ISYE 2028 BASIC STATISTICAL METHODS

Required

Credit: 3-0-3

Prepared Prof, Huo Spring 2010

Prerequisite(s): ISYE 2027, COE 1361 (old course, phased out)

Catalog Description:
Point and interval estimation of systems parameters, statistical decision making about differences in system parameters, analysis and modeling of relationships between variables.

Text:
Douglas C. Montgomery, George C. Runger, *Applied Statistics and Probability for Engineers*, 5th Edition, Wiley, 2010.
eText: http://www.coursesmart.com/9780470053041

Objective
The objective of this course is to introduce students to data collection and analysis from which sound conclusions can be drawn. This includes techniques of estimation, hypothesis testing, and regression.

Topical Outline
1. Data Description: Random Sampling; Data Displays; Sampling Distributions include *t*-Distribution and *F*-Distribution.
2. Point and Interval Estimation: Estimating the Mean; Estimating the Differences between Means; Proportions, and Variances; Methods of Moments; Maximum Likelihood Estimation; Properties of Estimators.
3. Tests of Hypothesis: One-and Two-Sided Tests; Single Sample Tests; Two Sample Tests; Use of *p*-Values; Goodness-of-Fit Test; Test for Independence; Test for Homogeneity.
4. Linear Regression and Correlation: Least Squares and the Fitted Model; Properties of the Least Squares Estimators; Inferences Concerning the Regression Coefficients; Analysis of Variance.

Outcomes and their relationships to ISyE Program Outcomes

At the end of this course, students will be able to:

- Estimate parameters of distributions
- Assess risks in decisions, concerning long term performance, based on sample data
- Select proper statistical techniques for statistical decision making based on the type of data available
- Use statistical software to conduct analyses and interpret output
- Draw sound statistical conclusions from experiments and observational studies

Course outcome \ Program Outcomes	**a. apply math**	**b. data**	**c. IE method**	**d. team**	**e. problem solving**	**f. prof/ and ethical responsibilities**	**g. communication**	**h. global, eco, envi and soc context**	**i. continue to improve**	**j. current issues**	**k. participate in an organization**
Estimate parameters…	H	H			H						
Assess risks in decisions…	H	H	M		H						L
Select proper statistical techniques…		M	M				M				M
Use statistical software to…		M	L				L				L
Draw sound statistical conclusions…	H		M				H				M

- H, M and L denote high, moderate and low relationships.
- Team project are sometimes conducted

Evaluation of the important outcomes

Three or more important outcomes will be evaluated from direct questions in the Final exam:

1. Students should be able to analyze and display sampling data, evaluate statistics, and estimate distribution parameters;
2. Students should be able to draw conclusions about population parameters from experimental data by using proper statistical techniques.
3. Students should be able to use proper statistical techniques (namely hypothesis testing) to draw sound statistical conclusions.