PubH 6809
Advanced Methods in Health Decision Science
Spring 2015

Credits: 3.0
Meeting Days: Thursday
Meeting Time: 9:05am – 12:05pm
Meeting Place: Moos Tower 1-435
Co-instructors: Karen M. Kuntz, ScD
Office Address: D-360 Mayo Building
Office Phone: 612-625-9333
Fax: 612-624-2196
E-mail: kmkuntz@umn.edu
Office Hours: by appointment

I. Course Description

This is an intermediate/advanced-level course on the methods of decision science. The emphasis is on methods that are particularly applicable to issues of medical decision making, although most of the course material is relevant to analyses of environmental and safety decisions as well. Students will learn to apply methods that are currently being used at the frontiers of clinical decision science research. While the primary emphasis is not mathematical theory, a certain amount of theoretical background is presented for each topic.

II. Course Prerequisites

Prerequisites are an introductory course in decision analysis (e.g., PubH 6717) and some facility with mathematical notation and reasoning.

III. Course Goals and Objectives

At the conclusion of this course, the student will be able to construct, parameterize, and analyze a complex Markov decision model in TreeAge software. The student will be able to derive the necessary model inputs from primary and secondary sources, either directly or through calibration. The student will have an appreciation of state-of-the-art methods in uncertainty and value-of-information analysis, diagnostic test evaluation, and assessment of health-related quality of life. In addition, the student will be proficient at reading and critiquing a typical paper that uses the methods of decision-analytic modeling.
IV. Methods of Instruction and Work Expectations

Class sessions will be a combination of lecture format, case discussion, and computer labs with expectations of class participation. Requirements of the course consist of an in-class midterm examination, seven problem sets, and a class project with oral presentation. It is expected that all students will keep up with the required readings and homework assignments.

V. Course Text and Readings

Readings will be assigned for each class, consisting of both methodological background and applications. There is no required text. The textbook from PubH 6717 can be used as a reference:


VI. Course Outline/Weekly Schedule

<table>
<thead>
<tr>
<th>Session 1</th>
<th>1/22/2015</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first paper is a motivating example on the use and role of models. The second paper was used to model comorbidity-related mortality in the modeling paper.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Readings:


I. RECURSIVE MODELS

<table>
<thead>
<tr>
<th>Session 2</th>
<th>1/29/2015</th>
<th>Markov Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first paper is one of the first to introduce the use of Markov chains to medical decision making. The second paper is a practical guide to building models in decision-analysis software.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Readings:


Assignment:

Review: Introduction to Matrix Algebra

<table>
<thead>
<tr>
<th>Session 3</th>
<th>2/5/2015</th>
<th>The DEALE, Life Tables, &amp; Survival Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Lee chapter provides a brief overview of survival functions. The “DEALE” papers introduce concepts of disease-specific mortality from overall mortality. The Kuntz &amp; Weinstein chapter provides an overview of many of the concepts from this course. The Kuntz &amp; Weinstein paper (second half) compares additive vs. multiplicative assumptions when modeling disease-specific mortality.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Readings:


Assignment:

Browse the website: [http://www.cdc.gov/nchs](http://www.cdc.gov/nchs) and view the current US Life Tables.

PROBLEM SET #1 DUE

<table>
<thead>
<tr>
<th>Session 4</th>
<th>2/12/2015</th>
<th>Estimating Probabilities from the Literature</th>
</tr>
</thead>
</table>

*Students will recreate the model from Friedman et al. for Problem Set 3. The second paper provides advantages and disadvantages of data sources. The third paper has nice discussion of rates and probabilities.*

Readings:


Assignment:

Turn in a 1-2 page description of your project. Students will give brief (3-minute) presentations on their project.

PROBLEM SET #2 DUE

<table>
<thead>
<tr>
<th>Session 5</th>
<th>2/19/2015</th>
<th>Monte Carlo Simulations</th>
</tr>
</thead>
</table>

*The first paper is a tutorial on PSA (actual example less interesting). The second paper introduces the concept of hypothesis testing. The third paper provides a nice overview of NHBs. The last paper contains recent best practice guidelines.*

Readings:


### Session 6  2/26/2015  Calibration & Dynamic Models

The first paper provides an overview of calibration methods. The second paper illustrates the value of dynamic modeling to capture herd immunity.

**Readings:**


**Assignment:**

Turn in a draft of your methods, with a diagram of your model (if applicable).

### Session 7  3/5/2015  Value of Information

The first chapter is a formal introduction to value of information. The second paper provides an analytical framework for NICE.

**Readings:**


**PROBLEM SET #3 DUE**

### Session 8  3/12/2015  Midterm

**IN-CLASS MIDTERM EXAMINATION (open-book and open-notes; no computers)**

II. EVALUATION OF DIAGNOSTIC TESTS

**Session 9  3/26/2015  ROC Analysis: Estimation**

Reading cover basic concepts of ROC estimation, including comparing two curves.

**Readings:**


**Assignment:**

Model presentations (details TBD).

### Session 10  4/2/2015  Correction for Biases in ROC Analysis

The first paper is an overview of biases in ROC analysis. The second paper is a mathematical adjustment for verification bias. The last two papers are clinical examples of this adjustment.
Readings:


Assignment:

Model presentations (details TBD).

PROBLEM SET #4 DUE

Session 11 4/9/2015

Optimal Positivity Criteria

The first chapter provides the methods of choosing a positivity criteria. The second paper is a higher level discussion.

Readings:


PROBLEM SET #5 DUE

III. VALUING OUTCOMES

Session 12 4/16/2015

QALYs and Utility Theory

The first three papers discuss different aspects of QALYs in general. The last paper is an example that uses the methods of multiattribute utility theory.

Readings:


PROBLEM SET #6 DUE
IV. COGNITION AND ATTITUDES

Reading cover example from the behavioral decision theory literature.

Readings:


PROBLEM SET #7 DUE

Sessions 14-15  4/30 – 5/7/2015  Presentations

The last two classes will be devoted to project discussions and final project presentations.

PROJECT PAPER DUE FRIDAY, MAY 15, 2015, at 5:00 PM.

VII. Evaluation and Grading

Grades are based on timeliness of assignments, class participations, and feasibility of final research proposal.

A/F letter grade will be determined by total effort as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>97-100%</td>
<td>(4.0) Represents achievement that is outstanding relative to the level necessary to meet course requirements</td>
</tr>
<tr>
<td>A</td>
<td>93-96%</td>
<td>(4.0) Represents achievement that is outstanding relative to the level necessary to meet course requirements</td>
</tr>
<tr>
<td>A-</td>
<td>90-92%</td>
<td>(4.0) Represents achievement that is outstanding relative to the level necessary to meet course requirements</td>
</tr>
<tr>
<td>B+</td>
<td>87-89%</td>
<td>(3.0) Represents achievement that is significantly above the level necessary to meet course requirements</td>
</tr>
<tr>
<td>B</td>
<td>83-86%</td>
<td>(3.0) Represents achievement that is significantly above the level necessary to meet course requirements</td>
</tr>
<tr>
<td>B-</td>
<td>80-82%</td>
<td>(3.0) Represents achievement that is significantly above the level necessary to meet course requirements</td>
</tr>
<tr>
<td>C+</td>
<td>77-79%</td>
<td>(2.0) Represents achievement that meets the minimum course requirements</td>
</tr>
<tr>
<td>C</td>
<td>73-76%</td>
<td>(2.0) Represents achievement that meets the minimum course requirements</td>
</tr>
<tr>
<td>C-</td>
<td>70-72%</td>
<td>(2.0) Represents achievement that meets the minimum course requirements</td>
</tr>
<tr>
<td>D+</td>
<td>67-69%</td>
<td>(1.0) Achievement below minimum course expectations but sufficient to be awarded credit</td>
</tr>
<tr>
<td>D</td>
<td>63-66%</td>
<td>(1.0) Achievement below minimum course expectations but sufficient to be awarded credit</td>
</tr>
<tr>
<td>D-</td>
<td>60-62%</td>
<td>(1.0) Achievement below minimum course expectations but sufficient to be awarded credit</td>
</tr>
<tr>
<td>F</td>
<td>below 60%</td>
<td>Represents failure (no credit) and signifies that the work was either (1) completed at a level of achievement that is not worthy of credit or (2) not completed and there was no agreement between the instructor and the student that the student would be awarded an I</td>
</tr>
</tbody>
</table>

S/N option must complete all assignments to a C- level (70%):

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Achievement that is satisfactory will be expected to complete all assignments and receive a minimum of 70% to receive a passing</td>
</tr>
<tr>
<td>Grade</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>S</td>
<td>Represents performance at the discretion of the instructor but not lower than 92%.</td>
</tr>
<tr>
<td>A</td>
<td>Represents achievement of outstanding performance.</td>
</tr>
<tr>
<td>B</td>
<td>Represents performance that is very good.</td>
</tr>
<tr>
<td>C</td>
<td>Represents performance that is good.</td>
</tr>
<tr>
<td>D</td>
<td>Represents performance that is satisfactory.</td>
</tr>
<tr>
<td>F</td>
<td>Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I.</td>
</tr>
</tbody>
</table>

**Course Evaluation**

Beginning in fall 2008, the SPH will collect student course evaluations electronically using a software system called CoursEval: www.sph.umn.edu/courseval. The system will send email notifications to students when they can access and complete their course evaluations. Students who complete their course evaluations promptly will be able to access their final grades just as soon as the faculty member renders the grade in SPHGrades: www.sph.umn.edu/grades. All students will have access to their final grades through OneStop two weeks after the last day of the semester regardless of whether they completed their course evaluation or not. Student feedback on course content and faculty teaching skills are an important means for improving our work. Please take the time to complete a course evaluation for each of the courses for which you are registered.

**Incomplete Contracts**

A grade of incomplete “I” shall be assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., documented illness or hospitalization, death in family, etc.), the student was prevented from completing the work of the course on time. The assignment of an “I” requires that a contract be initiated and completed by the student before the last official day of class, and signed by both the student and instructor. If an incomplete is deemed appropriate by the instructor, the student in consultation with the instructor, will specify the time and manner in which the student will complete course requirements.

Extension for completion of the work will not exceed one year (or earlier if designated by the student’s college). For more information and to initiate an incomplete contract, students should go to SPHGrades:

www.sph.umn.edu/grades.

**University of Minnesota Uniform Grading and Transcript Policy** - A link to the policy can be found at onestop.umn.edu.

**VIII. Other Course Information and Policies**

**Grade Option Change (if applicable)**

For full-semester courses, students may change their grade option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester courses) can be found at onestop.umn.edu.

**Course Withdrawal**

Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Office of Admissions and Student Resources at sph-ssc@umn.edu for further information.

**Student Conduct Code**

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.
As a student at the University you are expected to adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see:

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

Use of Personal Electronic Devices in the Classroom
Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference:

Scholastic Dishonesty
You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see:
http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: http://www1.umn.edu/oscai/integrity/student/index.html. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Makeup Work for Legitimate Absences
Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see:
http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html.

Appropriate Student Use of Class Notes and Course Materials
Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html.

Sexual Harassment
"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:
Equity, Diversity, Equal Opportunity, and Affirmative Action
The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy:

Disability Accommodations
The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, https://diversity.umn.edu/disability/.

Mental Health and Stress Management
As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: http://www.mentalhealth.umn.edu.

Academic Freedom and Responsibility: for courses that do not involve students in research
Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost. [Customize with names and contact information as appropriate for the course/college/campus.]

* Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".

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