Statistics 511 Regression Models
MWF 10:10 - 11:00am
009 Life Sciences Building

Instructor: Ephraim Hanks
Office: W-250 Millenium Science Complex
email: hanks@psu.edu
Office Hours: Tuesdays 2:00-3:30pm or by appointment

TA: Jason Bernstein
Office Hours: Tuesday / Thursday 1:00-2:00pm in Thomas 330A

Textbook: *Regression: Models, Methods and Applications* by Fahrmeir, Kneib, Lang, and Marx. This textbook is available in pdf form on Angel or through the University Library website.

Course Goals:

The goal of this course is to introduce the student to modern methods in regression and supervised learning. At the end of this course successful students will be able to do the following:

1. Conduct an appropriate exploratory data analysis when presented with a set of predictor and response variables.
2. Specify an appropriate linear (LM), generalized linear (GLM), or generalized linear mixed model (GLMM) for a given study goal and set of data. This includes creating appropriate predictor variables, including using indicator variables, interaction terms, and basis function expansions.
3. Estimate regression parameters (and other model parameters) using likelihood-based and regularization-based (penalized likelihood) approaches.
4. Use software to perform hypothesis tests for nested models and construct confidence intervals for model parameters.
5. Conduct and interpret appropriate model diagnostics.

Tentative Outline:

1. Exploratory Data Analysis (FKLM Ch 1.2)
2. Linear Models (FKLM Ch 3, 4.1)
3. Regularization (FKLM Ch 4.2)
4. Generalized Linear Models (FKLM Ch 5.4, 5.5, 5.1, 5.2)
5. Semiparametric and Nonparametric Regression (FKLM Ch 8)
6. Mixed Models – time permitting (FKLM Ch 7)

Computing: We will use the R statistical computing environment for all computation in this class.

Grading:

Homework:	30%
Midterm Exam	20%
Final Exam	30%
Project	20%

Course grades will be assigned according to the following cutoffs. If the grades are curved, a higher grade may be assigned, but you will not receive a lower grade than listed here.

A	[93,100]	C+	[77,80)
A-	[90,93)	C	[73,77)
B+	[87,90)	C-	[70,73)
B	[83,87)	D	[60,70)
B-	[80,83)	F	[0,60)

Exams:
The midterm exam date will be given at least a week before the exam. The comprehensive final exam date will be set by the registrar's office. No make-up exams will be given. In the case of a University approved conflict, an arrangement will be made with the instructor.

Homework:
Homework will be assigned approximately weekly and posted on ANGEL. You will be responsible to download the homeworks. **No late homework will be accepted.** The lowest homework grade of the semester will be dropped. Homework can be worked on in groups, but each student must submit homework individually.

Academic Integrity:
Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. All University policies regarding academic integrity apply to this course. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. All exam answers must be your own, and you must not provide any assistance to other students during exams.

Disability Services:
Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at http://equity.psu.edu/ods/. In order to receive consideration for course accommodations, you must contact ODS and provide documentation. If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible.