COURSE AND CONTACT INFORMATION

Course: STAT 6218  
Semester: SPRING 2015

INSTRUCTOR

Name: Dr. Tatiyana (Tanya) V Apanasovich,  
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COURSE DESCRIPTION

Linear models have a dominant role in statistical theory and practice. Most standard statistical methods are special cases of the general linear model, and rely on the corresponding theory for justification. The goal of this course is to develop the theoretical basis for analyses based on a linear model. We will focus on laying the theoretical foundation for simple as well as complex data sets. This course will present selected theory of the general linear parametric model as outlined below:

1. Linear Algebra for Linear Models.
2. Matrices and their decompositions.
3. Linear Models  
   (1) OLS Estimation  
   (2) Estimability  
   (3) Linear Restrictions  
   (4) Generalized Least Squares  
4. Distribution Theory  
   (1) Distribution Theory  
   (2) The Normal Distribution  
   (3) Chi-squared distribution  
   (4) The distribution of quadratic forms  
   (5) The F distribution  
   (6) The t-distribution  
5. Inference  
   (1) Hypothesis Testing  
   (2) The likelihood ratio test  
   (3) Coordinate-free hypotheses  
   (4) Parametric hypotheses  
   (5) F and t tests  
   (6) Power and Sample size  
   (7) Confidence regions  
6. ANOVA: One and two-way layout  
7. Mixed-effects models
COURSE PREREQUISITE(S)
The desirable prerequisites for the course are: (1) a year of mathematical statistics at the master’s level or higher (Stat 6201-2) and (2) a course in linear algebra at the undergraduate level or higher (Math 2184), although we will begin the course with a review of the required linear algebra from a coordinate-free perspective. A course or exposure to Regression Analysis will be helpful.

TEXTS
The course material will be based on notes prepared by the instructor supported by the reference
Linear Models in Statistics 2nd ed by Alvin C. Rencher and G. Bruce Schaalje

OBJECTIVES
Develop a critical understanding of the theoretical basis of statistical methods for linear models.

Build a foundation for all statistical modeling, including Generalized linear models, Econometric Models, Non-linear models, Dynamic linear models, and Time Series Analysis

GRADING
Your final grade will be a weighted average of your homework average (15%), in-class exam (40%), and take home exam (45%).

CLASS POLICIES

Homework: There will be frequent homework assignments, at least five, and we will occasionally go over solutions to homework problems. Homework will be collected and graded.

Students may be asked to present solutions on the board. Assignments must be completed by students individually, but group discussion is permitted. The due time will be 11:59pm of the due date (usually class date). You have to use Dropbox to submit the homeworks. No late homework will be accepted, but the lowest score will be dropped

Midterm Exam: One open–book in-class examination will be given on April, 9. Make-up midterm will be given only in exceptional circumstances (e.g. well-documented medical problems).

Take Home Exam: Take Home Exam will be given on April, 16. The due date will be April, 23. Assignments must be completed by students individually, NO group discussion is permitted.
ACADEMIC INTEGRITY
I personally support the GW Code of Academic Integrity. It states:: “Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information.” For the remainder of the code, see: http://www.gwu.edu/~ntegrity/code.html

SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM
DISABILITY SUPPORT SERVICES (DSS)
Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: http://gwired.gwu.edu/dss/

UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300
The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:
- crisis and emergency mental health consultations
- confidential assessment, counseling services (individual and small group), and referrals

http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices

SECURITY
In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.