STA 603: Introduction to Linear Model and Experimental Design
Spring 2017
Course Syllabus

Contact Information:
Instructor: Solomon W. Harrar, Ph.D.
Office Hours: MW 2 - 3:30PM or by Appointment
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Class Time and Place: MWF 11-11:50 and W 12-12:50, MDS 337

Catalog Description: Multivariate normal distribution; Linear models in matrix notation; Multiple linear regression (distribution results, categorical predictors, interactions, connection to ANOVA sums of squares, diagnostics); Ridge and Nonparametric regression; Generalized linear models (binomial, Poisson and gamma regression; over-dispersion; Mixed models; diagnostics) Professional presentation of results.

Course Objectives: In this course, our goal is to gain substantive understanding of regression methods from the application as well as mathematical points of views. We will cover methods for fitting regression models to a continuous or discrete outcome variables using quantitative as well as qualitative predictor variables. Model building, validation and inference will constitute the main focuses. The learning outcomes of the course are to (a) be able to intelligently analyze data using linear regression methods to illicit information in order to answer research questions. (b) be able to effectively and precisely communicate the finding of the data analyses in oral as well as verbal forms.

Course Content: In STA 603, we shall cover most, but not all, of the materials in chapters 5 through 16 of the textbook.

1. Basics of Matrix Algebra (Chapter 5)
2. Introduction to Multivariate Normal Distribution, Linear and Quadratic Forms (Chapter 5)
3. Multiple Linear Regression -- Estimation, Testing and Model Building (Chapters 6-11)
4. Introduction to Nonlinear Regression (Chapter 13)
5. Regression for Categorical and Count Dependent Variables (Chapter 14)
6. Time permitting: Design of Observational and Experimental Studies (Chapter 15) and One-way Layout (Chapter 16)

Prerequisite: Graduate standing in Statistics.

Required Text:

References:
Course Assessment: Your final graded on the course will be based on Homework assignments (25%), 2 Mid Terms (each 25%) and Final Exam (25%). Grades will be assigned according to the following scale: 85-100 ~ A, 70-84 ~ B, 60-69 ~ C, 50-59~D, 0-49 ~ E.

Homework: Homework will be assigned once a week. Some of the homework problems may be based on materials that are discussed in the book but not directly covered in class. I encourage you to ask questions in class. However, in the interest of time, we may not be able to entertain all your questions related to homework problems or otherwise. I will be more than happy to assist you during office hours or by setting up an appointment. Homework assignments must be done cleanly in an 81/2 X 11 size papers and must be stapled (if extends more than one sheet of paper). Answers must be written in complete sentences. Inclusion of outputs from software must be limited to most relevant parts and must be accompanied by written interpretation of the results to answer the question asked. Homeworks must be done individually. You are allowed to discuss problems with other students but the final write-up must be your own. Homeworks are due by 11 AM of the due date. Due dates will be announced when the Homeworks are assigned and will be posted on the course webpage. No late homework will be accepted.

Exams:
• There will be two midterms and one cumulative final exam.
• The midterm exams will tentatively occur on February 15th and March 29th, and the final exam will occur on May 1st from 3:30 - 5:30PM.
• The coverage of the midterms will be announced at a later time.

Make up: If you cannot make it to an in-class exam due to excused absences (see procedures for excused absences and verification requirements below), please let me know as soon as possible so that we can arrange for a make-up exam. There will be no make-up for homeworks. In the event that you cannot turn-in homework due to an excused absence, I will impute missing homework scores with the median of your scores on the other homeworks. It would be to your advantage to turn in homeworks in advance in the case of planned absence.

Procedures Regarding Excused Absences: You must notify me of an absence within one week after the absence or prior to the absence. You must submit any written documentation supporting an excused absence within one week after the period of absence, except when the absence is for the observation of a major religious holiday. If, for example, you have an extended, two-week absence because of serious illness, the documentation would be due within one week after you return to class. An absence for a major religious holiday requires advance written notification provided that the observance in question is important enough to warrant an excused absence.

Appropriate Verification for an Excused Absence for Illness: An absence is excused when an illness is “significant” and supported by appropriate verification to document the significance of the illness. I will take steps to confirm the authenticity of documentation provided by you to verify excused absences. Tier 2 or Tier 3 document provided to the student by University Health Services is an acceptable verification for an excused absence for illness.

Expectations: I expect you to attend and participate in class regularly. However, attendance and class participation will only have the obvious indirect bearing on your course
grade. In any event, the student is responsible to get caught up with the materials covered and homework assigned. I expect you to keep a positive attitude throughout the semester. The course is shaped to meet the needs of as many students as possible. All master’s candidates are required to pass a comprehensive departmental written examination on the content of a few courses including STA 623. This examination is normally administered in late May/early June. I will teach the course keeping in mind students who will be taking comprehensive exam. Some lectures may be much more technical than others. For some theorems we will do detailed proofs when the proof is enlightening to see the broader scope of applicability of the result. On the contrary, for some examples the algebraic details could be tedious in which case I will leave them as mini-homework for you to verify. I won’t collect these mini-homeworks but I expect you to fill in all the details on your own. I will be happy to assist you during office hours if you have difficulty verifying them. I expect you to practice appropriate classroom behavior. A student who violates the rules for civil behavior in class will be asked to leave for that day and I will take steps as appropriate to make sure that such behavior will not be repeated. You’re welcome to voice opinions. You must, however, express your opinions in a manner that is respectful, civil, and not disruptive to the class.

Website: I will maintain webpage for this course at the website http://as-houston.ad.uky.edu/statistics/users/sha274/STA603/. On the web page, some relevant information pertaining to schedule, homework assignments and R-codes from class will be posted. Also other course related announcements would be posted. Please check the website regularly, at least three times a week (every class day).

Some Dates You May Want to Know:
- January 16 - Monday ---- Martin Luther King Birthday - Academic Holiday
- January 18 - Wednesday ---- Last day to add a class for the 2017 Spring Semester
- February 1 - Wednesday ---- Last day to drop a course without it appearing on the student’s transcript
- February 1 - Wednesday ---- Last day to change grading option (pass/fail to letter grade or letter grade to pass/fail; credit to audit or audit to credit)
- March 13-18 - Monday through Saturday ---- Spring Vacation - Academic Holidays
- April 28 - Friday ---- Last day of classes
- May 1-5 - Monday through Friday ---- Final Examinations

Disability: If you have a documented disability that requires academic accommodations, please see me as soon as possible during the scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (725 Rose Street, Multidisciplinary Science Building, Suite 407, email: dtbeac1@uky.edu) for coordination of campus disability services available to students. To contact the DRC by phone, please call V/TDD (859) 257-2754. We can then work together to find the best solutions for you.

Student Code: All students need to be familiar with the Student Code of Conduct found at http://www.uky.edu/StudentAffairs/Code/part1.html.

Academic Integrity: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.