

ABE/RNR/EIS 613 Applied Biostatistics Fall 2014

Description of Course

The main aim of this course is to develop a conceptual and practical understanding of introductory through advanced statistical methods and their applications in ecology, evolutionary biology, geochemistry, environmental policy, medicine and laws. This course intends to provide graduate students with necessary statistical training in designing experiments, implementing, analyzing, and reporting their research.

Locations and Times

Lecture: 3:00 - 4:15pm, Mon & Wed, Shantz 440

Lab: 9-10am Tue, Shantz 338

Instructor Information

Dr. Lingling An

Office: 501 (Shantz)

Phone: 621-1248

E-mail: anling@email.arizona.edu

Office Hours: 1-2pm (Thur)

Course website: <http://cals.arizona.edu/~anling/ABE613/ABE613.htm>

TA information

TBA

Course Objectives and Expected Learning Outcomes

Focus on understanding how design choices drive choice of the appropriate statistical model for analysis and inference; explore the principles and pitfalls of estimation and hypothesis testing. In addition, the course provides hands-on experience with data analysis. At the end of the course the students will be expected to perform independent analysis on ecological or biological data and be well trained in presenting this information to a diversely trained audience. Specifically, through this course the students will

- improve their understanding of statistical reasoning and of measures of uncertainty
- learn how to translate mountains of computer output into short summary statements that communicate the results in a language common to all scientists
- learn a fairly large array of statistical tools that will be useful for a wide range of problems
- know the language, the general tools, and the spirit of statistical data analysis, which will make communication with statisticians more effective and beneficial.

Topics

We will cover most of the topics from chapter 1~ chapter 23.

1. Drawing Statistical Conclusions.
2. Inference Using t-Distributions.
3. A Closer Look at Assumptions.
4. Alternatives to the t-Tools.
5. Comparisons among Several Samples.
6. Linear Combinations and Multiple Comparisons of Means.
7. Simple Linear Regression: A Model for the Mean.
8. A Closer Look at Assumptions for Simple Linear Regression.
9. Multiple Linear Regression.
10. Inferential Tools for Multiple Regression.
11. Model Checking and Refinement.
12. Strategies for Variable Selection.
13. The Analysis of Variance for Two-Way Classifications.
16. Repeated Measures and Other Multivariate Responses
- 18 Comparisons of Proportions or Odds.
- 19 More Tools for Tables of Counts.
20. Logistics Regression for Binary Response Variables.
21. Logistic Regression for Binomial Counts.
22. Log-Linear Regression for Poisson Counts.
23. Introduction to elements of Research Design

Teaching Format

The course will consist of lectures (3 units) and labs (1 unit).

Required Text:

Ramsey, F. L., and D. W. Schafer. 2002. *The statistical sleuth: A course in methods of data analysis*, 2nd edition.

Required Software:

JMP 11: 6-month license is available through CatSoft at the university bookstore.

Required/Recommended Knowledge

The students must have some knowledge of basic statistical concepts such as means, standard deviations, histograms, the normal and t-distributions.

Please read assigned readings before class—this will allow us to focus on the conceptual foundations and applications of each topic.

Use JMP for the computational muscle for assignments, where you will be asked to provide a statistical summary for each problem. These should be brief, focused on the question of interest rather than the statistical tools used, and written in the spirit of Summary of Statistical.

Grading Policy

- There will be about 10 homework assignments due in lab sessions. Permission for late submissions should be obtained from the instructor in advance.
- One in-class midterm exam and one final exam.
- One final project. Each team consists of 2~3 students. The reports will be due the last day of class and presentations will be scheduled the last week of class.

The distribution of the weight of each component in the final grade:

Midterm exam: 25%
Homework: 35%
Final exam: 25%.
Project: 15%

The grading scale will be:

A: 90 - 100
B: 80 -89
C: 70 -79
D: 60 -69
E: 0 - 59

Assignment Format

Homework and project will be typed and exams will be hand-written.

Attendance Policy

Regular class and lab attendance is expected and will be required if students intend to understand the material at a level that will lead to a passing grade. However, attendance will not be recorded.

Classroom Behavior

- All cell phones and beepers must be turned off prior to entering the classroom. These sounds and conversations distract both students and instructors alike. The sole exception will be for those individuals involved in emergency services.
- While in class, students are expected to conduct themselves in a manner conducive to learning and in a way that does not distract the other students from learning. Respect and common courtesy to fellow students and the instructor is expected.
- The Arizona Board of Regents' Student Code of Conduct <http://dos.web.arizona.edu/uapolicies/scc5308abcd.html#sccphilosophy> , ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://policy.web.arizona.edu/~policy/threaten.shtml>.

Special Needs and Accommodations Statement

Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: uadrc@email.arizona.edu, <http://drc.arizona.edu/>. You must register and request that the Center or DRC send me official notification of your accommodations needs as soon as possible. Please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate. *The need for accommodations must be documented by the appropriate office.*

Student Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://dos.web.arizona.edu/uapolicies/>.

Confidentiality of Student Records

<http://www.registrar.arizona.edu/ferpa/default.htm>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.