Instructor: Javier Cabrera,  
Office: 471 Hill, Email: xavier.cabrera@gmail.com

Lecture/Venue: Wednesday 6:40-9:30/ SEC 220 BUS

Office Hours: Wed 4:30-6:10


Web Page: www.rci.rutgers.edu/~cabrera/587/ also on sakai

Course Objectives: A three credit course designed to be an advance course in statistical computing for data analysis. It is required that the students have some knowledge of R at the level that is used in Stat586. The course should provide Graduate students with the tools to perform the computations required for their research. Important topics are: Numerical Analysis, Bayesian methods, and Non-linear methods. The computations are mostly performed using R and WinBugs.

Topics:

2. Overview of basic Numerical Analysis, computations, algorithms.  
   Linear algebra: SVD, QR, spectral decomposition, Cholesky factorization. Givens, Householder and other transformations. 
   Optimization: Newton-Raphson, Gradient Methods, Nelder-Mead, Simulated Anneling, Stochastic Approximation. 
   Random number generation, sampling from known CDF’s. Simulations.

3. Bayesian Essentials. 
   Monte-Carlo simulation methods, Bayesian Inference, MCMC, Bayesian Regression, the EM algorithm. Using the WinBUGS Software, R.


6. (If there is time) Other algorithms: LASSO, gam, lda, MARS, n-net, ppr.
Additional references:


Statistical Consulting Cabrera. Springer-Ver


**Homework & class participation:** There will be five homework assignments accounting for 15% of final grade. All students must work independently on the homework sets. All homework must be turned in by the beginning of class on the due date. No late homework will be accepted. Your class participation will be used to add a maximum of 5% to the grade.

**Final Project:** There will be one individual final project involving analysis of a data set and writing and R-package. Prepare a report following the format provided in the report instructions. The data sets will be uploaded to the course web site shortly. The project will account for 42% of the final grade.

**Exams:** There will be one in class midterm exam accounting for 43% of the final grade. Part I closed book, Part II open book.