



**FLATHEAD LAKE  
BIO STATION**  
UNIVERSITY OF MONTANA



## *Summer Session 2020*

**BIOB 491, Special Topics:**

### **Field Studies in the Evolution of Animal Behavior**

*Main self-contained 4-week course: 5 credits*

Lectures & Formal Discussions (30%)

Field Work & On the Spot Discussions (70%)

**BIOE 490 for Undergrads, or BIOB 596 for Grads:**

### **Independent Study in the Evolution of Animal Behavior**

*Independent Study: 2 credits*

*Optional follow-up extension of the main course, entailing  
two additional weeks of supervised independent study.*

*Field Work & On the Spot Discussions (100%)*

### **Dates**

*Main Course July 6 – 31*

Main class meets MTWR 8am-5pm, and Friday 8am-12pm

*Independent Study August 3 – 14*

The main course's extension provides opportunity for deeper study of select systems studied in the main course; work hours vary with project demands.

### **Professor: Dr. Paul J. Watson**

BA Zoology & BA Botany, University of Montana, 1981

PhD 1988, Cornell University, Section of Neurobiology & Behavior

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**Prerequisites:** One semester of college-level biology and an ecology course (can be met via BIOE342 Field Ecology at FLBS) or equivalents; **OR** explicit consent of Dr. Watson.

### **Course Overview**

The course is designed to prepare biology majors for graduate studies in evolutionary behavioral ecology. The course also is open to advanced students in other non-life science or non-science majors if they have particular interest in this field with prior approval from the instructor. The course will provide students with advanced understanding of the principles and methods of animal behavior and evolutionary behavioral ecology research. Emphasis will be on the field study and complimentary field-supportive lab studies, of the sexual and social strategies of diverse terrestrial species. It stresses concepts of behavioral evolution and sober, but awesomely fun, evolutionary adaptationist hypothesis formulation and challenging quantitative testing.

Students and the instructor shall intensively work together to foster development of the necessary intellectual, emotional, and technical skills necessary to gather publication quality data on the adaptive functions of animal behavior using field and complimentary lab observation and experimentation. Students in this course will learn to apply modern Darwinian Theory to the analysis of the behaviors of virtually any organism, and will move decisively toward becoming creators of verifiable knowledge, rather than just knowledge consumers.

The course prepares students for independent doctoral graduate research in animal behavior. The course also is for anyone deeply interested in the key role of adaptation and natural selection in the evolution of mind, which is reflected in context-specific behavior, and the rich sometimes challenging philosophical implications of the central role natural selection plays in constructing the living world. It provides essential “concentrated, principled exposure” to spectacularly complex organisms operating in their natural environments.

*For University of Montana students, this course is designed to strongly complement Dr. Doug Emlen’s campus-based courses in animal behavior.*

### **Course Learning Objectives**

- 1) *Observe, capture, handle, mark, release and perform further systematic observations on at least six species of animals ranging from Columbian ground squirrels\*, to spiders, to mayflies, to water striders.*
- 2) *Design and conduct animal behavior experiments using standard scientific methods beginning with developing testable hypotheses to collecting and analyzing data.*
- 3) *Articulate the theory that all behaviors are aimed at "maximizing life time inclusive fitness," and identify four common, important misconceptions about the meaning of inclusive fitness.*
- 4) *Understand the contributions to the field of animal behavior by the five leading scientists who started the so-called, "second Darwinian revolution."*
- 5) *Learn to explain the central role of honest signaling systems for understanding the social and sexual behavior of all creatures, and be able to explain the pervasive role of honest signaling of need, quality and commitment in animal social life.*
- 6) *Learn the key ecological correlates of six major animal mating systems and provide two examples of how certain individuals may try to obtain mates using alternative strategies. Relatedly, be able to discuss how even relatively “simple” animal nervous and epigenetic systems enable highly complex adaptive responsiveness to environmental circumstances.*

\* Columbian ground squirrels are the only mammal we can actually handle due to various regulations. However, the station population of ground squirrels we are re-establishing using “soft-release” methods will be individually identifiable and of known relatedness. This will greatly enrich our ability to study their complex social behavior.

### **Text**

Professor John Alcock’s classic textbook, now in its new 11<sup>th</sup> edition, “Animal Behavior: An Evolutionary Approach.” Sinauer Associates, June 1, 2018. New coauthor this edition is Dr. Dustin R. Rubenstein. ISBN-10: 1605355488.

### Course assignments:

- a) *Read at least six chapters of your choice from the course textbook (Rubenstein and Alcock, 2019, Animal Behavior, 11th edition), and*
- b) *Take a one-hour oral examination in which you and the instructor discuss answers to the thought questions offered at the end of each of your chosen chapters;*
- c) *In class or on field trips, present two papers that you choose with instructors' consent from the primary literature;*
- d) *Present an end of semester 15–20 minute PowerPoint presentation on one of our statistically analyzed data sets.*

### Grading

- Lecture / Discussion Verbal Participation: 20%
- Participation in Field and Supporting Lab Research, including the quality of your field notebook and data sheets: 50%
- Written Final Project Report & Class Presentation: 15%
- Verbal 1-Hour Final Exam: 15%

The degree to which you participate in the “24/7” spirit of this class will be factored in as **extra credit**.

Graduate Credit: In addition to normal expectations, graduate students will present one additional (total = 3 paper presentations) inspiring substantive paper from the primary literature, chosen collaboratively with the instructor. The instructor also expects a higher degree of project leadership and logistical support from graduate students. I grade graduate students about 20% harder on their field notebooks.

### Course and Field Supplies

\*Available for purchase at the FLBS Bookstore

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|---|---|
| - Plenty of pencils, regular or mechanical*   | - Lunch pack-up container(s) (resealable)*  |
| - <b>permanent-ink</b> , weather-resistant pens are acceptable*   | - Mess kit and utensils   |
| - Form holder style metal clipboards for data collection using standardized forms   | - Packable water bottles (total capacity at least 2 liters)*                              |
| - Inexpensive <b>digital wristwatch</b> or <b>simple flip phone</b> with stopwatch mode and countdown mode that can display 24-hr (military) time. Carrying smart phones during field observations will be discouraged. | - Hot/cold mug*   |
| - Rite in the Rain field notebooks*   | - Daypack (not a full-size backpack)  |
| - Sunscreen, sun hat, and sunglasses  | - Your preferred insect repellent   |
| - Serious raingear  | - Bear spray*   |
| - Hand lens (10-14x) & 2x magnifying glass, if possible.  | - Quality headlamp and small flashlight, extra batteries                                  |
| - Laptop (required); loaded with MS Word, Excel, and, <i>if you have one</i> , your favorite statistical/graphics package   | - Your favorite insect net(s) (optional)  |
|   | - Digital camera with zoom (optional)   |
|   | - Hip boots or waders (optional)  |
|   | - Binoculars (optional but strongly encouraged)   |
|   | - a small, light-weight seat for more comfortable field observations (highly recommended) |

## Overnight Field Gear

We will potentially do overnight field trips. *Nevertheless, you will at least a few have weekends off, and you may want to use several of them to explore the “Crown of the Continent” on your own or with fellow students from our course and other courses!*

Food and cooking equipment will be provided for any class trips, but you will need your own eating utensils, plate or bowl, cup and water bottle. You may need to be quite self-sufficient during your own overnight excursions. You may want to bring a personal water purification system – many types are available at retailers like REI.

We probably will spend time wading in cold streams and clean but leech-infested muddy wetlands. You will need a reliable headlamp, good footwear for hiking over rough terrain, including snowfields, footwear or waders for working in cold water, extra dry socks and warm clothes. Hiking sticks can be useful as well. If we (or you) camp out, you will want a warm sleeping bag, a sleeping pad, and small backpacking tent or tarp shelter; students ideally will share shelters to avoid crowding limited campsite space.

**We are in grizzly country. Bear spray is strongly recommended.**

**Do not leave food or cosmetic products in tents.**



## **Course Policies**

*Logistical notes:* The majority of this course is taught outside, *regardless of weather*, with class plus transport occasionally taking 10 hours or more per day, sometimes at locations far from your housing at the Biological Station. We will hike on some days, usually with breaks for “behavioral prospecting” (discovering behaviors begging for discussion and possible study), and on some days we will hike or be exposed to outside conditions all or most of the day. *Students must be prepared.* If you are certain that you can hike 5–10 miles in a day, you will really enjoy this course. Just as important, you also must nurture the ability to sit patiently and *OBSERVE*.

Please pay very close attention to the requirements you pack wet weather and cold weather gear, including a change of clothes for overnight campouts, and appropriate footwear for hiking in rough terrain and wading in smaller streams and wetlands. And remember to keep a clean camp and carry bear spray on your person and at the ready whenever hiking in open country or forest.

***Everyone in the course should be prepared to document that they are up-to-date on their tetanus immunizations.***

***Get a booster shot now if you're not sure.***

Students will adhere to University of Montana Student Conduct Code and Discrimination, Harassment, Sexual Misconduct, Stalking, and Retaliation Policy (policy website: <http://www.umt.edu/safety/policies/>) and to the Biological Station Code of Conduct form signed during student registration. Students must also follow FLBS Rules and Regulations and abide by the Safety Orientation Checklist.

FLBS students are required to complete University of Montana Prevention Education Program courses: AlcoholEdu and Sexual Assault Prevention for Adult Learners after coursework begins and prior to completion of coursework.

Students with disabilities may request reasonable modifications by contacting the instructor. The University of Montana assures equal access to instruction for students with disabilities in collaboration with instructors and Disability Services for Students (406.243.2243, <http://www.umt.edu/dss/default.php>). The University does not permit fundamental alterations of academic standards or retroactive modifications.

## **Our Schedule**

The day to day schedule for this course may change as the phenology of observable behavioral phenomena changes due to uncontrollable variables. The preference is to have living illustrations of those concepts in front of us when discussing them. In general, weeks 1 and 2 would include a trip to the National Bison Range, Ninepipe National Wildlife Refuge, Wild Horse Island, and up Beartrap Pass to the east of the station. We will also take advantage of great research opportunities at the Bio Station itself. Overall, be ready to be flexible and weather-proof for the whole class. Let's get out there!

## **Wireless Internet at FLBS**

A reliable secure wireless connection to the Internet is available in selected areas. Bring your laptop!

*Last updated 22 October 2019*