

Biology 548: Evolutionary Ecology

http://www.webpages.uidaho.edu/~snuismer/Nuismer_Lab/548.htm

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Lectures: T-TH 2:50-4:05pm, held on both WSU and U of I campuses.

Introduction:

Evolutionary ecology focuses on the process and form of adaptation to abiotic environments and biotic interactions. Our first goal for the course is to develop a strong theoretical and conceptual foundation for understanding how phenotypic and genetic variation shapes adaptation and defines evolutionary potential. Our second goal is to show how this foundation can be applied to important topics in evolutionary ecology.

This course will consist of background lecture sessions developed from theory and key papers in evolutionary ecology, and discussion sessions based on either problem sets or readings from the primary literature.

The course opens with foundational topics, focusing on a quantitative genetic approach to evolvability, models of selection, and constraints on adaptation. For each foundational topic, we will apply these foundation concepts to topics in evolutionary ecology, including life history evolution, the evolution of phenotypic plasticity, local adaptation and coevolution, and adaptation to anthropogenic change.

Overview:

The format of this course will be that of a graduate seminar. Instructors will give background lectures on Thursdays, and students will lead problem solving or reading discussion sessions on Tuesdays on the topic of that week.

Your role will include 1) leadership and participation on problem set and reading discussions, 2) leadership of one reading discussion of a paper you choose, and 3) preparation of an oral IGNITE presentation and a written "Intellectual Merits" summary. Oral presentations will be given in the last week of the semester.

1) Leadership and participation on problem sets and reading discussions:

You will lead discussion on problem solving and readings from the primary literature that we have assigned. Problem sets and primary literature will be assigned on Thursdays and discussed on Tuesdays. Readings will be primarily based on recent papers that reflect current progress in the field; most will be drawn from the primary literature. The citations for these papers will be provided by the instructors. Most of which should be readily download-able in PDF format through the internet.

Discussions will be led by a pair of students who will be randomly selected at the beginning of each Tuesday section. Although some students may be randomly selected to lead more than once, slight instructor induced alterations of the random number generator will ensure that each student leads at least one discussion.

2) Leadership of one reading discussion of a paper you choose

You will each complete a major project for the course. The assignment is to develop the rationale and justification for research into an important, emerging, or transformational topic in evolutionary ecology. Sounds easy, correct?

Development of your research ideas:

You and your colleagues will direct the development of your research question. We will help you organize into small groups, perhaps 3 students per group. In these groups, you will test and develop your individual research ideas through readings, discussions, and mini-presentations. You will each work independently on your own idea, but will use your group to help sort through your arguments. As a participant in the group, you are responsible for challenging each other with questions and critique. The faculty will visit the groups during the discussions to answer questions and provide additional feedback and insight into your projects.

Group meetings begin the last week of February, when we will not hold formal class meetings. After that, small group meetings will continue on your own schedule.

In addition to working in small groups, you will assign a paper for the whole class, and lead a reading discussion. These reading discussions will take place in April.

3) Preparation of an oral IGNITE presentation and a written “Intellectual Merits” summary

Through both a written and oral presentation, you will present the rationale and justification for research into an important, emerging, or transformational topic in evolutionary ecology. During the semester, you will identify, develop, and refine a research question or concept in evolutionary ecology, and develop a strong justification and rationale for a research project to address the question.

The main goals of this assignment are related to development of the following:

- your scientific ideas through discussions in a small group
- critical thinking about your chosen topic
- an oral IGNITE presentation
- a concise and powerful written argument for the importance of your topic

Oral IGNITE presentation:

The presentation should be developed to “ignite” the audience’s excitement on the research question. An IGNITE presentation is similar to a PechaKucha night (Japanese for “chit-chat”). Ideally, each person is given 5 minutes and 20 slides, each slide presented for 15 seconds and slides are automatically advanced. The presentation should also ignite discussion.

Written “Intellectual Merits” summary:

You will also develop a written version of your IGNITE talk. It should take the form of an “Intellectual Merits” subsection of an NSF proposal “Project Summary”. One page, single-spaced maximum.

Grading:

Problem solving/Discussion leadership: 100 pts

Writing assignment: 100 pts

Presentation: 100 pts

| Day | Date: | Lecture | Topic | Instructor | Reading/Problem Set | Campus |
|--|------------------|---------------------|--|------------|---------------------------------|--------|
| TH | Jan 10: | 1 | Introduction to Evolutionary Ecology | Dybdahl | Reading: Perspectives on | Idaho |
| T | Jan 15: | | Reading discussion | | Evolutionary Ecology | Idaho |
| Foundations of Evolutionary Ecology: | | | | | | |
| TH | Jan 17: | 2 | Quantifying fitness and natural selection | Nuismer | | Idaho |
| T | Jan 22: | | Problem solving/Data analysis | | Problem Set 1: | Idaho |
| TH | Jan 24: | 3 | Application: Life histories: the evolution of fitness components | Dybdahl | | Idaho |
| T | Jan 29: | | Reading discussion | | Reading discussion | Idaho |
| TH | Jan 31: | 4 | Adaptation and population growth | Nuismer | | Idaho |
| T | Feb 5: | | Problem solving/Data analysis | | Problem Set 2: | Idaho |
| TH | Feb 7: | 5 | Application: Plasticity and adaptation | Dybdahl | | Idaho |
| T | Feb 12: | | Problem solving/Data analysis | | Problem Set 3: | Idaho |
| TH | Feb 14: | 6 | Constraints and multivariate selection | Nuismer | | Idaho |
| T | Feb 19: | | Problem solving/Data analysis | | Problem Set 4: | Idaho |
| TH | Feb 21: | 7 | Application: Constraints and trade-offs | Dybdahl | | Idaho |
| T | Feb 26: | | IGNITE development meetings | | Reading discussion | |
| TH | Feb 28: | | IGNITE development meetings | | | |
| T | March 5: | | Reading discussion | | | Idaho |
| TH | March 7: | 8 | Genetic drift and its interaction with selection | Nuismer | | Idaho |
| T | March 12: | SPRING BREAK | | | | |
| TH | March 14: | SPRING BREAK | | | Problem Set 5: | |
| T | March 19: | | Problem solving/Data analysis | | | WSU |
| TH | March 21: | 9 | Application: Evolution in small populations | Dybdahl | Reading discussion | WSU |
| T | March 26: | | Reading discussion | | | WSU |
| TH | March 28: | 10 | Gene flow and local adaptation | Nuismer | | |
| T | April 2: | | Problem solving/Data analysis | | Problem Set 6: | |
| TH | April 4: | 11 | Local adaptation and coevolution | Dybdahl | | WSU |
| T | April 9: | | Reading discussion | | | WSU |
| Student selected papers for discussion: | | | | | | |
| TH | April 11: | | Discussion of primary literature | | Reading: student selected paper | WSU |
| T | April 16: | | Discussion of primary literature | | Reading: student selected paper | WSU |
| TH | April 18: | | Discussion of primary literature | | Reading: student selected paper | WSU |
| T | April 23: | | Discussion of primary literature | | Reading: student selected paper | WSU |
| TH | April 25: | | Discussion of primary literature | | Reading: student selected paper | WSU |
| T | April 30: | | IGNITE Presentation | | | WSU |
| TH | May 2: | | IGNITE Presentation | | FINAL PAPERS DUE | WSU |