Biology 548: Evolutionary Ecology

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

Scott Nuismer (UI)
email: snuismer@uidaho.edu

Office: Life Sciences South 266C
Phone: (208) 885-4096

Mark Dybdahl (WSU)
email: dybdahl@wsu.edu

Office: 269 Eastlick
Phone: (509) 335-7909

Meeting time and location: T-TH 2:00-3:15 pm, AD 336 at U of I, TBA at WSU

Overview and Goals:

Evolutionary ecology focuses on the process and form of adaptation to abiotic environments and biotic interactions. The course begins by developing a general theory of phenotypic evolution. This general theory will be used to explore the process of adaptation. Key topics will include genetic constraints, the interaction between drift and selection, and the emergence of local adaptation. The goal of this first portion of the course is to develop a strong theoretical and conceptual foundation for understanding how phenotypic and genetic variation shapes adaptation and defines evolutionary potential.

Once we have established the basic conceptual framework, the course will move on to explore major research topics in evolutionary ecology. We will consider topics such as life history evolution, adaptation to variable environments, the evolution of phenotypic plasticity, and coevolution. The goal of this second portion of the course is to illustrate the diversity of topics currently explored within evolutionary ecology and demonstrate how the conceptual framework developed earlier can be used to gain valuable insights into processes occurring at the interface of ecology and evolution.

Logistics:

The format of this course will be that of a graduate seminar. For the first part of the course, instructors will present background lectures on Thursdays, and Tuesdays will be devoted to student-lead problem solving or reading discussion sessions on the topic of that week.

During the second part of the semester, students will identify, develop, and refine a research question or concept in evolutionary ecology. The research idea should be an important, emerging, or transformational topic in evolutionary ecology. Sounds easy, no?

The development of your topic will involve the following process:

- Test your topic ideas through discussions in development meetings
- Refine your ideas by choosing and leading a discussion on a pivotal paper
- Develop and present an oral IGNITE presentation
- Write a concise and powerful argument explaining the importance of your topic

1) Leadership and participation on problem solving and reading discussions.

You will help lead discussions 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 and most can be easily downloaded as PDF files.

A pair of students will be randomly selected to lead discussion 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) Research development meetings.

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 will be scheduled for one week, when we will not hold formal class meetings. After that, small group meetings will continue on your own schedule.

3) Leadership of one reading discussion of a paper you choose.

You will assign a paper for the whole class, and lead a reading discussion. These reading discussions will take place in April.

4) Preparation of an oral IGNITE presentation and a written "Intellectual Merits" summary.

Through both written and oral formats, you will present the rationale and justification for your research topic in evolutionary ecology.

Oral IGNITE presentation:

The presentation should be developed to "ignite" the audience's excitement on the research question. An IGNITE presentation is similar to those given on 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. Oral presentations will be given in the last week of the semester.

Written "Intellectual Merits" summary:

You will also develop a written description of your topic. It should take the form of an "Intellectual Merits" subsection of an NSF proposal "Project Summary". One page maximum, single-spaced.

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 15:	1	Introduction to Evolutionary Ecology	Dybdahl	Perspectives on Evolutionary	Idaho
T	Jan 20:		Reading discussion		Ecology	Idaho
Foundations of Evolutionary Ecology:						
TH	Jan 22:	2	Quantifying fitness and natural selection	Nuismer		Idaho
T	Jan 27:		Problem solving/Data analysis		Problem Set 1	Idaho
TH	Jan 29:	3	Adaptation and population growth	Nuismer		Idaho
T	Feb 3:		Problem solving/Data analysis		Problem Set 2	Idaho
TH	Feb 5:	4	Constraints and multivariate selection	Nuismer		Idaho
T	Feb 10:		Problem solving/Data analysis		Problem Set 3	Idaho
TH	Feb 12:	5	Genetic drift and its interaction with selection	Nuismer	Problem Set 4	Idaho
T	Feb 17:		Problem solving/Data analysis			Idaho
TH	Feb 19:	6	Gene flow and local adaptation	Nuismer		Idaho
T	Feb 24:		Problem solving/Data analysis		Problem Set 5	Idaho
TH	Feb 26:	7	Evolution of fitness components: life histories	Dybdahl	Life history evolution	Idaho
T	March 3:		Reading discussion			
TH	March 5:		IGNITE development meetings			
T	March 10:		IGNITE development meetings			Idaho
TH	March 12:	8	Variable environments, phenotypic plasticity	Dybdahl		Idaho
T	**March 17:**		**SPRING BREAK**		Problem Set 6	
TH	**March 19:**		**SPRING BREAK**			
T	March 24:		Problem solving/Data analysis			WSU
TH	March 26:	9	Constraints and trade-offs	Dybdahl		WSU
T	March 31:		Reading discussion		Measuring constraints	WSU
TH	April 2:	10	Evolution in small populations	Dybdahl		
T	April 7:		Reading discussion		Problem Set 7	
TH	April 9:	11	Migration, selection, adaptation at range limits			WSU
T	April 14:		Reading discussion	Dybdahl	Problem Set 8	WSU
Student selected papers for discussion:						
TH	April 16:		Discussion of primary literature		Reading: student selected paper	WSU
T	April 21:		Discussion of primary literature		Reading: student selected paper	WSU
TH	April 23:		Discussion of primary literature		Reading: student selected paper	WSU
T	April 28:		Discussion of primary literature		Reading: student selected paper	WSU
TH	April 30:		Discussion of primary literature		Reading: student selected paper	WSU
T	May 5:		IGNITE Presentations			WSU
TH	May 7:		IGNITE Presentations		FINAL PAPERS DUE	WSU