Math 569 ± Statistical Learning

Course Description from Bulletin: The wealth of observational and experimental data available provides great opportunities for us to learn more about our world. This course teaches modern statistical methods for learning from data, such as, regression, classification, kernel methods, and support vector machines.

Enrollment: Elective for AM MS, PhD plus MMF plus other majors.

Textbook(s): T. Hastie, R. Tibshirani and J. Friedman, *The Elements of Statistical Learning*, Springer (2001), ISBN 0-387-95284-5.

Other required material: Software packages such as R, JMP, and MATLAB

Prerequisites: MA

2. Linear Methods for Regression and Classification 9
    a. Linear Regression and Least Squares
    b. Subset Selection and Coefficient Shrinkage for Linear Regression
    c. Linear Discriminant Analysis
    d. Logistic Regression
3. Basis Expansions and Kernel Methods 9
    a. Piecewise polynomials
    b. Smoothing Splines
    c. Regularization via Reproducing Kernel Hilbert Spaces
    d. Kernel Smoothers
    e. Local Regression
4. Model Assessment, Selection, and Inference 9
    a. Bias, Variance and Model Complexity
    b. Bayesian Approach and BIC
    c. Vapnik-Chervonenkis Dimension
    d. Cross-Validation
    e. Bootstrap and Maximum Likelihood Estimation
5. Advanced Topics 9