Syllabus for BIOL/ECOL 563: Statistics for Ecology Spring 2018
Meeting time: MoWe 1:30-3:10
Location: Mitchell 106

Instructor

James Umbanhowar Teaching Assistant Professor of Biology
Office: Genome Sciences Building 4252 and Mitchell 121, Email: jumbanho@unc.edu
Office hours: I’m available Monday and Wednesday after class and by appointment. Additional office hour time will be added.

Description

In this course, we will be covering a wide range of statistical techniques that are used by ecologists. We will focus on drawing connections from basic statistical concepts to analysis of the types of data encountered in experiments and observations in the field of environmental science. This course should take you from an intro level statistics course to the position where you can actually do statistics. The emphasis on concepts should also empower you to learn more statistical techniques as needed.

Prerequisites

You should have taken an introductory statistics course that covered: basic probability theory, common probability distributions (normal, poisson, binomial), hypothesis testing including standard parametric approaches using normal errors such as the t-test and simple linear regression. If you have gotten a bit rusty, you can review your old text or

Text

There is no single text. Readings will be provided on Sakai. Most of these will come from books available for download from UNC computers.

Grading

Course grade will be determined on weekly assignments and a take home final exam.
Weekly assignments: 80%
Final exam (take home assignment) 20%
Grading scale:

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<th>Percentage</th>
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Course Policies

- Class attendance is not required, but is highly recommended. If you do miss class, you will probably want to come to office hours to catch up.

- Late assignments will be marked down 5% per day unless previous permission has been granted. Please tell me early if you have conflicts that preclude finishing assignments on time.

- The final exam will be given out in the last week of class. You will have time to finish it during our final exam period.

Course content

This course covers a number of statistical methods that have proven useful in analyzing ecological data, both observational and experimental. The topics this semester will include the following.

Overview of regression
Likelihood theory and its applications in regression
Generalized linear models
Poisson and logistic regression
Mixed effects models
Generalized additive models
Nonlinear regression
Bayesian analysis

Course schedule

January 10 Review of probability distributions and basic statistics.
January 15 NO CLASS
January 17 Introduction to Linear and multiple regression
January 22 Introduction to R.
January 24 Assessing homogeneity of variance in ANOVA.
January 29 Graphs of ANOVA.
January 31 Graphs of ANOVA cont’d.
February 5 Randomized block designs.
February 7 Randomized block designs.
February 12 Producing an interaction plot.
February 14 ANCOVA (Analysis of covariance).
February 19 Split plot designs.
February 21 Repeated measures designs.
February 26 Introduction to likelihood.
February 28 Likelihood ratio tests and Wald tests.
March 5 Fitting Poisson distribution using ML.
March 7 Testing the Poisson fit and negative binomial distribution.
March 12 SPRING BREAK
March 14 SPRING BREAK
March 19 Fitting negative binomial models.
March 21 Goodness of fit. Poisson regression.
March 26 Negative binomial regression. Comparing models with LRT.
March 28 Information criteria for model selection.
April 2 Model selection with variable transformation.
April 4 Goodness of fit for count models with continuous predictors.
April 9 Analysis of covariance, random effects in Poisson regression.
April 11 Introduction to Bayesian estimation.
April 16 Bayesian diagnostics and credible intervals
April 18 Random effect models in Bayesian statistics.
April 23 Logistic regression.
April 25 Goodness of fit for logistic regression.
May 8: Take home final due in class at 7pm.