

BIOLOGY 374: ICHTHYOLOGY

Justin Sipiorski

TNR 437 (LABS: 400,400a,401,403, 410,412,414)

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Office hours/Open lab: M 9-10, 12-1; T 10-1; W 9-10, 12-2

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 Tuesday afternoon or Monday and Wednesday morning depending on section: 2--13:00-14:50, 3--15:00-16:50, 1—10:00-12:00). 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. [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* (5th edition). (2016) J.S. Nelson, T.C. Grande. and M.V.H. Wilson. John Wiley and Sons. Hoboken, New Jersey.

GRADING: There will be two, one-hour examinations on the lecture material, each worth 30 points Each exam will comprise short essay questions. A list of ALL TOTAL POSSIBLE essay questions will be available in advance. On the exam you will be asked to choose to answer a subset of the possible essay questions. Some questions may be required of all students. You will answer 8 questions in total, 4-6 points each.

There will be four, 25-point (25 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 three 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 marine stock imperiled by overexploitation and the other two 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 or 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 95 total points (24 x 5 = 120, -25 = 95 pts; 8 lab periods will be for review or practicals

and you are allowed five absences, no penalty). On occasion, lab points may be based on small, essay-style group or individual assignments.

There are 360 total points awarded in this course: 60 for lecture exams, 100 for laboratory practicals, 75 for the papers, 30 points for the laboratory final unknown exercises and 95 for laboratory attendance. With the field trip (discussed below) there are a possible 40 extra credit points available scattered across the semester. 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%

B + = 86.7 - 89.9%

C + = 76.7 - 79.9%

D + = 66.7 - 69.9%

F = < 60%

A- = 90 - 93.3 %

B = 83.4 - 86.6%

C = 73.4 - 76.6%

D = 60.0 - 66.6%

B - = 80 - 83.3%

C - = 70 - 73.3%

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

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

Week 1: Introduction, Syllabus & Exercise on Fish Morphology

Week 2: Lamprey Dissection; Shark Dissection

Week 3: Perch Dissection; Osteichthyes Osteology

Week 4: Review (Mon.); Practical I **SEPT 24/25th** (Tues. Wed.)

Week 5: "Agnathans" & Chondrichthyes; Sacropterygii, Early Actinopterygians, Elopomorpha, Oseoglossomorpha, Clupeomorpha & Gonorhynchiformes

Week 6: Cyprinidae I; Cyprinidae II

Week 7: Review (Mon.); Practical II **OCT 15/16th** (Tues. Wed.)

Week 8: Catostomidae, Remaining Cypriniformes, Characiformes; Siluriformes, Gymnotiformes

Week 9: Salmoniformes, Esociformes, Osmeriformes; Stomiiformes, Aulopiformes, Myctophiformes, Lampriformes, Percopsiformes, Zeiformes, Gadiformes, Holocentriformes, Ophidiiformes, Batrichoidiformes, Kurtiformes, Gobiiformes

Week 10: Mugiliformes, Cichliformes, Blenniiformes, Gobiesociformes, Atheriniformes, Beloniformes, Cyprinodontiformes, Synbranchiformes, Carangiformes, Itiophoriformes, Anabantiformes; Pleuronectiformes, Syngnathiformes, Scombriformes, Trachiniformes, Labriformes

Week 11: Review (Mon.); Practical III **NOV 12/13th** (Tues. Wed.)

Week 12: Perciformes I, Perciformes II

Week 13: Scorpaeniformes; Moroniformes, Acanthuriformes, Spariformes, Lophiiformes, Tetraodontiformes

Week 14: Review (Mon.); Practical II **DEC 3/4th** (Tues. Wed.)

Week 15: FINAL LAB UNKNOWN EXERCISES WRAP UP

Week 16: Finals week, NO LABS

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 two exams on the dates listed below but the topics on each exam will not exactly be known until the week prior to the exam)

EXAM DATES (FIRM, regardless of our progress)

1. MONDAY, OCT 28 DURING LECTURE PERIOD
2. MONDAY Dec. 16th 2:30-4:30pm A121 SCI

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 1 |
| 4. Systematics, Taxonomy, Biological Classification | Chapter 1, 4 |
| 5. "Dead Ichthyologists" a History of Ichthyology | Chapter 1 |
| 6. Modes of Locomotion | Chapters 9-17 |
| 7. Fish responses to salinities | Chapter 19 |
| 8. Air-breathing Fishes | Chapter 24 |
| 9. Breeding Systems/Life Histories | Chapter 27 |
| 10. General Aquatic Ecology | Chapters 30-35 |
| 11. Fish Distribution (Biogeography and Provinces), Aquatic Habitats | Chapter 29 |
| 12. Fish Sensory Adaptations | Chapter 20-22 |
| 13. Comparative Physiology of Fishes | Chapters 18-19, 23-26, 28 |
| 14. The Beginning of Fishes | Chapter 2 |
| 15. Hagfishes | Chapter 5 |
| 16. Lampreys | Chapter 5 |
| 17. Sharks, Skates, Rays and Ratfishes | Chapter 6 |
| 18. Early Bony Fishes | Chapters 7,8 |
| 19. Teleosts | Chapters 8 |