FALL 2017
LINEAR MODELS: MATH 7651

Instructor: George

Phone: 678-5088

Office Hour: TBA, or by Appointment

The course will focus on two main aspects of linear inference. The first is the traditional topics of linear models, in which random errors are normal. These include the essentials concepts of least squares, regression, and general linear models. The second is the more contemporary topics of generalized linear model in which we assume an exponential family error. We will extend our study to quasilikelihood procedures and generalized estimating equations. For the most part we will use both geometric approach and matrix approach as the underlying tools for proving properties of estimates and test statistics. We will also learn to use the software R. I will expect students to learn the R language, mainly on their own,

The specific topics to be covered are:

1. The Simple Linear Models

2. Multivariate Data, Multivariate Normal Distribution

3. General Linear Models

    (a) Estimation and Inference

    (b) Gauss Markov Theorem

    (c) Distribution of Quadratic Forms

    (d) Partitioning of the Sum of Squares

    (e) General Linear Hypothesis of Full Rank

4. **Generalized Linear Models**

    (a) Logistic Regression

    (b) Other Link Functions

(c) Some Diagnostics

5. Quasilikelihood Methods

6. Generalized Estimating Equations

7. Applications to Longitudinal and Other Correlated Data

The main texts are: *Linear Models with R* by Julian J. Faraway, Chapman and Hall/CRC 2004; and *An Introduction to R Software for Statistical Modeling & Computing* by Petra Kuhnert and Bill Venables CSIRO Mathematical and Information Sciences.

HOMEWORK
Problems will be assigned weekly and selected problems graded. Homework will account for 50% of the course grade.

EXAMINATION
A Final Project will given.