ADVANCED STATISTICAL MODELING FOR BIOLOGISTS

Time and Place: TH 10:45 AM-12:05 PM , LS 102
Instructor: Fred Adler
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TA: Sabrina McNew
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Discussion: W 3:05 - 3:55, LS 107
Office Hours:TBA
Web Site: `http://www.math.utah.edu/~adler/bio6500/`
Optional texts:
> Ecological Models and Data in R, Ben Bolker
> Statistics: An Introduction Using R, Michael J. Crawley

Other worthy books:
> J. Adler, *R in a Nutshell*
> J. S. Clark, *Models for Ecological Data*
> R. Hilborn and M. Mangel, *The Ecological Detective*
> S. Otto and T. Day, *A Biologists Guide to Mathematical Modeling*

The Course. Advanced statistical modeling for biologists is designed for life science graduate students with a perhaps rusty background in mathematics and statistics who wish to become real practitioners of the art of modern statistics. The course will be based on the R programming language. Throughout, the focus will be on the tight link between experimental design, explicit model building, and statistical analysis. The schedule will be subject to revision based on how things go.

Homework. Homework will be project-based, involving each of the main components of the course, roughly every 2-3 weeks.

Projects. The project is central to the course, and involves choosing a topic, and presenting the idea, a progress report, and a full poster (or talk) at the end of the semester, along with a formal write-up. These projects should be based on the students own area of research or area of research interest, and involve analysis of real or simulated data. During the fifth and sixth weeks of the semester, we'll meet with each registered student to discuss this project.

Grading. Grades will be weighted according to the following scheme.

Written homework	20%
Project presentation	20%
Project write-up	40%
Class participation	20%

Learning Objectives The goal of this course is to give graduate students the tools they need to work with complex data sets. Rather than seeing statistics as a grab bag of techniques, the focus will be on the tight link between experimental design, explicit model building, and statistical analysis. Students will

1. Learn to use the R language,

2. Learn to simulate experiments in R,

3. Learn to analyze time-to-event data, general linear models and contingency tables,

4. Gain experience with likelihood and modern model fitting techniques.

5. Creatively analyze and visualize your own data

ADA statement. The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

Accommodations policy. The instructor does not grant content accommodation requests as the course content fulfills legitimate pedagogical goals

Classroom etiquette. Students will maintain a respectful and safe learning atmosphere, and class will be cancelled if this atmosphere is violated.

TENTATIVE COURSE OUTLINE

Weeks	Date	Topic
1	Aug 23	Introduction to probability, statistics, and R
2-3	Aug 30	Simulating and analyzing time to event data
4-5	Sep 13	Regression: Multiple, generalized, mixed model
6	Sep 27	Simulating and analyzing count data
7	Oct 04	Project idea presentations
8	Oct 18	Regression toward the mean
9	Oct 25	Analyzing morphology
13	Nov 01	Spatial statistics
12	Nov 08	Project Progress Reports
11	Nov 15	Bayesian statistics
10	Nov 22	False discovery rate
14	Nov 29	Project Panic Sessions or special topic
15	Dec 06	Project presentations