

University of Guelph

Course title: Graduate Statistics in Integrative Biology, offered as Advances in Ecology and Behaviour (IBIO*6000) for Fall 2015

Instructor: Andrew McAdam (amcadam@uoguelph.ca), SCIE 2457, ext.56826

Meeting Time: Wednesdays 9:30-11:30am

Meeting Location: SSC3317

Description: The objective of this course is to provide students with a practical introduction to ecological data analysis using R. The course will be based on a series of teaching modules that will cover a variety of topics relevant to graduate statistics. Each module will begin with a brief synopsis or introductory lecture. Students will then be expected to independently work outside of class through a series of exercises that will allow them to learn relevant concepts through hands-on applications. The independent module exercises will finish with the completion of an assignment, which will include the analysis of a provided dataset as well as the student's own dataset. Students are, therefore, encouraged to enter the course with an analyzable dataset in hand, but if one is not available the instructor can provide a dataset to be analyzed during the course. The course will finish with a final project in which the students will have completed an entire analysis of their own data and written up their methods and results from this analysis.

Restrictions: Graduate students in Integrative Biology

Evaluation:

1. **Assignments: 4 x 15% each = 60%**
2. **Final project: 40%**

Due Dates

Assignment #1 Your dataset: October 2

Assignment #2 General linear models: October 23

Assignment #3 Model selection: November 6

Assignment #4 Generalized linear models: November 20

Note that an assignment on linear mixed effect models will not be graded

Final Project: November 30

Topics:

1. Quantitative approaches
2. Power, replication, control and independence
3. Introduction to R
4. Presentation of data and results
5. Review of general linear models (regression, ANOVA)

- a. Assumptions, diagnostics, interactions, SS types
 - b. Nonlinearities, collinearity, problems with ratio variables, ANCOVA
- 6. Maximum likelihood and model selection
 - a. Stepwise procedures, AIC
- 7. Non-normality, transformation and generalized linear models
- 8. Mixed-effects models