

PROBABILISTIC OPERATIONS RESEARCH MODELS

MATH/CSCI 4310/8316

Course Description:

This is a survey course of probabilistic operations, research models and algorithms. Topics include Markov chains, queueing theory, inventory models, forecasting, and simulation. **3 credits**

Prerequisites:

MATH 2050 with a C- or better or permission of instructor.

Anticipated audience/demand:

senior and graduate majors in mathematics

Major Topics:

1. Review of Probability Theory

- a. random variables
- b. probability distributions
- c. conditional probability and independent events
- d. expectations

2. Markov Chains

- a. Chapman-Kolmogorov equations
- b. classifications of states of a Markov chain
- c. long-run properties
- d. absorbing states

3. Queueing Models

- a. applications
- b. basic structure of queueing models
- c. birth and death process
- d. queueing networks

4. Inventory Models

- a. components of inventory methods
- b. continuous-review models
- c. periodic-review models

5. Forecasting

- a. applications
- b. time series
- c. methods for constant-level model
- d. incorporating seasonal effects
- e. exponential smoothing
- f. Box-Jenkins model

6. Simulation

- a. applications
- b. random number generation
- c. generation of random observations from a probability distribution
- d. simulation processes

Methods:

The class will be presented primarily in lecture form.

Textbook:

Hillier, Frederick S., and Gerald J. Lieberman. *Introduction to Operations Research, 9th ed.* New York: McGraw Hill.

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