

Behavior of fish and other aquatic organisms (Bio.399/FW 499)
Hatfield Marine Science Center

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Course description:

An inquiry-based approach to laboratory and field studies in animal behavior, including habitat choice, communication, mate choice and parental care tactics, social behavior, anti-predator behavior, and host-parasite interactions. Emphasis is placed on behavioral challenges and adaptations of local marine organisms, observation-based development of hypotheses, and study-design and execution.

4 credit units: 2 hours discussion, 6 hours lab per day X 11 days.

Prerequisites: 1 year of college biology or consent of instructor.

Location: Hatfield Marine Science Center

Dates: 10-23 July 2006

Course justification:

An understanding of animal behavior is valuable for at least two reasons. First, behavior is the interface between an animal's environment and processes that occur at and below the organismal level. Thus, it integrates all levels of biological inquiry. Processes that occur at the community or ecosystem level are ultimately the result of the behavior of an assemblage of organisms. The behavior of these organisms is under the influence of natural selection and is proximately caused by cellular and subcellular processes responding to environmental inputs. Second, people, themselves being animals, tend to have an interest in what animals do and why they do it, and the behavior of organisms can serve as a "hook" to other aspects of biology. Think about how many times behavior (human or otherwise) appears on television and in magazines, is portrayed at zoos, aquaria and museums, or is discussed at social events. Thus, students pursuing careers involving whole organisms or in free-choice and informal education settings such as zoos and aquariums benefit considerably from an understanding of behavior.

While there are common patterns in behavior that transcend taxa, the mainstream behavioral literature is dominated by research on terrestrial vertebrates, especially birds and mammals, and most theory is driven by work on these groups. Fishes and invertebrates in aquatic environments face some unique challenges that influence their behavior. This course focuses on behavioral adaptations and proximate mechanisms controlling behavior in marine fishes and invertebrates. Using an inquiry-based format that minimizes lecture and maximizes experiential learning, the course will familiarize

students with the process of thinking about and conducting research in animal behavior, and with presenting research to professional and lay audiences.

Course Objectives:

This course is intended for students who have some background in biology and have completed their Freshman year. Students should consult with the course instructor before enrolling. I assume little or no previous course work in animal behavior or aquatic biology but do assume that students are highly motivated, adaptable, and comfortable near the water. This is a “hands-on”, intensive, field/laboratory course, taught in an inquiry-based format. It is intended to inspire and guide students in future course work in animal behavior and behavioral ecology and to complement the lecture courses delivered on the Corvallis campus. Because of the format and minimal amount of time spent on formal lectures, students are expected to prepare themselves by reading the assigned literature and “browsing” relevant websites (see below) prior to the start of the class. As is typical of any course, but especially field courses, the more time and effort you put into the course, the more you will get out of it. Most of your grade will be based on your participation in group exercises and a final research project. The group projects are designed to expose students to local organisms and the behavioral problems they face, and as an introduction to the study of behavior in an ecological and evolutionary context. The group projects will provide students with the familiarity and background to conduct their independent projects. Students can work in teams of 2-3 and the instructor(s) will assist in the project design, logistics and data analysis. Students will be instructed/assisted in use of library resources, study design, and basic statistical analysis.

Projects may focus on aspects of reproduction, social structure, symbioses, and diel rhythms. Students learn the process of identifying and solving problems in animal behavior, along with commonly used techniques. We will take advantage of the facilities at the Oregon Coast Aquarium, Hatfield Marine Science Center, and NOAA Fisheries Behavioral Ecology laboratory.

Assessment:

Assigned background reading: 10%

Participation in group field exercises and discussions: 50%

Final Project and oral presentation of results: 25%

Written report of results of field project: 15% In order to maximize time spent on course projects during class time, this should be written in a scientific journal format and should be submitted two weeks prior to the end of the last summer term. Students taking the course through SED or who are interested in informal education in a public aquarium may instead develop an educational display.

Students with Disabilities: "Students with documented disabilities who may need accommodations, who have any emergency medical information the instructor should know, or who need special arrangements in the event of evacuation, should make an appointment with the instructor as early as possible, no later than the first week of the term. In order to arrange alternative testing, the

student should make the request at least one week in advance of the test. Students seeking accommodations should be registered with the Office of Services for Students with Disabilities."

Rules on Civility and Honesty: The Department of Zoology follows the university rules on civility and honesty. These can be found at osu.orst.edu/instruct/cssa556/CIVHON556. Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

- * cheating—use or attempted use of unauthorized materials, information or study aids
- * fabrication—falsification or invention of any information
- * assisting—helping another commit an act of academic dishonesty
- * tampering—altering or interfering with evaluation instruments and documents
- * plagiarism—representing the words or ideas of another person as one's own

Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action.

"The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office."

Tentative schedule

Students should expect to spend most of each day on course-related activities

9 July: Arrive at HMSC

10 July: Orientation/Discussion on background reading/Introduction to basic observational and experimental methods.

11 July: Begin group project (2-3 different projects, depending on enrollment)

13 July: Introduction to library resources (Prof. Janet Webster)/Exam on background reading.

14 July: End group project: Basic statistics – Introduction to SYSTAT.

16 July: Free day

17 July: Guest speaker: NOAA Fish Behavioral Ecology Research Team/ Begin independent project

22 July: End independent project

23 July: Oral presentation of independent project results.

Examples of Group Projects

Choice of shoal mates in fishes

Mate choice in pipefishes or gobies

Effects of brood size and age on courtship and parental investment

Habitat choice: effects of substratum type, life history stage, travel costs, parasite prevalence.

Effects of predator presence on foraging in polychaete worms and siphon extension in clams.

Effects of time of day on activity patterns (various fishes and invertebrates).

Time/place and delayed matching to sample learning.

We will take advantage of opportunities as they arise. For example, course projects may be linked with research projects conducted by the NMFS behavioral ecology group or the ornamental fish programs.

Independent projects may be derived from group projects and **must be approved by the instructor**. If the class size is large, there may be two or more group projects running simultaneously.

Some Useful websites

Animal Behavior Society: <http://www.animalbehavior.org/>

International Society for Behavioral Ecology <http://web.unbc.ca/isbe/>

American Society of Ichthyologists and Herpetologists

<http://abstracts.co.allenpress.com/cgi-bin/asih/index.pl>

General background reading

Alcock, J. 2005. Animal Behavior: An Evolutionary Approach, Sinauer Associates

Chapts 1, 2, 6, 8, 12.

The Behavior of Animals: Mechanisms, Function, and Evolution (Bolhuis and Giraldeau eds.). Blackwell Publishing (2005).

Chapts: 1, 4, 7, 9, 11,

Supplemental Reading for Project Ideas (*Available on reserve*)

Behavioral Ecology of Teleost Fishes (Godin, ed). Oxford University Press (1997).

Exploring Animal Behavior in Laboratory and Field (Ploger and Yasukawa ed.). Academic Press (2003).

Behaviour and Physiology of Fish (Sloman, Wilson, Balshine, eds.). Academic Press (2006).

Papers relevant to specific group projects will be made available on Blackboard.