PubH 6862  
Cost-Effectiveness Analysis in Health Care  
Spring 2014

I. Course Description

This course is intended to give students an overview of the theory and applications of cost-effectiveness analysis, cost-utility analysis and related forms of economic evaluation directed at interventions in the health care sector. The topics to be covered are: the theoretical basis for this analysis from economics, comparison of the various forms of economic evaluation, measures of costs and related controversies, measures of outcomes including health status and health-related quality of life, assigning monetary values to outcomes, the value of a human life and of a quality-adjusted life year, discounting, uncertainty in cost-effectiveness analysis, Markov Models, international policy comparison, the question of whose preferences should policy be based on and publication bias. Lectures will be also given on the statistical methods involved with cost function models and discrete choice models for determining quality of life weights. Students will also learn TreeAge Pro, a decision-analytic software package, and study a number of classic applications from the literature in depth.

The course occasionally uses conventional microeconomic analytical and statistical tools. While it is not required, it is recommended that students have taken a microeconomics course. Nevertheless, because not all have taken such a course, one lecture is spent at the beginning of the course familiarizing students with this content.
II. Course Prerequisites
There are no course prerequisites, although a course in microeconomic theory is recommended.

III. Course Goals and Objectives
1. The student will be able to understand cost and effectiveness measures; to distinguish among cost-effectiveness, cost-benefit, cost-utility, cost analyses and other forms of economic evaluations; know the advantages and disadvantages of each approach; and understand the various perspectives that can be taken.
2. The student will know the recommendations of the US Panel on Cost-Effectiveness and Medicine.
3. The student will have an appreciation for the controversies in the field: the costs of consumption in additional life years, productivity costs, discounting, choice of respondents, etc.
4. The student will learn and be able to apply TreeAge Pro decision analytic software in a series of exercises, one of which will ask the student to replicate the analysis of an existing study from the literature.
5. The student will understand and be able to apply Markov analysis and other modeling techniques.
6. The student will be familiar with the statistical issues of cost-effectiveness analysis and a menu of approaches for evaluating the uncertainty associated with point estimates of the incremental cost-effectiveness ratio.
7. The student will be familiar with a number of the important studies from the cost-effectiveness analyses literature.

IV. Methods of Instruction and Work Expectations
The course is mostly lecture and discussion of readings, with quizzes and homework. A Moodle site has been established at https://ay13.moodle.umn.edu/course/view.php?id=11259

V. Course Text and Readings
4. Required papers are available at the library’s electronic journals or directly through the internet.

VI. Course Outline/Weekly Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings (* = optional reading)</th>
</tr>
</thead>
</table>


1/28 Making Collective Decisions

**Quiz #1**


1/30 Overview of Economic Evaluations

Gold et al., Ch. 1, pp. 3-24.

Drummond et al., Ch. 2, pp. 7-26.


2/4 Application 1: Decision Analytic Modeling

**Quiz #2**

Drummond et al., Ch. 9, pp. 277-295.


2/6 TreeAge Pro 1: Decision Trees and Cost-Effectiveness Analysis

**Greg Rhee**

The readings will be the sections of the TreeAge Pro User’s Manual for 2013 corresponding to the material covered in class. They will be announced in class.

Please remember to bring a laptop to class.
2/11 Measuring Costs in Cost Utility Analyses
Gold et al., Ch. 6, pp. 176-213.
Drummond et al., Ch. 4, pp. 55-101, note that pp. 73-78 will be covered later in the course.

2/13 Cost Issues in Cost Utility Analyses: Survivor Consumption

Quiz #3


2/18 Cost Issues in Cost Utility Analyses: Productivity Costs and Costs of Informal Care


2/20 Assessing Effectiveness in Cost Effectiveness Analyses

Homework #1 due

Gold et al., Ch. 5, pp. 135-175.
Drummond et al., Ch. 5, pp. 103-136.

2/18 Application 2: Reflecting Uncertainty in Economic Evaluations

Gold et al., Ch. 8, pp. 247-275.

Drummond Ch. 8, pp. 247-275.


2/20 TreeAge Pro 2: Sensitivity Analysis

Greg Rhee

The readings will be the sections of the TreeAge Pro User’s Manual for 2013 corresponding to the material covered in class. They will be announced in class.

Please remember to bring a laptop.

3/4 Assessing Outcomes in Cost Utility Analyses

**Quiz #4**

Gold et al., Ch. 4, pp. 82-134.

Drummond et al., Ch. 6, pp. 137-209.


3/6 Important Measures of General Health Status and Quality of Life

**Homework #2 due**

**EuroQol (EQ-5D):**


**Health Utilities Index (HUI3):**


**Quality of Well-Being Index (QWB):**

Quality of Well-being Scale—Self Administered (QWB-SA) questionnaire.


**Short Form 36 (SF-36) and the SF-6D**

*Bult, Roelf, Maria G. M Hunink, Joel Tsevat, and Milton C. Weinstein. Heterogeneity in the Relationship Between the Time Tradeoff and Short Form-36 for HIV-Infected and Primary Care Patients, *Medical Care* vol. 36, no. 4, April 1998, pp. 523-532.

3/11 Other Quality of Life Measures and Measurement Issues

**Quiz #5**

**Self-reported Health Status**

Disease-specific Quality of Life Weights


Comparative Review of Preference-Weighted Measures of HRQoL


Issues of Bias with the SG, TTO and VAS


3/13 Midterm Exam

Spring Break

3/25 Cost-benefit Analysis

Drummond et al., Ch. 7, pp. 211-245.


### 3/27 Application 3: Markov Models


*Drummond et al., Ch. 9, pp. 295-322.


### 4/1 TreeAge Pro 3: Markov Models

**Greg Rhee**


**The other readings will be the sections of the TreeAge Pro User’s Manual for 2013 corresponding to the material covered in class. They will be announced in class.**

**Please remember to bring a laptop.**

### 4/3 Value of Human Life and of Quality Adjusted Years of Life


### 4/8 Discounting Debate

**Quiz #6**

Gold et al. Ch. 7, pp. 214-246.

Drummond et al. pp. 73-78.


**4/10** Cost Analyses: Return on Investment, Cost of Illness, and Budget Impact


**4/15** Discrete Choice Models

Homework #3 Due


4/17 Policy: US v. NICE

Quiz #7


United Kingdom’s National Institute for Clinical Excellence (NICE). Guide to the Methods of Technology Appraisal, June, 2008. This Guide is being rewritten and a new one might be available. If so, we will substitute the new one. I will announce which one is current in class. The 2008 version is available on the web at: http://www.nice.org.uk/media/B52/A7/TAMethodsGuideUpdatedJune2008.pdf


*Tufts Medical Center, Institute for Clinical Research and Health Policy Studies, CEA Registry, Center for the Evaluation of Value and Risk in Health, Peter J. Neumann. (This used to be at Harvard Center for Risk Assessment but moved to Tufts). Check out the CEA Registry at https://research.tufts-nemc.org/cear/Default.aspx. Try a search using their program.

Check out NICE’s guidance policies: http://www.nice.org.uk/guidance/index.jsp.


*Gold et al., Ch. 3 (pp. 54-81).

4/22 TreeAge Pro 4: Probabilistic Sensitivity Analysis

Greg Rhee


The other readings will be the sections of the TreeAge Pro User’s Manual for 2013 corresponding to the material covered in class. They will be announced in class.
4/24 Application 4: Stochastic CEAs and the Statistical Evaluation of ICERs

Melissa S. Martinson


4/29 Who's Preferences

Homework #4 Due


Dolan, Paul (2008) Developing methods that really do value the ‘Q’ in the QALY Health economics, policy and law, 3 (01). 69-77. ISSN 1744-1331

Sackett DL, Torrance GW: The utility of different health states as perceived by the general public. Journal of Chronic Diseases 1978, 31(11):697-704. http://ac.els-cdn.com/0021968178900723/1-s2.0-0021968178900723-main.pdf?_tid=8296ff90-7e1b-11e3-b0bd-00000aab0f6c&acdnat=1389814417_02c5e9c792f9ba0a3ad72d02985494ad


*Dolan, Paul and Lee, Henry and Peasgood, Tessa (2012) Losing sight of the wood for the trees: some issues in describing and valuing health, and another possible approach Pharmacoeconomics, 30 (11), 1035-1049. ISSN 1170-7690


*Dolan, Paul and Shaw, Rebecca (2003) A note on the relative importance that people attach to different factors when setting priorities in health care Health expectations, 6 (1). 53-59. ISSN 1369-6513.


Publication Bias


Two More Applications

Homework #5 Due


TBA

Final Exam 4:00 - 6:00 pm, regular classroom

VII. Evaluation and Grading

Grades are based on performance on (1) a midterm exam, (2) a final exam, (3) a series of 7 quizzes, and (4) a series of 5 homework assignments using TreeAge Pro software. The midterm and final will each account for 1/3 of the grade, while the quizzes will account for 1/6 and the programming assignments the final 1/6.

The course grade will be determined by the average of the number equivalents of the letter grades you receive on each of the above. When determining the grade for the course, the standard 4-point scale will be used to find the number equivalent of the letter grades. For example if you receive a B+ on the midterm, an A- on the final, an A on the quizzes and an A on your homework, your course grade will be calculated as follows: (3.333 x 0.333) + (3.667 x 0.333) + (4.000 x .0167) + (4.000 x .0167) = 3.667. Since 3.667 is in the A-range, you would receive an A in the course. The cut-off to earn an A is 3.75, to earn an A- is 3.50 and to earn a B+ is 3.250. Other grades would be similarly calculated.

<table>
<thead>
<tr>
<th>Average</th>
<th>Grade</th>
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<tbody>
<tr>
<td>3.750 - 4.000</td>
<td>A</td>
</tr>
<tr>
<td>3.500 - 3.750</td>
<td>A-</td>
</tr>
<tr>
<td>3.250 - 3.500</td>
<td>B+</td>
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<tr>
<td>2.750 - 3.250</td>
<td>B</td>
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The quiz grade is determined by your average score on 7 quizzes. Each quiz has two questions and is worth a total of 5 points. The following table shows the letter grades and grade point equivalents for the scores on each of the quizzes:

<table>
<thead>
<tr>
<th>Average points</th>
<th>Grade</th>
<th>Grade points</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.500 - 5.000</td>
<td>A</td>
<td>4.000</td>
</tr>
<tr>
<td>4.300 - 4.499</td>
<td>A-</td>
<td>3.667</td>
</tr>
<tr>
<td>4.000 - 4.299</td>
<td>A/B</td>
<td>3.500</td>
</tr>
<tr>
<td>3.800 - 3.999</td>
<td>B+</td>
<td>3.333</td>
</tr>
<tr>
<td>3.500 - 3.799</td>
<td>B</td>
<td>3.000</td>
</tr>
<tr>
<td>3.300 - 3.499</td>
<td>B-</td>
<td>2.667</td>
</tr>
<tr>
<td>3.000 - 3.299</td>
<td>B/C</td>
<td>2.500</td>
</tr>
<tr>
<td>2.800 - 2.999</td>
<td>C+</td>
<td>2.333</td>
</tr>
<tr>
<td>2.500 - 2.799</td>
<td>C</td>
<td>2.000</td>
</tr>
<tr>
<td>Etc.</td>
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<td></td>
</tr>
</tbody>
</table>

The grade for the programming assignments will be determined by the average number of points for 5 assignments, converted into its letter grade.

Because exams and quizzes emphasize the material covered in class, students will find it difficult to be successful in this course without effectively studying and knowing the Power Point slides from the course. Some topics may be covered by lecture alone, and students will be responsible for that material, just as they are for material covered in both lecture and the readings.

Please note the following:

- If applicable, students may change grading options during the initial registration period or during the first two weeks of the term. **The grading option may not be changed after the second week of the term.**

- An incomplete grade is permitted only in cases of exceptional circumstances and following consultation with the instructor. In such cases, an "I" grade will require a **specific written agreement** between the instructor and the student specifying the time and manner in which the student will complete the course requirements. Extension for completion of the work will not exceed one year.

**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](http://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](http://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. 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".