

## Bio 21/51/120: Population Ecology

Instructor: Mark A. McPeck

Place: Online

Time: 9L: 8:55-10:00 MWF & X-hour: 9:10-10:00 Th

This course will explore the causes and consequences of the dynamics of abundance and genetic structure of biological populations. Because both of these are problems involving counting and change over time, the study of populations is essentially an accounting problem that involves describing, predicting and projecting the numbers and types of individuals over time. Topics to be considered include the regulation of abundance in discrete and continuous time models, the dynamics of alleles through breeding across generations, the inheritance of quantitative traits, the consequences of small population size, natural selection at both the genetic and phenotypic levels, and dispersal among populations.

### Sequence of Study:

- What is population ecology?
- The basics of population dynamics and population dynamics models.
- The dynamics of alleles in populations and inheritance of quantitative traits
- Population dynamics in a variable environment
- Allele dynamics in a small population
- Natural selection at the genetic level
- Natural selection at the phenotypic level
- Dispersing individuals among populations
- Dispersing alleles among populations
- Structured population dynamics
- Life history evolution

**Grading:** Grades will be based on performance on periodic homework assignments. These homework assignments will involve a series of problems working with data and developing and analyzing new models. If you are enrolled in BIO 21, your entire grade will be based on these homework assignments.

For those enrolled in BIO 51 & 120, they will develop an independent modeling or analysis project of their own choosing. The topic will be developed in consultation with Dr. McPeck. Grades on these projects will be based on the originality, thoroughness and depth of the project.

**Readings:** This course has no textbook. Everything we do will be in class, so your attendance and participation during class is essential. Readings from the primary literature will be assigned periodically.