IEOR 165 – Engineering Statistics, Quality Control, and Forecasting
Spring 2020

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Lectures: TuTh 1230-200P, 105 North Gate

Discussions: Section 1: W 4-5P, 166 Barrows
Section 2: F 4-5P, 106 MoffittLibrary

Website: http://courses.ieor.berkeley.edu/ieor165/

Optional Textbook: *Introduction to Probability and Statistics for Engineers and Scientists*, by Sheldon Ross

Prerequisites: IEOR 172 or STAT 134 or an equivalent course in probability theory

Grading: Project (20%); homeworks (20%); midterm (20%); final exam (40%)

Midterm: Tuesday, March 17, 2020 1230-200P

Final Exam: Thursday, May 14, 2020 3-6P

Description: This course will introduce students to basic statistical techniques such as parameter estimation, hypothesis testing, regression analysis, analysis of variance. Applications in forecasting and quality control.

Outline: Specific topics that will be covered include:

- Regression – Basic optimization; maximum likelihood estimation; least squares regression; high-dimensional regression; support vector machines (SVM's) (about 6 weeks)
- Forecasting – ARAR algorithm; Holt-Winters algorithm; Holt-Winters seasonal algorithm (about 1 week)
- Hypothesis Testing – Review of probability; *t*-test; confidence intervals; Mann-Whitney *U* test; multiple testing; ANOVA; Kruskall-Wallis test; likelihood ratio tests; quality control (about 6 weeks)

Lecture Notes: Jan 21 Probability Review; Course Syllabus

Jan 23	Method of Moments
Jan 28	Linear Regression
Jan 30	Linear Regression
Feb 04	Diagnostics
Feb 06	Heteroscedasticity
Feb 11	Maximum Likelihood Estimation
Feb 13	Maximum Likelihood Estimation
Feb 18	Bias-Variance Tradeoff
Feb 20	Regularization
Feb 25	Cross-Validation
Feb 27	Distribution Estimation
Mar 03	Semiparametric Models
Mar 05	Support Vector Machines
Mar 10	Markov Processes; Holt-Winters Algorithm
Mar 12	Midterm Review
Mar 31	Null Hypothesis Testing
Apr 02	One-Sample Location Tests
Apr 07	Confidence Intervals
Apr 09	Two-Sample Location Tests
Apr 14	Multiple Testing
Apr 16	Multiple Comparisons
Apr 21	Quality Control
Apr 23	Weighted Control Charts
Apr 28	Neyman-Pearson Testing
Apr 30	Final Review