

BIOLOGY 374: ICHTHYOLOGY SUMMER 2017

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TNR 403 (LABS: 400,400a,401,410,412,414)
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Office hours/Open lab: in summer, 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 in the summer session, lecture and lab hours are arranged in an *ad hoc* fashion as we proceed through the timeslots. The scheduled sessions will be made clear to the student on a daily basis as field times/places are solidified. 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 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 10 questions in total, 3 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.

During the last week of the course there will be a 15-point group exercise to identify 15 unknown species in a provided jar. Groups will spend as much time as required in TNR 400 using any resources necessary to ID, to the best of

their ability 15 unknown species of fish. Group members can collaborate on the exercise but between group collaboration is not allowed. I will be present to answer questions and to provide necessary tools and equipment

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 ($24 \times 5 = 120$, $-25 = 95$ 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 345 total points awarded in this course: 60 for lecture exams, 100 for laboratory practicals, 75 for the papers 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%	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.

LABORATORY SCHEDULE (Will probably not change)

Week 1: General External Anatomy of Fishes

Osteology, External Anatomy and Internal Anatomy of Agnatha and Chondrichthyes

Osteology, External Anatomy and Internal Anatomy of Osteichthyes.

Review & **Practical I:** External and Internal Anatomy of Fishes.

Week 2: World Fishes A (?? Families): Myxiniiformes, Petromyzontiformes, Elasmobranchi, Holocephali, Sarcopterygii, Cladistia, Chondostei, Neopterygii, Osteoglossomorpha, Elopomorpha, and Clupeomorpha

World Fishes B (?? Families): Ostariophysi, Siluriformes, Protacanthopterygii, Stenopterygii, Ateleopodomorpha, Cycloquamata, Scopelomorpha, Lampriformes, Polyomixiomorpha and Paracanthopterygii

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

Review & **Practical II:** World Fishes A-C

Week 3: World Fishes D (160 Families): Perciformes

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

Review & **Practical III:** World Fishes D & Regional Fishes A:

Week 4: Regional Fishes B: Minnows & Carps 1 and 2

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

Review & **Practical IV:** Regional Fishes B, C, D

We will also be taking four, three-hour field trips to collect/observe fishes from local waterways during the course. These will highlight four aquatic ecotypes: Glacial Lake, Small Stream, Medium Stream, Large River.

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)

There will be two lecture exams, one at the end of week two and one at the end of week 4, roughly spitting materials on the list below in half. Details will be determined as the course proceeds.

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