

"Mathematical models and quantitative methods in evolution and ecology"
Graduate seminar: E&EB 678b

Professors: David Post and Suzanne Alonzo

Time: Spring semester 2007, Wednesday 10-12pm

Where: 551 OML

In this course, we focus on how quantitative approaches are used to allow scientific inference. We will first discuss general principles for generating hypotheses that are testable (i.e. quantifiable). This course will also examine a variety of approaches used to model population level processes in evolution and ecology including an overview of population genetics, quantitative genetics, optimality models, game theory and population dynamic equations. We will also discuss experimental design, statistical analyses, inference and other quantitative methods. The course assumes a basic background in algebra, calculus, probability theory and statistics. Please address any questions regarding the course to Suzanne.Alonzo@Yale.edu or David.Post@Yale.edu.

The course is structured as a graduate seminar and will meet two hours weekly for discussion and practical exercises. Students are expected to actively participate in and occasionally lead discussion on weekly topics. Practical exercises will be done in Matlab. However, no prior knowledge of Matlab or computer programming is required. Extensive reading will be assigned for topic and must be read before the class. Each student will propose and complete a quantitative project based on their research interests that will be presented at the end of the semester. No text is required for the course and reading will be posted on the classesv2.yale.edu site for E&EB 678b. Students may wish to purchase a Student edition of Matlab for the course and if possible should bring their own laptop computers.

Please go the classesv2 server and do the reading for week 1 BEFORE the first class.

<u>Date</u>	<u>Week</u>	<u>Topic</u>
January 17	1	Asking questions and developing hypotheses
January 24	2	Experimental design
January 31	3	Introduction to models and modeling
February 07	4	Phenotypic models
February 14	5	Genetic models
February 21	6	Experimental replication
February 28	7	Statistical power and inference
March 07	8	Population and multi-species models
March 28	9	Project discussion
April 04	10	Monte Carlo and randomization methods
April 11	11	Connecting models and data
April 18	12	Quantitative methods of measurement
April 25	13	Presentation of projects