

ISYE 2028 BASIC STATISTICAL METHODS

Required

Credit: 3-0-3

Prepared Prof, Serban, Fall, 2013

Prerequisite(s): ISYE 2027

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

Topics	Weeks
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.	4
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.	4

Software

A software package will be used in this class for assignments, projects or in some professor's classes in the tests. Currently, ISyE adopted the open source software R. It is free, very powerful, and employers appreciate the skill of competence in R.

Outcomes and their relationships to ISyE Program Outcomes

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

- Estimate parameters of distributions
- Perform statistical analysis and decision making using statistical inference
- 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. Design, conduct experiment, analyze interpret data	c. Design system	d. team	e. problem solving	f. prof/ and ethical responsibilities	g. communication	h. global, eco, envi and soc context	i. Life-ling learning	j. Contemporary issues	k. use tools for eng. practice
Estimate parameters...	High	High			High						
Perform statistical analysis ...	High	High	Low		High		Medium				High
Use statistical software to...		High									
Draw sound statistical conclusions...	High		Low				High				High

Evaluation of the important outcomes

The outcomes will be evaluated from direct questions in the Final exam.

ISyE ABET Student Outcomes a - k

- a) an ability to apply knowledge of mathematics, science, and engineering
- b) an ability to design and conduct experiments, as well as to analyze and interpret data
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d) an ability to function on multidisciplinary teams
- e) an ability to identify, formulate, and solve engineering problems
- f) an understanding of professional and ethical responsibility
- g) an ability to communicate effectively
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i) a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.