ABE/RNR/EIS 513/413 Applied Biostatistics

Location and Time

Lecture: Mon & Wed, 1:00 – 2:15 pm, Shantz 440

Description of Course

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

Prerequisite: An introductory course on Statistics that covers probability distributions and hypothesis testing, e.g., MATH 163 or 263.

Instructor and Contact Information

Dr. Fei Jia
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Office: Shantz 504
Office Hours: Wed 2:15 – 3:15 pm

Dr. Lingling An
E-mail: anling@email.arizona.edu

Course website: D2L
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.

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/2015-16/policies/classatten.htm

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02

Participating in course and attending lectures are vital to the learning process. As such, attendance is required at all lectures. Students who miss class due to illness or emergency are required to bring documentation from their healthcare provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

Makeup Policy for Students who Register Late – after the first class meeting

Only one missed assignment can be made up. The due date is one week after registration.

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

Recommended Knowledge

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.

Assignments and Examinations

- There will be about 10 homework assignments. Permission for late submissions should be obtained from the instructor in advance.
- One in-class midterm exam (Mid of Oct) and one final exam. The date and time for the Final Exam can be found at: http://www.registrar.arizona.edu/schedules/finals.htm
- One final project (required for graduate students only). 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.

Grading Scale and Policies

The distribution of the weight of each component in the final grade for **undergraduate students**:

Midterm exam: 30%
Homework: 40%
Final exam: 30%.

The distribution of the weight of each component in the final grade for **graduate students**:

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

Honors Credit

Students wishing to contract this course for Honors Credit should email me to set up an appointment to discuss the terms of the contact and to sign the Honors Course Contract Request Form. The form is available at http://www.honors.arizona.edu/documents/students/ContractRequestFrom.pdf

Scheduled Topics/Activities

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

Week	Topics	Homework
Week 1 (Mon)	Introduction; Variables, Data Tables, Models	
(Wed)	Descriptive Statistics	
Week 2 (Mon)	Testing, Inference, P-values	Hw1

(Wed)	Continued …	
Week 3 (Mon)	**Labor Day- No class**	
(Wed)	Tools based on the t-distribution	Hw2
Week 4 (Mon)	Assumptions of t-tools, Data Transformations	
(Wed)	Alternatives to t-tools (Nonparametrics)	
Week 5 (Mon)	ANOVA	Hw3
(Wed)	ANOVA using Extra-Sum-of-Squares Principle	
Week 6 (Mon)	Planned and Unplanned Comparisons after ANOVA	
(Wed)	Simple Linear Regression and Correlation	Hw4
Week 7 (Mon)	continued...	
(Wed)	Regression or ANOVA?: Lack of Fit	
Week 8 (Mon)	Review for midterm	Hw5
(Wed)	**Midterm Exam**	
Week 9 (Mon)	Multiple Regression	
(Wed)	Inferential Tools for Multiple Regression	Hw6
Week 10 (Mon)	Model Checking and Refinement	
(Wed)	Continued …	
Week 11 (Mon)	Strategies for Variable Selection	Hw7
(Wed)	Multi-factor ANOVA	
Week 12 (Mon)	Repeated Measures ANOVA	
(Wed)	Proportions and Odds	Hw8
Week 13 (Mon)	Tables of Counts	
(Wed)	Intro to the General Linear Model	
Week 14 (Mon)	Logistic Regression for Binary Responses	Hw9
(Wed)	Logistic Regression for Binomial Counts	
Week 15 (Mon)	Log-Linear Regression for Poisson Counts.	
(Wed)	Review for final	Hw10
Week 16 (Mon)	Class project presentation	
(Wed)	Class project presentation	
TBA	**Final Exam**	

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (i.e. texting, chatting, reading a newspaper, making phone calls, web surfing, etc).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self. See: http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Accessibility and Accommodations

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit http://drc.arizona.edu/.

If you have reasonable accommodations, 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.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

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://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

The University Libraries have some excellent tips for avoiding plagiarism available at: http://www.library.arizona.edu/help/tutorials/plagiarism/index.html.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination, http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at:
http://catalog.arizona.edu/2015-16/policies/aaindex.html
Student Assistance and Advocacy information is available at:
http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

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.