

PubH 6717-001 Decision Analysis for Health Care Fall 2018

Credits:	2.0
Meeting Days:	Fridays
Meeting Time:	1:00pm – 2:50pm
Meeting Place:	Mayo 1250
Instructor:	Eva A. Enns, PhD
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Office Hours:	Wednesdays 12-2pm, PWB 15-220 (conference room)

I. Course Description

This course will introduce students to the methods and growing range of applications of decision analysis and cost-effectiveness analysis in health care, public health, technology assessment, medical decision making, and health resource allocation.

II. Course Prerequisites

None.

III. Course Goals and Objectives

At the conclusion of this course, the student will be able to formulate and solve a decision analysis problem by specifying the relevant variables, uncertainties, and objective. The student will have an appreciation of the practical problems in applying these methods to the evaluation of various strategies and public health policies. The student will have an appreciation of the uses and limitations of these methods in decision making at the individual, organizational, and policy level. The student will learn the basic principles and mechanics underlying incremental cost-effectiveness analysis.

IV. Methods of Instruction and Work Expectations

Class sessions will be a combination of lecture and in-class group activities. Class attendance and participation is expected and a component of your final grade. Practice problems (and solutions) will be posted for each week and students are expected to review these problems in preparation for lecture.

Students will have the opportunity to discuss these problems in depth with the TA during (optional) weekly problem sessions. There will be a midterm and final exam, as well as a final project, which will consist of an outline of a decision analysis applied to a problem selected by the student. Components of the final project will be submitted for feedback throughout the semester prior to the final submission of the project.

V. Course Text and Readings

Required readings are posted on the course website. Additional papers related to specific lecture topics will also be posted on the course for students who may be interested in learning more about a particular topic.

An optional textbook is also available. Past students have generally found the textbook helpful, so if you learn well through reading a textbook or if you plan to continue your studies in the area of decision analysis, I highly recommend buying the textbook. The relevant sections are highlighted in the syllabus each week.

- Hunink MGM, et al. Decision Making in Health and Medicine: Integrating Evidence and Values. Cambridge, UK: Cambridge University Press. **2nd edition (2014) or 1st edition (2001).**

VI. Course Outline/Weekly Schedule

Session 1	September 7	Introduction
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Introduction to Decision Analysis / Models of Decision Making / Where is Decision Analysis Used / Motivational Cases / Elements of Decision Problems / Probability Review

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 1.

Session 2	September 14	Decision Trees
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Structuring Decision Problems under Uncertainty / Building a Decision Tree / Probabilities / Sequence of Events / Specifying Outcomes / Analysis of a Decision Tree

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapters 1, 2, and 3.

Session 3	September 21	Diagnostic Tests
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Conditional probabilities revisited / Sensitivity and Specificity / Likelihood ratios / Bayes' Theorem / Bayesian updating / Prior and posterior probabilities

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapters 5 and 6.

Due today:

Project: Outline real-world problems in decision analytic framework

Session 4	September 28	Non-Dichotomous Tests
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Probability review using likelihood ratios and odds / Introduction to receiver operating characteristic (ROC) Curves / Choosing a positivity criterion for a diagnostic test

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 7.

Session 5	October 5	Value of Information
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Expected value of perfect information / Gross and net value of information / Value of imperfect information

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 5, 6, and 7 (review).

Due today:

Project: Construct a decision tree for a real-world problem & list necessary inputs.

Session 6	October 12	Midterm Review
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Midterm Review.

*** TAKE-HOME MIDTERM EXAM POSTED AT 5PM TODAY ***

Session 7	October 19	Exploring Uncertainty
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Estimating model parameters / One-way, two-way, and probabilistic sensitivity analysis / Threshold analysis

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 8; 1st edition: Chapter 11: sections 11.1, 11.2, 11.3.6, 11.3.8 or 2nd edition: Chapter 12: sections 12.1, 12.2, 12.5, 12.6.

Due today:

*** MIDTERM EXAM (SUBMIT BY 12PM) ***

Session 8	October 26	Preferences in Decision Making
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Eliciting Utilities / Basic Reference Gamble / Time Trade-Off / Rating Scale / Quality-adjusted life-years

Required Reading:

Feeny, D. et al., (2002). Multiattribute and Single-Attribute Utility Functions for the Health Utilities Index Mark 3 System, *Medical Care*, 40(2).

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 4.

Session 9	November 2	Basics of Cost-Effectiveness Analysis
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Shopping spree problem / Competing choice problem / Dominance / Extended dominance

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 9: sections 9.1-9.4.

Session 10	November 9	Applied Cost-Effectiveness Analysis
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Examples / Cost-effectiveness in policy making / Cost-effectiveness thresholds / Peer feedback on project topics

Required Reading:

Hutton et al. Cost-effectiveness of screening and vaccinating Asian and Pacific Islander adults for hepatitis B, *Ann Intern Med.* 2007; 147(7).

Bendavid et al. Cost-effectiveness of HIV monitoring strategies in resource-limited settings: a Southern African analysis, *Arch Intern Med.* 2008; 168(17).

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, 1st edition: Chapter 9: sections 9.6-9.10 or 2nd edition: Chapter 9: sections 9.6-9.12.

Session 11	November 16	Time Preference and Discounting
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Discounting and Present Value / Discounting Health Benefits / Discounted life-expectancy and quality-adjusted life-expectancy

Required Reading:

Fleurence, R. & Hollenbeak, C. Rates and Probabilities in Economic Modelling. *Pharmacoeconomics*. 2007; 25(1).

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 9: section 9.5; Chapter 10: section 10.1.

Due today:

Project: Revision of real-world problem based on peer feedback and parameter estimates.

November 23

THANKSGIVING BREAK. NO CLASS.

Session 12	November 30	Dynamic Modeling
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Dynamic modeling basics / Deterministic cohort models / Markov models / Event rates vs. event probabilities / Hazard ratios vs. relative risks

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, Chapter 10.

Session 13	December 7	Advanced Topics & Final Review
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Simulation basics / Stochastic cohort models / Microsimulation models / Review for final

***** TAKE-HOME FINAL EXAM POSTED AT 5PM TODAY *****

Optional Reading:

Hunink et al., *Decision Making in Health and Medicine*, 1st edition: Chapter 11: sections 11.3.3-11.3.5 or 2nd edition: Chapter 12: sections 12.3.3-12.3.5.

December 14

Due today:

***** FINAL EXAM (SUBMIT BY 12PM) *****

VII. Evaluation and Grading

Grades are based on performance on

1. Midterm exam (20% of the total grade)
2. Final exam (40% of the total grade)
3. Final project (30% of the total grade)
4. Class participation (10% of the total grade)

No credit will be given for late submissions (reasonable exceptions will be allowed; extensions should be arranged ***in advance***). Exams must be completed independently.

Midterm and Final exams

Both the midterm and final exams will be take-home assignments that should be completed independently. You will have one week to complete these exams. Exams are due on the dates listed at 12pm.

Final project

Throughout the course, you will be asked to reflect on a policy question of interest and formulate it in terms of the decision analytic framework. The final written assignment will be the culmination of your findings. It should be less than 5 pages (1.5 line spacing) and include:

- a description of the policy problem and the decision(s) to be made
- an outline of a decision tree
- a summary of the data that would be required to conduct the analysis
- commentary on the feasibility of conducting the decision analysis and/or the applicability of decision analysis to the policy question

The final written assignment should be submitted with the final exam.

Electronic Submission of Assignments

All assignments (homework, midterm and final exams, final project) should be uploaded electronically as a .pdf file to the course website by the deadline (date & time). You may prepare assignments electronically or you may upload a scanned or photographed copy of hand-written assignments. Please preview any scanned documents before submission to ensure visibility and completeness.

The University utilizes plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following:

A	4.000 - Achievement that is outstanding relative to the level necessary to meet course requirements
A-	3.667
B+	3.333
B	3.000 - Achievement that is significantly above the level necessary to meet course requirements
B-	2.667
C+	2.333
C	2.000 - Achievement that meets the course requirements in every respect
C-	1.667
D+	1.333
D	1.000 - Achievement that is worthy of credit even though it fails to meet fully the course requirements
S	Achievement that is satisfactory, which is equivalent to a C- or better.

For additional information, please refer to:

<http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html>.

Course Evaluation

The SPH will collect student course evaluations electronically using a software system called CoursEval: www.sph.umn.edu/courseeval. 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 at: 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 adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf.

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:

<http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

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:

<http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

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:
http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf.

Disability Accommodations:

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center Student Services 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 or ds@umn.edu 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>.

The Office of Student Affairs at the University of Minnesota:

The Office for Student Affairs provides services, programs, and facilities that advance student success, inspire students to make life-long positive contributions to society, promote an inclusive environment, and enrich the University of Minnesota community.

Units within the Office for Student Affairs include, the Aurora Center for Advocacy & Education, Boynton Health Service, Central Career Initiatives (CCE, CDes, CFANS), Leadership Education and Development – Undergraduate Programs (LEAD-UP), the Office for Fraternity and Sorority Life, the Office for Student Conduct and Academic Integrity, the Office for Student Engagement, the Parent Program, Recreational Sports, Student and Community Relations, the Student Conflict Resolution Center, the Student Parent HELP Center, Student Unions & Activities, University Counseling & Consulting Services, and University Student Legal Service.

For more information, please see the Office of Student Affairs at <http://www.osa.umn.edu/index.html>.

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.

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