

BIOLOGY 374: ICHTHYOLOGY

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Office hours: Daily 11am to Noon, or by appointment.

GOAL: to familiarize students with the taxonomy, systematics, evolution, natural history, ecology, biogeography, anatomy, behavior, and physiology of extant and extinct fishes with an emphasis on the taxonomy of the fishes of Wisconsin and the Upper Midwest.

FORMAT: This course is worth 4 credit hours and will consist of two hours of lecture per week (Monday and Wednesday 8:00-8:50) coupled with two, two-hour lab periods per week (Monday and Wednesday morning or afternoon depending on section: 1--9:00-10:50, 2--15:00-16:50). It is the student's responsibility to contact the instructor immediately after any absence (excused or otherwise) to procure missed assignments and handouts. Lecture notes can be obtained from other students and off the D2L website for the course. Missed labs cannot be made up but the material may be viewed during review sessions the week prior to lab exams.

Lectures will be in the form of Powerpoint presentations and/or notes and figures on the board. Presentations or outlines will be posted to the D2L site for the course at least 24 hours prior to lecture. It is strongly recommended that you print off a copy of the powerpoint slides or the note outline for each lecture prior to attending. You will have more time to focus on lecture material if you are simply jotting down side notes on your printed copy of the lecture rather than having to write down all the information on each slide. As the lecture material will follow the text closely, it is also strongly recommended that you read the assigned text material **prior** to coming to the corresponding lecture. The lecture schedule will be adhered to as strictly as possible although, from time to time, it is possible that we might finish a lecture topic early or one topic might need to be extended into a subsequent lecture. Each lecture will be followed by the posting of a lecture review sheet that can be used as an outline for exam studying.

TEXTS:

1. (REQUIRED) *Biology of Fishes* (3rd edition). (2004) M. Barton. Brooks/Cole Publishers. St. Paul, Minnesota
2. (RECOMMENDED) *A Field Guide to Freshwater Fishes: North America North of Mexico* (2nd edition) (2011) L.M. Page and B.M. Burr. Houghton Mifflin Company. Boston, Massachusetts.
3. (OPTIONAL but excellent) *Fishes of Wisconsin* (out of print), (1983) G. Becker. University of Wisconsin Press, Madison, Wisconsin. COPIES AVAILABLE AT TEXT RENTAL OR VIEW PDF ONLINE . . .

<http://digicoll.library.wisc.edu/cgi-bin/EcoNatRes/EcoNatRes-idx?id=EcoNatRes.FishesWI>

4. (OPTIONAL TEXT) *The Diversity of Fishes*. (2008) G.S. Helfman, B.B. Collette, and D.E. Facey. Blackwell Science, Malden, Massachusetts
5. (OPTIONAL TEXT) *Fishes: An introduction to Ichthyology* (6th edition). (2007) P.B. Moyle and J.J. Cech, Jr. Prentice Hall. Upper Saddle River, New Jersey.
6. (OUTSTANDING REFERENCE) *Fishes of the World* (4th Edition). (2006) J.S. Nelson. John Wiley and Sons. Hoboken, New Jersey.

GRADING: There will be three, one-hour examinations on the lecture material, each worth 50 points and will be 50 questions. Each exam will include true/false, multiple choice, matching, fill-in-the-blank, and short essay questions. Essay questions will be available in advance.

There will be four, 50-point (50 questions) laboratory practical examinations during the semester. The questions will be practical in nature and therefore will include identification, external anatomical, internal anatomical, and taxonomically related questions on actual specimens. **PRACTICALS CANNOT BE MADE UP!**

There are two written assignments (25 points each). These are meant to be fairly straightforward exercises that can be completed in a relatively short period of time. One paper will be related to a fish stock imperiled by overexploitation and the other will be on the biology of a non-game, native Wisconsin fish species. Papers should be based on several (at least 3) sources of information (properly cited) and will be between 2 and 3 pages in length (1-inch margins, 1 line of heading, 12-point font, double spaced). Plagiarism in any form will result in a grade of zero! I will randomly assign fish species to each student in the class.

Lastly, attendance will be taken at all labs or there will be simple laboratory quizzes each worth five points with perfect attendance worth possible 100 total points (24 x 5 = 120, -4 = 100 pts; 8 lab periods will be for review or practicals and you are allowed four absences, no penalty). On occasion, lab points may be based on small, essay-style group or individual assignments.

There are 500 total points awarded in this course: 150 for lecture exams, 200 for laboratory practicals, 50 for the papers and 100 for laboratory attendance. With the field trip (discussed below) there are a possible 40 extra credit points available. Final grades are determined on total points earned during the entire semester. The following letter designations will be awarded to the corresponding percentages of total points earned:

A = 93.4 - 100%	A- = 90 - 93.3 %	
B + = 86.7 - 89.9%	B = 83.4 - 86.6%	B - = 80 - 83.3%
C + = 76.7 - 79.9%	C = 73.4 - 76.6%	C - = 70 - 73.3%
D + = 66.7 - 69.9%	D = 60.0 - 66.6%	
F = < 60%		

The instructor reserves the right to curve final grades to more evenly distribute them.

FIELD TRIP: There will be non-mandatory fish collecting field trips offered during the semester--sometimes during the week and sometimes on Saturday mornings earlier in the semester (Approx mid September through early November). Attendance one of these field trips is extra credit and is worth 10 points. The goal of the field trips is to familiarize students with several methods that ichthyologist's use to collect fish or ecological fish data and for students to see some of the local fishes in life.

BONUS POINTS: There will be several bonus points offered on each practical and lecture exam and on lab quizzes. There will also be a single, short essay-style bonus assignments offered during the course of the semester for approximately 10 points. With the field trip these bonus points will total around 40 points.

LABORATORY SCHEDULE (Will probably not change)

Week 1: General External Anatomy of Fishes

Week 2: Osteology, External Anatomy and Internal Anatomy of Agnatha and Chondrichthyes

Week 3: Osteology, External Anatomy and Internal Anatomy of Osteichthyes.

Week 4: Review & **Practical I (SEPT 26th):** External and Internal Anatomy of Fishes.

Week 5: World Fishes A (?? Families): Myxiniiformes, Petromyzontiformes, Elasmobranchi, Holocephali, Sarcopterygii, Cladistia, Chondrostei, Neopterygii, Osteoglossomorpha, Elopomorpha, and Clupeomorpha

Week 6: World Fishes B (?? Families): Ostariophysii, Siluriformes, Protacanthopterygii, Stenopterygii, Ateleopodomorpha, Cyclosquamata, Scopelomorpha, Lampriomorpha, Polyomixiomorpha and Paracanthopterygii

Week 7: World Fishes C (?? Families): Mugilomorpha, Atherinomorpha, Stephanoberyciformes, Beryciformes, Zeiformes, Gasterosteiformes, Synbranchiformes, Scorpaeniformes, Pleuronectiformes and Tetraodontiformes

Week 8: Review & **Practical II (OCT 24th):** World Fishes A-C

Week 9: World Fishes D (160 Families): Perciformes

Week 10: Regional Fishes A: Lampreys, Chondrosteans, Neopterygians, Eels, Mooneyes, Clupeids, Catfishes, Suckers, Smelts, Pikes, Mudminnow, Salmonids

Week 11: Review & **Practical III (NOV 14th):** World Fishes D & Regional Fishes A:

Week 12: Regional Fishes B: Minnows & Carps 1 and 2

Week 13: Regional Fishes C: Minnows & Carps 3, Pirate Perch, Troutperch, Burbot, Killifishes, Silverside, Sticklebacks, Temperate Basses, Drum, Sculpins, Gobies

Week 14: Regional Fishes D: Sunfishes, Basses, and Percids

Week 15: Review & **Practical IV (DEC 14th):** Regional Fishes B, C, D

TENTATIVE LECTURE SCHEDULE

(The topics are listed below in roughly the order in which they will be covered. Speed of coverage is an unknown at this point. We will have the three exams on the dates listed below but the topics on each exam will not be known until the week prior to the exam)

EXAM DATES (FIRM, regardless of our progress)

1. **Wed. October 5th**
2. **Wed. November 9th**
3. **Fri. December 16th, 12:30 to 14:30, NOT COMPREHENSIVE**

TOPICS AND READINGS

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| 1. Setting the Stage, National Geographic DVD: "It's All About the Fishes" | Chapter |
| 2. Call for conservation, stigmas, role of Ichthyology in your education, Careers | Chapter |
| 3. Role of Biological Collections, Neo-naturalism, Diversity Studies | Chapter |
| 4. "Dead Ichthyologists" a History of Ichthyology | Chapter |
| 5. Systematics, Taxonomy, Biological Classification | Chapter |
| 6. Fish evolution (general, big picture view of major groups) | Chapter |
| 7. Modes of Locomotion | Chapter |
| 8. Fish responses to salinities | Chapter |
| 9. Air-breathing Fishes | Chapter |
| 10. Breeding Systems/Life Histories | Chapter |
| 11. General Aquatic Ecology | Chapter |
| 12. Fish Distribution (Biogeography and Provinces), Aquatic Habitats | Chapter |
| 13. Systematics, Taxonomy, Biological Classification | Chapter |
| 14. Fish Sensory Adaptations | Chapter |
| 15. Comparative Physiology of Fishes | Chapter |