
- place fish in the context of the broader food web and ecological community.
- describe the management and use of fish by human society.
- describe the conservation challenges faced by fish now and in the future.
- write clear, concise scientific reports both individually and in teams.
- present effective, informative, and persuasive arguments in writing and orally.

Grading

Exam I (22 Feb)		20%
Exam 2 (5 Apr)		20%
Exam 3 (3 May)		20%
Madison Lakes	(due 22 Mar)	15%
Shedd Paper (due 8 May)		15%
Fishy readings (due 3 May)		10%

Grade	Percentage	Points Range
A	92-100%	186-200
AB	88-91.9%	174-185.9
B	81-87.9%	166-173.9
BC	78-80.9%	154-165.9
C	70-77.9%	140-153.9
D	60-69.9%	120-139.9
F	Below 60%	119 and below

Discussion section: All students are expected to attend and participate in Discussions every week. Topics and formats will vary, as indicated in the course schedule below.

Textbook: No textbook is assigned; individual readings will be posted as pdfs on the course website. Relevant textbooks and other resources are also on reserve at Steenbock Memorial Library.

Exams: (*Please note: exams must be taken during the indicated times. Make-ups will not be offered*)

1. 22 Feb (Lectures 1-9). During discussion period.
2. 5 Apr (Lectures 10-19). During discussion period.
3. 3 May (Lectures 20-28, also drawing on earlier material). During discussion period.

Papers:

1. Madison Lakes. Field outing on 24 Feb, option of morning or afternoon trip. Paper due 22 March.
2. Shedd Aquarium. Full day (06:00-19:00) field trip on 21 Apr. Paper due 8 May.
3. Fishy Readings. Book report due 3 May.

Panel of experts: Each student will be randomly assigned two fishes—one freshwater, one marine. Early in the semester, you will be expected to do some research on your species, and be prepared to share your knowledge during class discussion or in answering exam questions (yes, your fishes will be included on the test!). Besides web resources, there are a wide variety of books in the library (*Fishes of the Great Lakes*, *Freshwater Fishes of Canada*, etc.) that have useful information.

Readings:

Egan, D. 2017. Death and Life of the Great Lakes. WW Norton and Co. (Chapters 1,2,3,5,10)

Moyle, P.B. and J.J. Cech. 2004. An introduction to Icthyology. Fifth Edition. (Chapters 1,2,3,7,13)

Loew, P. and J. Thannum. 2011. After the storm: Ojibwe treaty rights twenty-five years after the Voigt decision. The American Indian Quarterly 35(2): 161-191.

Rahel, F.J. 2000. Homogenization of fish faunas across the United States. Science 288: 854-856.

Vander Zanden, M.J., J.M. Casselman, J.B. Rasmussen. 1999. Stable isotope evidence for the food web consquences of species invasions in lakes. Nature 401: 464-467

Lec	Date	Topic	Lecturer
1	Jan 23	Introduction	Vander Zanden & Lyons
2	Jan 25	Fish evolution and systematics	Vander Zanden
		Discussion: none	
3	Jan 30	Fish evolution and systematics	Vander Zanden
4	Feb 1	Morphology & adaptations	Vander Zanden
		Discussion: ancient fishes	Vander Zanden
5	Feb 6	Growth and Bioenergetics	Vander Zanden
6	Feb 8	Growth and Bioenergetics	Vander Zanden
		Discussion: TBA	Vander Zanden
7	Feb 13	Fishes of WI	Lyons
8	Feb 15	Adaptive Radiations	Lyons
		Discussion: Mad lakes trip	Lyons
9	Feb 20	Reproduction	Lyons
10	Feb 22	Fishes as predators	Lyons
		Discussion: Exam 1 (lec. 1-9)	
	Feb 24	**MAD LAKES FIELD TRIP**	Lyons
11	Feb 27	Fishes as prey	Lyons
12	Mar 1	Life history and migrations	Lyons
		Discussion: Mad lakes trip	Lyons
13	Mar 6	Fish-habitat relationships	Perales
14	Mar 8	Social behavior	Lyons
		Discussion: UW Fish Collection	Lyons
15	Mar 13	Food webs and trophic cascades	Lyons
16	Mar 15	Global biogeography	Lyons
		Discussion: UW Fish Collection & trophic cascades	Lyons
17	Mar 20	Great Lakes	Lyons
18	Mar 22	Lake Tanganyika	Lyons
		Discussion: Connectivity optimization in practice **[Mad Lakes paper due]**	Lyons
	Mar 27	SPRING BREAK	
	Mar 29	SPRING BREAK	
19	Apr 3	Tropical Subsistence Fisheries	Koning
20	Apr 5	Capture Fisheries	Lyons
		Discussion: Exam 2 (lec. 10-19)	
21	Apr 10	Aquaculture	Lyons
22	Apr 12	Walleye fisheries	Vander Zanden
		Discussion: walleye fisheries	Vander Zanden
23	Apr 17	Conservation and threats	Vander Zanden
24	Apr 19	Conservation and threats	Vander Zanden
		Discussion: Shedd field trip	Vander Zanden
	Apr 21	**SHEDD FIELD TRIP**	Vander Zanden
25	Apr 24	Conservation and threats	Vander Zanden
26	Apr 26	Mercury in fish	Vander Zanden
		Discussion: Shedd trip report	Vander Zanden
27	May 1	Invasive species and food webs	Vander Zanden
28	May 3	Climate change	Magee
	May 3	***Discussion: Exam 3 (lec. 20-28)***	
	May 8	**Shedd paper due**	

Course philosophy

The central goal of Zoology 510 is to give students experience with the scientific process of using facts to guide conceptual thinking, then analyzing the evidence for a hypothesis about ecological systems. Together, we will assess many aspects of fish evolution, ecology, and conservation through lectures, discussions, field trips, and research projects. By the end of the course, you will be aware of the enormous diversity of fishes on Earth, their deep and recent evolutionary history, the way they function as organisms and within ecological webs, their management and use by human society, and the conservation challenges that fish face now and in the future. Along the way, you will execute two research projects, hone your skills in scientific writing in teams and individually, and use the fish collection at UW-Madison. You will find that fish are a fascinating taxon for building your critical thinking and communication skills.

Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension.
Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

Accommodations for students with disabilities

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life.
Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of your educational record, is confidential and protected under FERPA.
http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

Diversity & Inclusion

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. The faculty leading this course commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." https://diversity.wisc.edu/