

ISYE 4031 REGRESSION AND FORECASTING

Credit: 3-0-3

Prepared Prof, Roshan Vengazhiyil, Fall 2013

Prerequisite(s): ISYE 2028

Catalog Description:

Regression analysis: multiple linear regression, diagnostics, and variable selection.
Forecasting: exponential smoothing techniques and autoregressive moving average models.

Text:

Forecasting, Time Series, and Regression by Bowerman, O'Connel, and Koehler, Duxbury Applied Series, 4th Edition, Duxbury Applied Series.

Objective

The objective of this course is to learn about regression, time series, and other forecasting models and their applications in various fields of science and engineering.

Topical Outline

Topics	Weeks
Introduction and review of statistics	1
Simple Linear Regression	2
Multiple linear regression	2
Model building and residual analysis	3
Advanced topics in regression	1
Forecasting: Time series regression	1
Exponential smoothing	1
ARIMA models	2
seasonal ARIMA modeling	1
Advanced topics in forecasting	1

Outcomes and their relationships to ISyE Program Outcomes

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

- Formulate real life problems using regression and forecasting models.
- Collect appropriate data to estimate the models and understand which data are useful in solving the problem.
- Use statistical software to estimate the models from real data.
- Draw conclusions from the estimated models to solve the real life problems.

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-lng learning	j. Contemporary issues	k. use tools for eng. practice
Formulate problems	High			Med	High						
Collect data		High		Med							
Estimate models	High	High									High
Draw conclusions				Med	High		Med				

- Team projects are conducted

Evaluation of the important outcomes

1. A project will be assigned to a team of 2-3 students. Students are expected to identify a real life problem, formulate it using statistical models, collect necessary data, analyze it, draw conclusions, and present the solutions.
2. Final exams will be used for evaluating student's ability to draw conclusions from the statistical analysis of data.

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.