

Ecology of Fishes

Pymatuning Laboratory of Ecology

Session 3, 2014
June 23-July 11

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About the course

In this course, conducted at the Pymatuning Laboratory of Ecology in northwest Pennsylvania, students will explore the population, community, and ecosystem ecology of fishes. We will conduct field investigations of fish in streams, lakes, and marshes. Students will attend background lectures, conduct experiments and field surveys, participate in data collection and analysis, and gain experience in the interpretation and presentation of results. We will learn how to integrate math, physics, chemistry, and biology in our study of fishes. In addition, we seek to expose students to current research in fish ecology. Students will participate in an overnight field trip, and they will leave the course with a greater knowledge of and appreciation for Pennsylvania's rich diversity of fishes.

Fisheries resources have a large social and economic value and we will also consider important issues related to managing fisheries in a sustainable manner. Because fisheries managers work on issues of large social interest, they must bring together an understanding of cultural values, historical context, political processes, and biological processes in order to be successful, and we will emphasize how scientific knowledge is integrated with social values in shaping fisheries management.

Specific Learning Outcomes

- 1) Using fish and their environment as a model system, students will investigate the ecology of fishes of northwest Pennsylvania, and in doing so will gain practical experience in executing the scientific method.
- 2) Students will apply skills such as mathematics, computing, quantitative reasoning, and writing to addressing questions in fish ecology.
- 3) Students will achieve a greater understanding of applied issues involved in management of fisheries resources, including cultural values, historical context, political processes, and biological processes.



Competence in these three areas will be assessed via quizzes, tests, and focused homework assignments, as well as performance in the field.

Schedule 2014

- Mon. 6/23 The Physical Stage: Limnology and Stream Ecology
Lab: Methods in Stream Ecology
- Tues. 6/24 Effects of Fish on Invertebrate Assemblages
Lab: Invertebrate Sampling, Local Ponds and Lakes, limnocorral experiment
- Wed. 6/25 Historical Factors in Fish Diversity: Taxonomy
Lab: Measuring Species Richness, Linesville Creek
- Thur. 6/26 The Ice Ages! Biogeography of Fish
Lab: Fish Diversity of Sugar Lake
- Fri. 6/27 Functional Morphology and Food Habits
Lab: Morphology and Diet Analyses, Pymatuning Reservoir
- Mon. 6/30 Habitat selection in fishes
Lab: trapping study, Linesville Creek
- Tues. 7/1 **Test 1: 9:00 AM**
Competition and Predation in Fish Communities
Lab: Fish Survey, Linesville Creek
Depart for Allegheny Field Trip, 7:00 PM
- Wed. 7/2 Ecology of Large Rivers
Lab: All-day canoe trip, Allegheny River
- Thur. 7/3 Natural Gas Drilling, Stream Acidification, and Fish Communities
Lab: All-day, field trip, Allegheny National Forest
Return to PLE, 7:00 PM
- Fri. 7/4 Fireworks day, no class
- Mon. 7/7 Behavioral Cascades and Indirect Effects in Fish Communities
Lab: Fish Surveys, Payden Creek
- Tues. 7/8 Productivity/Diversity Relationships in Fish Communities
Lab: All Day Field Trip, French Creek
- Wed. 7/9 Humans and Fish: Case Studies of Lake Victoria and Lake Erie
Lab: All Day Field Trip, Presque Isle
- Thur. 7/10 Invasive species and other current challenges in fisheries management
Lab: Visit with PA Fish and Boat Fisheries Biologists. Afternoon: Independent Projects
- Fri. 7/11 **Test II: 9:00 AM**
Presentation of Class Projects: 1:00 PM

Additional Information

Text: ["Fishes of the Allegheny: Species accounts and natural history notes"](#) 2012; Andrew M. Turner.

Daily Schedule: In general, we will begin lecture each day in the fish lab at 8:30 AM, and we will try to conclude the day's activities at 5:00 PM. The van will leave the dining hall for the lab site at 8:15 AM sharp. We may deviate from this schedule from time to time.

How to Dress: Fish live in water, and sometimes in murky, muddy water, so we too will spend most of this course in the water, and sometimes in murky, muddy water. You will want to wear waders when you are electrofishing (the waders provide your only insulation from the electric current). You may borrow hip boots from PLE, or you may elect to purchase your own. I suggest wearing jeans and socks with your waders in order to avoid falling victim to the dreaded "wader rash". It is generally most comfortable to wear shorts and old but sturdy shoes when performing field activities other than electroshocking. Finally, if you own a mask, snorkel, and fins, you may want to bring them along for the Presque Isle and Allegheny field trips.

Safety: Nothing is more important than your personal safety. If you are uncomfortable with the water, wear a life jacket. Use caution and common sense when using the boats, electrofishing gear, etc.

Grades: You are responsible for all material covered in lecture, laboratories, and in the field. You should know the common name and family of all fish we encounter. Final scores will be calculated as follows:

Test I: 25%

Test II: 25%

Quizzes 25%

Final Project 15%

Contribution to Class: 10%

Grades will be assigned as 90-100 = A, 80-89 = B, etc.

Independent Project: a substantial portion of your grade will be based on your independent project. Here you are required to conduct research aimed at answering an original question. You will present a 10-20 minute long lecture on your project the final day of the course. The ideal project will use data collected by the entire class but synthesized by yourself.

Class Projects: We will run the laboratory portion of the class as a series of class projects. The class will be divided into three groups, and each day one of the three groups will be responsible for recording and synthesizing all the data collected that day. We will then start the next day with a brief (15 minute?) presentation of the previous day's project by the responsible group. Each presentation should be accompanied by a short handout summarizing the data collected the previous day. A note about writing things down and keeping them organized: because data collected early in the course may be used later in the course for independent projects, it is important that we carefully record and organize the all data from our field trips. Indeed, a critical step in becoming a scientist is merely learning to write things down so that others can make use of your observations.

Attitude: Fish are a source of endless fascination, and there is much yet to be learned about them. I expect the students in this course to approach the material with enthusiasm, and I trust that students that do so will perform well in this course. Help your classmates with the fieldwork, and help organize the data. This should be a fun course.