

# ICHTHYOLOGY

Biology 330/530

Spring 2017

## The Course:

Welcome to the study of fishes - Ichthyology. In this course we will cover the general biology of fishes, as understood through several disciplines of the biological sciences. This course does not require previous university level knowledge of vertebrate physiology, anatomy, paleontology, ecology, ethology, genetics or systematics. However you will learn about how constraints of aquatic life related to each of these disciplines affect the biology of aquatic vertebrates, and in particular to fishes.

In this course, lectures will be devoted to general biology of fishes to the disciplines mentioned above, and labs will explore diversity of fishes., both present and past. The final two thirds of the semester will cover identification of specimens from the upper mid-western area. It will require competence at using keys to identification. Knowing the species you are dealing with is one of the most important aspects of studying fishes. Although it is easy to learn to recognize game fishes, identification of the smaller species takes some practice and will be difficult initially. Using a key to species requires fluency in anatomical terms and an ability to visualize what the descriptions in the key. By the end of the semester students will be comfortable with both.

**Undergraduate vs. Graduate student credit – There are fundamental differences in expectations between undergrad students and grad students. Undergraduate students will not necessarily be planning on a profession involving fish or fisheries, but rather will be gaining breadth in their understanding of how fishes have adapted to the environmental challenges they face. Graduate students who may possibly aim on working with state, federal or even international agencies will be required to show the level of knowledge that will make them successful at the level they choose.**

## Meeting time and place:

**Lectures:** 51 Halsey Science, Tuesday 1:20-3:20, but we all need a break for a few minutes after an hour.

**Labs:** 51 Halsey Science, Thursday 1:20 - 4:20.

## Textbooks:

1. Helfman, Collette, Facey & Brown. The Biodiversity of Fishes: Biology, Evolution and Ecology (2<sup>nd</sup> edition)
2. Rainboth, W.J. 2017 - Biology 330/530 Laboratory Manual. (Individual Chapters - on D2L)

## Schedule:

For readings H=Helfman - Chapter : L=Lab Manual Draft - Chapter (downloaded from D2L)

Week	Reading	Subject
Week 1 - 30 Jan - 03 Feb		
Lecture reference	H-1	Introduction to Ichthyology, historical perspectives
Lab reference	L-1	Fish capture methods, basics for field work

Week 2 - 06 Feb - 10 Feb			
	Lecture reference	H-2, L-5	Taxonomy, systematics, classification
	Lab reference	H-3, L-2	Field studies conclusion, begin external anatomy
Week 3 - 13 Feb - 17 Feb			
	Lecture reference	H-3, L-5	Evolutionary trends, integument system
	Lab reference	H-11, H-4, L-2	Diversity - chordates and first fishes, external anatomy
Week 4 - 20 Feb - 24 Feb			
	Lecture reference	H-5	Respiration, ventilation, buoyancy
	Lab reference	H-13, H-4, L-3	Diversity - lampreys, hagfishes, ext. & int. anatomy
Week 5 - 27 Feb - 03 Mar			
	Lecture reference	H-6	Body shapes, locomotion
	Lab reference	H-12, L-7	Diversity - sharks, begin identification exercise
Week 6 - 06 Mar - 10 Mar			
	Lecture reference	H-7	Homeostasis, osmoregulation, thermoregulation
	Lab reference	H-12, L-7	Diversity - rays and relatives, keying fishes
Week 7 - 13 Mar - 17 Mar			
	Lecture reference	H-8	Sensory perception
	Lab reference	H-14, L-7	Diversity - Sarcops-Actinops, keying fishes
20 Mar - 24 Mar	Spring break week		
Week 8 - 27 Mar - 31 Mar			
	Lecture reference	H-9	Reproduction, Reproductive behavior
	Lab reference	H-14, L-7	Diversity - Elopomorphs to Salmonids, keying fishes
Week 9 - 03 Apr - 07 Apr			
	Lecture reference	H-10, L-4	Age and Growth, Genetics
	Lab reference	H-14, L-7	Diversity - Ostariophysans, keying fishes
Week 10 - 10 Apr - 14 Apr			
	Lecture reference	H-19, 20	Predatory behavior, anti-predation
	Lab reference	H-14, L-7	Diversity - Neoteleosts & Acanthomorphs, keying fishes
Week 11 - 17 Apr - 21 Apr			
	Lecture reference	H-21, 22	Migratory behavior, schooling, communication
	Lab reference	H-15, L-7	Diversity - primitive Acanthopterygians, keying fishes
Week 12 - 24 Apr - 28 Apr			
	Lecture reference	H-23	Cleaning behavior, Fish communities, deep sea
	Lab reference	H-15, L-7	Diversity - Perciform fishes, keying fishes
Week 13 - 01 May - 05 May			

Lecture reference	H-24, 25	Freshwater fish communities
Lab reference	H-15, L-7	Diversity - Advanced Perciform fishes, keying fishes

Week 14 - 08 May - 12 May

Lecture reference	M-24, 25	Marine communities (student evals)
Lab reference	L-7	Finish keying, hand in term paper (Local field trip)

**Lecture notes:** As you can see from the lecture and lab readings, the course is divided into a unity part (lecture) and a diversity part (lab). As this point in time, not all lectures are in Powerpoint, but more will be added as the semester progresses. In as much as it is possible, I will make these files available on D2L in advance of the class presentation. However, in some instances, I will be working on these right up until the class starts, and will post them afterwards.

**Quizzes vs. Exams:** This course will NOT have giant hourly exams during the lecture periods. Instead, we will have at least ten weekly quizzes handed out at the end of the lab period on Thursdays. Quizzes may differ slightly on the number of points, usually varying between 25 and 30, but occasionally more. The quizzes will cover the lecture and lab of the current week AND lecture and lab of the previous week. Quizzes are open book tests and we may be able to have these done as take-home exercises to be turned in on the following Tuesday. There will be no make-ups unless the student has already cleared their absence in advance or there is a physician's note about illness.

**Identifying Wisconsin fishes:** By the middle of the semester, you begin to learn how to identify fishes from our area. We will use a method that has been successfully helped students for a century and a half. You will begin by sorting specimens from a typical locality in our region. It is an exercise in pattern recognition in which you will learn to recognize repeated details that will ultimately be critical for distinguishing populations of different species. Once you have figured out how many species you have and which specimens represent those species, you will use an illustrated key to species of our region to identify the species. At that time we will set up additional lab hours for those having difficulties. This exercise will be worth 140 points and the full procedure will be dealt with in a handout later in the semester. There are different requirements for undergraduate and graduate students. **Procedure for graduate students will be more rigorous, in order to reduce the tendency to guess the final answer without actually completing the effort that the last couplet requires. An error at that point means that the species in question will no longer be allowed from that collection jar. Choosing to guess can create more work!**

**Term paper:** At the middle of the semester - sometime around spring break - you will declare a subject you wish to examine more thoroughly on your own. You will turn in a term paper on this subject two weeks before the last week of the semester. More information will be supplied on this subject early in the semester. It will be worth 100 points. **There are different requirements for graduate and undergraduate student term papers, that will be listed on the handout. However the most important added requirement for grad students is to add an additional section to the paper that presents plans for studying the problem, as if this is a M.S. thesis proposal.**

**Attendance:** As you may have guessed, attendance at lecture and lab is mandatory. Any excused absence must requested by class time on the day of the absence by email or telephone.

Field trips are currently under consideration and be discussed in class. There are a variety of places that can be reached on Saturday but our options are somewhat limited if we try to do it during a lab session. The nearest stream of decent size - Waukau Creek - may be high this year if it is anything last year. High water is difficult to navigate and fish are much better at moving through it than someone wearing waders. Other options may be possible, maybe a trip to the Shedd aquarium in Chicago on a Saturday for those interested.

**Grades:** will be recorded numerically, not alphabetically, during the course. Letter grades at the end of the semester will be calculated by totaling the points and finding the percent. There will not be a curve.

100 - 93 = A    89 - 87 = B+    82 - 80 = B-    76 - 73 = C    69 - 67 = D+    62 - 60 = D  
92 - 90 = A-    86 - 83 = B    79 - 77 = C+    72 - 70 = C-    66 - 63 = D    <60 = F

My office hours will be posted outside my office and outside the lab. I am usually in the building or on campus during non-teaching hours and in the evenings until about 6:00PM, however you might have to look around to find me.

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