

PUB HLTH 444
ADVANCED DECISION ANALYSIS
Winter 2008 Quarter
January 7, 2008-March 10, 2008
Tuesdays 6:00-9:00pm
McGaw 2-403

Course Instructor:

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I. Course Description

Study and application of advanced decision-analytic methods useful in medical decision modeling and cost-effectiveness analyses. Included are the probabilistic theory of hazard rates and modeling of age-dependent mortality, Markov modeling, stochastic tree modeling, techniques for multi-way sensitivity analysis such as probabilistic sensitivity analysis and information-value analysis, cost-effectiveness modeling, the use of spreadsheets for Markov models, and software for stochastic tree modeling. Medical decision-analytic literature is reviewed and theoretical underpinnings of models are explored. A project using decision analysis software is required.

II. Prerequisites

Basic Decision Analysis PUB HLTH 431 or equivalent introduction to decision analysis.

III. Course Objectives

After completion of the course, students should be able to do the following:

Markov modeling

- Construct a Markov chain transition diagram for a medical treatment problem.
- Use data to estimate incidence rates and convert these to transition probabilities.
- Formulate and solve a Markov chain cohort model in a spreadsheet.
- Solve a Markov chain using rollback or cohort analysis on a spreadsheet.
- Discuss a published Markov chain analysis (effectiveness or cost-effectiveness) for a medical treatment problem.

Hazard rates and age-dependent mortality models

- Specify the mathematical relationship between hazard rates, the survival curve, and the survival time probability density.
- Explain superposition and splitting of independent arrival processes.
- Explain the Gompertz model of human mortality.

Stochastic tree modeling

- Construct a stochastic tree transition diagram for a medical treatment problem.

- Convert a Markov chain diagram to a stochastic tree diagram.
- Explain the Coxian approximation to human mortality.
- Formulate a factored stochastic tree model of a complex medical treatment problem.
- Formulate and solve a factored stochastic tree model using stochastic tree software.
- Discuss a published stochastic tree analysis (effectiveness or cost-effectiveness) for a medical treatment problem.

Probabilistic sensitivity analysis

- Discuss a published probabilistic sensitivity analysis for a medical treatment problem.
- Discuss a published information-value analysis for a medical treatment problem.

Cost-effectiveness analysis

- Discuss basic issues underlying cost-effectiveness and cost-benefit analysis.
- Discuss a published cost-effectiveness analysis for a medical treatment problem.

IV. Teaching Format

Class meets weekly. Assigned readings and problems are reviewed and discussed. Software is demonstrated on the instructor's notebook computer.

V. Student Evaluation

Students are evaluated based on:

1. (50%) Satisfactory discussion of readings and assigned problems.
2. (50%) Satisfactory completion of a final decision analysis project. The problem is generated by the student, and may be either a decision analysis or cost-effectiveness analysis. It may be focused on an individual patient decision or a policy decision.

VI. Course Evaluation

The Programs in Public Health administer web-based course evaluations to students for each course near the end of the quarter. ***Your completion of both the unit (course) and faculty evaluation components is required; failure to complete either of the evaluations will result in an incomplete grade until the evaluations are submitted.*** You will be sent the web link and instructions via email later in the quarter. You will have about two weeks time to complete the evaluations before grades are submitted.

VII. Academic Integrity

Academic integrity at Northwestern University is based on a respect for individual achievement that lies at the heart of academic culture. Every faculty member and student, both graduate and undergraduate, belongs to a community of scholars where academic integrity is a fundamental commitment. The Programs in Public Health abides by the standards of academic conduct, procedures, and sanctions as set forth by The Graduate School at Northwestern University. Students are responsible for knowledge of the information provided by The Graduate School on their Web page at <http://www.tgs.northwestern.edu/studentsvcs/ethics/>. Additionally, faculty reserve the right to use the "Safe Assignment: Plagiarism Detection Tool" that is part of the Course Management System. Info about this tool is found at <http://course-management.northwestern.edu/tipsheets.html>."

VIII. Readings

Required textbook:

Decision Modelling for Health Economic Evaluation

Andrew Briggs, Karl Claxton and Mark Sculpher

Oxford University Press (paperback)