Course Syllabus

FRSHWTR 511—Ichthyology

3 credits, Face to Face

**Time** 1130 – 1630 Fridays

**Room**  Great Lakes Research Facility (600 East Greenfield Ave) Room 1084

**Instructor:**

John Janssen School of Freshwater Sciences,
Room 3013, 600 E. Greenfield Ave.
jjanssen@uwm.edu 414-382-1733

Instructure Canvas Site: https://uwmil.instructure.com/courses/513451

**Office hours:** Friday 1030-1130 or 1630-1700 and by arrangement.

**Course description:**

The biology of fishes focusing on diverse behavioral, biomechanical, genetic, and physiological adaptions to a great variety of ecological systems.

How many currently “known” species of fishes are there? Did you know there are about 35,000 species of fish - as many as all other vertebrate groups combined? Have we lost any species? Why does it matter how many there are? How are they useful to humans? Their usefulness to humans is diversifying. Fishes have always been a food source, but their anatomical, physiological, genetic, and behavioral variation are proving to be useful to a variety of scientific disciplines. For example, engineers are designing robots based on fish swimming adaptations, sensors are being designed based on fish visual, hydromechanical, and electrosensory capabilities, and some fishes are model organisms for understanding vertebrate developmental biology. However, multiple threats exist that prompt adaptation or constrain it. Why do some survive these environmental challenges and what can’t they survive? Effective use of the diverse fish adaptations, and constraints on adaptation, requires an understanding of their evolutionary history which lays the framework for comparative study of adaptation.

**Learning Objectives:**

This course is intended to enable students to:

1. Identify fishes in the field and laboratory. This is comparative using both anatomy and behavior.
2. Describe and compare fish lifestyles, ecology, and behavior
3. Identify the challenges of life in water and how these relate to diverse adaptations.
4. Describe and analyze diverse threats to the survival of fish species and the destruction of biodiversity of fishes

Approach:
We use the Kolb model, beginning with Concrete Experience. That experience for the first four sessions is collecting trips at diverse habitats. Most fishes are too difficult to identify without a good background in their comparative anatomy (see Field Guide) so part of the Concrete Experience will be to learn their diverse anatomies, at which point you will have a gateway to identification. Reflective Observation follows in the form of a question: “Why is there such diversity in anatomies?” To begin to answer that question leads to Abstract Conceptualization...initially in the form of the fundamental physics of moving and feeding in a water environment. Active Experimentation is observational, in which we examine the anatomy as it relates to diverse modes of locomotion and feeding, based on video recordings and observations of live fish at the Discovery World Aquarium. That Concrete Experience leads to a next cycle of Reflective Observation. Ultimately the great diversity of fishes is related to their long history (400 million years), diverse habitats, and factors such as reproductive behavior.
Class Attributes:
   3 credit units, consent required to audit
   Undergraduate/Graduate
   Must be able meet the requirements of the field work with or without accommodations
   from the Accessibility Resource Center.

Prerequisites:
   Junior standing or graduate standing
   Bio Sci 152 and Bio Sci 310 or consent of instructor

Course materials: Calliet G., Love M., and Ebeling A. Fishes: A Field and Laboratory Manual on
Their Structure, Identification, and Natural History. Waveland Press, Inc. Prospect Heights, IL


available at UW System Library. http://digicoll.library.wisc.edu/cgi-bin/EcoNatRes/EcoNatRes-
idx?id=EcoNatRes.FishesWI

Pertinent, time sensitive special topic readings as needed.

Time commitment for the course:
   We will try to do four collecting (field) trips. Transportation via UWM vehicles or vessels
   leaving from the Great Lakes Research Facility, Room 1084. Scheduled for the first
   four weeks, but weather and Covid dependent.
   Time in September Field Trips plus Discovery World trip:  5 hours x 5 days = 25 hours.
   Time in classroom: 10 hours x 2 hours = 20 hours
   Time for completing assignments = 7 hr per week x 15 = 105
   Graduate student project:  50 hr
   Graduate student total:  200 hr
   Undergraduate student total:  150 hr

Learning Activities

Collection Trips

Collecting trips are inherently unpredictable, the exact projects will be determined as we obtain
collection results. The trip to the Discovery World Aquarium is also part of the active learning
experience. What species they have varies each year and they generally do a local collecting trip in September. The trips create a unique, hands-on and active learning opportunity for you to achieve a number of the essential skills and knowledge aimed for in this course. This is typical of field work and part of the course lessons.

Analytical Projects and Reports
Subsequent to and based on the collection trips, you will complete 8 Projects. Each student will also receive a collection of 15-20 fish species mostly based on what species we actually collect. In the past we have collected 30-40 species.

Projects are graded as follows:

- Analytic Reports (8) (with revisions based on feedback)
- In-class Reporting

They are a lesson in completion of an assignment. There is an initial due date for each. However, I will give you feedback until each project is complete and has met the rubric criteria. The Project rubric will guide your report compilation and in-class reporting. Final report completion is at the time of the final exam, however quick completion in your best interest as project skills and knowledge are part of your preparation for and success with exams.

Graduate Student Project. For graduate students you will propose a “favorite species” and a comparative species. The comparative species must be either an example of convergent evolution (species with similar characteristics but in a different fish family) or divergent evolution (species with dissimilar

In-class Lectures, Discussions, In-class Reports

Once the Collection Trips have finished, we will meet regularly in class for laboratory work based on Calliet et al., lectures, discussions, and integration of readings, trip experiences, and collected result analysis.

After the September collecting trips I will give a lecture that integrates what we found on the trips with details of subsequent meetings. This will be the course narrative. The lecture and discussion will be recorded for subsequent use in class.

Each subsequent meeting works with this narrative and will be project oriented, based on assigned readings primarily from the Calliet, Ebeling, Love book. I will present a format for reports.

Attendance Policy: Every class has “hands on” exercises, therefore, attendance in class is critical for successful completion of this course. If you have an unavoidable excuse an alternative will be arranged.
**Tentative Course Schedule and general assignments**

These suggestions are to sustain engagement and progress, as well as raise the value of the in class reports/discussion and assure readings are completed to inform trips, reports, and discussions.

**Grading Undergraduate**

Projects. 8 projects x 5 points each, all or nothing. 40 pts.
Weekly Reading (Quiz, post, written, group discussions) [all or nothing] 20 pts.
Mid-term exam 20 pts.
Final Exam 20 pts.

**Grading, Graduate**

Projects. 8 projects x 5 points each 40 pts.
Convergent/Divergent Evolution Project 20 pts.
Mid-term exam 20 pts.
Final Exam 20 pts.

100 pts.

**Assessments: Letter Grade**

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Schedule—One meeting /week

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<td>Collecting trip and demonstration of certain water physics 10, field guide</td>
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FINAL EXAM  1500-1700 Dec. 16, but the University usually changes this mid-semester
University Policies

General campus policies that apply to this course are listed on the Secretary of the University's web site: http://uwm.edu/secu/syllabus-links/ (Links to an external site.).

1. Students with disabilities. Notice to these students should appear prominently in the syllabus so that special accommodations are provided in a timely manner. http://uwm.edu/arc/
2. Religious observances. Accommodations for absences due to religious observance should be noted. https://apps.uwm.edu/secu-policies/storage/other/SAAP%201-2.%20Accommodation%20of%20Religious%20Beliefs.pdf
3. Students called to active military duty. Accommodations for absences due to call-up of reserves to active military duty should be noted. Students: http://uwm.edu/active-duty-military/


1. A notation of "incomplete" may be given in lieu of a final grade to a student who has carried a subject successfully until the end of a semester but who, because of illness or other unusual and substantiated cause beyond the student's control, has been unable to take or complete the final examination or to complete some limited amount of term work. https://apps.uwm.edu/secu-policies/storage/other/SAAP%201-13.%20Incomplete%20Grades.pdf
2. Discriminatory conduct. Discriminatory conduct will not be tolerated by the University. It poisons the work and learning environment of the University and threatens the careers, educational experience, and well-being of students, faculty, and staff. https://apps.uwm.edu/secu-policies/storage/other/SAAP%205-1.%20Discriminatory%20Conduct%20Policy.pdf
3. Title IX/Sexual Violence. Title IX is a federal law that prohibits sex discrimination in education program or activities, and UWM policy prohibits such conduct (see Discriminatory Conduct, above). This includes sexual violence, which may include sexual harassment, sexual assault, relationship violence, and/or stalking in all educational programs and education-related areas. UWM strongly encourages its students to report any instance of sex discrimination to UWM’s Title IX Coordinator (titleix@uwm.edu). Whether or not a student wishes to report an incident of sexual violence, the Title IX Coordinator can connect students to resources at UWM and/or in the community including, but not limited to, victim advocacy, medical and counseling services, and/or law enforcement. For more information, please visit: https://uwm.edu/sexual-assault/.
4. Academic misconduct. Cheating on exams or plagiarism are violations of the academic honor code and carry severe sanctions, including failing a course or even
suspension or dismissal from the University. 
https://uwm.edu/deanofstudents/conduct/academic-misconduct/

5. Complaint procedures. Students may direct complaints to the head of the academic unit or department in which the complaint occurs. If the complaint allegedly violates a specific university policy, it may be directed to the head of the department or academic unit in which the complaint occurred or to the appropriate university office responsible for enforcing the policy. https://apps.uwm.edu/secu-policies/storage/other/SAAP%205-1.%20Discriminatory%20Conduct%20Policy.pdf

6. Grade appeal procedures. A student may appeal a grade on the grounds that it is based on a capricious or arbitrary decision of the course instructor. Such an appeal shall follow the established procedures adopted by the department, college, or school in which the course resides or in the case of graduate students, the Graduate School. These procedures are available in writing from the respective department chairperson or the Academic Dean of the College/School. 
https://apps.uwm.edu/secu-policies/storage/other/SAAP%201-10.%20Grade%20Appeals%20by%20Students.pdf

7. LGBT+ resources. Faculty and staff can find resources to support inclusivity of students who identify as LGBT+ in the learning environment.
http://uwm.edu/lgbtrc/


9. Final Examinations. Information about the final exam requirement, the final exam date requirement, and make-up examinations. https://apps.uwm.edu/secu-policies/storage/other/SAAP%201-9.%20Final%20Examinations.pdf