

Instructor: Dr. Jason Hoeksema (318 Shoemaker, 662-915-1275, hoeksema@olemiss.edu)

Lecture/Lab: Tuesday & Thursday, 9:30 a.m. – 12:00 (Shoemaker Hall Rm. 225)

Required course materials:

Course grading: Grades will be based on lab exercises and associated homework (20%), a midterm exam (30%), in-class presentations (10%), and a final exam (40%).
Grading scale: >90% = A/A-, 80-89% = B+/-, 70-79% = C+/-, 60-69% = D, <60% = F

Learning objectives:
By the end of the course, students will be able to:
- Design efficient sampling schemes and experiments for biological research
- Describe and summarize data using descriptive statistics and graphics
- Conduct inferential statistical tests on a wide variety of data types
- Interpret, explain, and present the results of statistical tests

Course format:
Lectures introduce statistical concepts and approaches to data analysis. Lab exercises and associated homework assignments allow students to practice applying concepts and approaches to analysis of real data on computers, using the open-source statistical software R.

Schedule of lecture topics (relevant chapters from Field et al. in parentheses)
- 21 Aug Course overview; Intro to Statistics (Ch. 1) and Introduction to R (Ch. 3)
- 23 Aug Intro to Statistics continued (Ch. 2)
- 28 Aug Exploring Data with Graphs (Ch. 4)
- 30 Aug Probability and Hypothesis Testing
- 4 Sep Probability and Hypothesis Testing (continued: presentations)
- 6 Sep Correlation (Ch. 6)
- 11 Sep Linear Regression (Ch. 7, pp. 245-260)
- 13 Sep Exploring assumptions and handling violations of assumptions
- 18 Sep Intro to Power Analysis & its application to correlation & regression
- 20 Sep Comparing two means: t-test, etc. (Ch. 9)
- 25 Sep t-test (continued, including power & sample size estimation)
- 27 Sep Introduction to the take-home Midterm Exam (due Monday, Oct. 1 at 11:59 p.m.)
- 2 Oct Comparing several means: ANOVA (GLM1) (Ch. 10)
- 4 Oct Comparing several means: ANOVA (GLM 1) (Ch. 10) continued
- 9 Oct Analysis of covariance: ANCOVA (GLM 2) (Ch. 11)
- 11 Oct Analysis of covariance: ANCOVA (GLM 2) (Ch. 11) continued
- 16 Oct Factorial ANOVA (GLM 3) (Ch. 12)
18 Oct  Multiple regression (GLM 4) (Ch. 7, pp. 261-end)
23 Oct  GLM overview, review, practice and power analysis
25 Oct  GLM overview, review, practice and power analysis (continued)
30 Oct  Analysis of categorical response variables I: Chi-squared and related (Ch. 18)
1 Nov  Analysis of categorical response variables II: Logistic regression  (Ch. 8)
6 Nov  Mixed models and repeated-measures designs
8 Nov  Brief intro to some advanced topics: Meta-analysis, multivariate, and alternatives to null hypothesis testing
13 Nov  Writing Methods/Statistics sections of prospectuses, grant proposals, and papers; writing Results sections of papers
15 Nov  Work on student projects
20-22 November: THANKSGIVING BREAK
27 Nov  Student presentations
29 Nov  Introduction to the take-home Final Exam
5 Dec  Take-home final exam due at 10:00pm

**Academic misconduct:** Students are responsible for abiding by the university’s policies on Academic Conduct and Discipline, which are available on the university website.

**Collaboration with your peers is encouraged on lab exercises and homework, but all writing and R code must be your own, with no exceptions.** On the take-home midterm exam and final exam, no discussion with other students is allowed, and all answers must be strictly your own work. Violation of this policy or any others will not be tolerated in this course, and possible sanctions for academic misconduct include: failure on the work in question, course grade reduction or failure of the course, disciplinary probation, or suspension or expulsion from the University.

**Cell phones, texting, e-mail, and web-browsing in class and meetings:** Turn off your phones and PDAs before entering class or a meeting with an instructor. Computers are encouraged in class, but may only be used for course work. Texting, e-mailing, internet browsing, and making phone calls are all strictly prohibited during class and meetings with the instructor.

**Guidelines for project and presentation:** You can work alone or in a group of 2 (no larger). You must present an analysis of some data related to your graduate research project or research interests. The data can be your own, borrowed from someone, or made up. The analysis can be anything you are learning in class, but it must answer a question related to your research interests. Undergraduates: Time limit is 7 minutes, maximum, and will be strictly enforced, so please practice. Format for presentation (1 slide each): Brief background, research question, data collection methods, type of analysis (justified), results (2 slides OK if necessary), conclusions. Please upload a Powerpoint presentation to Blackboard. **Additional requirements for graduate students:** Include 1 slide each for Methods (Statistics) and Results, written in style of journal article. Presentation time limit for graduate students is 10 minutes.