## SYLLABUS

### OVERVIEW OF LEARNING OBJECTIVES vs. RELATED DESE DEPARTMENTAL COMPETENCY

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Learning Objective</th>
<th>Related Departmental Competency</th>
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<tbody>
<tr>
<td>1</td>
<td>To develop an understanding of the seven steps (tasks) in a policy analysis, and the conceptual framework of policy analysis</td>
<td>- “Develop a depth of knowledge in one area within environmental sciences &amp; engineering”</td>
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</table>
| 2   | To learn how to conduct (1) a financial appraisal, (2) a social cost-benefit analysis, (3) a multi-criteria project appraisal; and (4) a cost-effectiveness analysis. | - “Apply advanced methodologies in … environmental sciences & engineering”  
- “Apply evidence-based concepts in public health decision-making”  
- “Specify approaches for assessing, preventing, and controlling environmental hazards that pose risks to human health and safety” |
| 3   | To develop an understanding of the strengths and weaknesses of these four approaches to policy analysis, and their underlying assumptions | - “Develop a depth of knowledge in one area within environmental sciences & engineering”  
- “Apply evidence-based concepts in public health decision-making” |
| 4   | To develop the ability to critically appraise analyses prepared by others | “Demonstrate awareness of and sensitivity to the varied perspectives, norms, and values of others based on individual and ethnic/cultural differences” |
| 5   | To learn how to design a policy analysis to be carried out by others | - “Explain the relationships between scientific knowledge, exposure, risk assessment, environmental management, and environmental policy.” |
| 6   | To develop critical writing and communication skills in order to better explain to decision-makers the results of (1) a financial appraisal, (2) a social cost-benefit analysis, (3) a multi-criteria project appraisal; and (4) a cost-effectiveness analysis. | - “Demonstrate written and oral communication skills related to environmental engineering”  
- “Analyze, interpret, and explain the results of original research”  
- “Explain the relationships between scientific knowledge, exposure, risk assessment, environmental management and environmental policy” |
| 7   | To learn how to read and synthesize the cost-benefit literature on a specific policy intervention | “Review and synthesize a body of research.” |
COURSE OBJECTIVES:

There are two main objectives of this course. The first is to teach students how to conduct four types of analyses: (1) a financial appraisal, (2) a social cost-benefit analysis, (3) cost-effectiveness analysis, and (4) a multi-criteria project appraisal. Students will learn the strengths and weaknesses of these four approaches, and their underlying assumptions. In the process students will develop an in-depth understanding of four dimensions of project/policy analyses: criteria for evaluation, alternatives (interventions), groups of affected parties, and the time profile of project/policy consequences.

The second objective is to put students in the role of a consumer of these four types of policy analyses, especially social cost-benefit analyses, and for them to think carefully about how they would like others to assemble evidence for a planning or policy choice (e.g., an infrastructure investment). Students will consider the type of analyses and displays of information that they would want if they were a decision maker (manager). Students will learn how to assess the quality of financial, cost-benefit, cost-effectiveness, and multi-criteria analyses prepared by others.

ASSIGNMENTS

There will be two required assignments in this course (Note: the first assignment has two parts). Students can then choose between undertaking a third (optional) assignment and taking a final exam. The third optional assignment allows students to explore a topic in cost-benefit analysis of their choosing by conducting a “lite” systematic literature review. A good literature review should critically appraise what is already known about a subject and identify gaps in knowledge (what is not yet known) from existing studies. Systematic literature reviews structure the search process and data extraction from existing studies systematically and transparently with explicit and reproducible methods. Students will not have time in this course to conduct a full-scale systematic literature review, but if they choose this assignment in lieu of a final exam, they will learn more about what a systematic literature review entails.

Ideally students should work in pairs on a literature review because it is important to have a way to control for individual biases in the assessment of a specific literature. If you choose this optional third assignment instead of the final exam, you are encouraged to discuss different possible topics for your literature review with other students in class and find a “partner” with similar interests to you. If you are unable to find a suitable partner, you can do your literature review by yourself.

Possible Topics for Optional Third Assignment

Students (ideally working in pairs) will select one of the following as the focus of their “lite” literature review:

1) a theoretical issue about cost-benefit analysis;
2) a methodological issue about cost-benefit analysis; or
3) cost-benefit analyses about a specific project or policy.
If you choose to undertake the optional third assignment in lieu of a final exam, you should submit the topic of their literature review on Tuesday, Feb. 13. It is recommended that students do some preliminary searching of the existing literature and any prior literature reviews to ensure that there are sufficient primary studies on the topic, it is narrow enough, and there have not been recent systematic reviews on the same topic.

**Literature Review - Assignment #3 – Important Dates**

*Feb. 13*  
Students should submit the topic of their literature review,

*April (TBD)*  
Student presentations on the results of the literature review

*May 4*  
Assignment #3 is due on the day of the final exam (Friday, May 4).

**GRADING POLICY:**

Grades for the course will be based on the following weights:

- Assignment No. 1 - Part A (due Feb. 22) - 20%
- Assignment No. 1 - Part B (due March 22) - 15%
- Assignment No. 2 (due April 12) - 15%
- Assignment No. 3 or Final Exam (May 4) - 40%
- Class participation and presentations - 10%

**TOTAL** = 100%

A Grade of H indicates superior performance, over and above the mastery of basic concepts. A Grade of P indicates satisfactory performance. A grade of L indicates a low pass and that the student has a poor understanding of numerous concepts covered in the course. A grade of F indicates a failure to understand the basic concepts covered in the course.

**All students are bound by the UNC honor code:** "It shall be the responsibility of every student at the University of North Carolina at Chapel Hill to obey and to support the enforcement of the honor code, which prohibits lying, cheating, or stealing when these actions involve academic processes or University, student or academic personnel acting in an official capacity.” Please do not look at past years' assignments or exams.

**TEXTS:**


FINAL EXAM – Friday, May 4, 8:00-11:00 AM

[Note: Students must arrange their schedule to ensure that they are in Chapel Hill to take the final exam on the regularly scheduled exam date and time. If they cannot do this, they should choose the optional Assignment #3]

SYLLABUS

Part I - Introduction, Decision Matrices and Types of Policy Problems (SESSIONS 1-2)


Background Reading


Part II - Criteria for Project Evaluation & Introduction to Cost-Benefit Analysis (SESSIONS 3-6)

A. Selecting Criteria


B. The Concept of Economic Value


C. Cost-Benefit Analysis – An example

L-G, Introduction, pp. 1-24

D. Ethical issues and debates regarding the use of cost-benefit
BGVM, Ch. 1-3.

**Background Readings:**


E. Teaching case: Tahiti Electrification

Levy, Robert I. “Sociocultural factors in the reception and impact of solar energy systems in isolated Tuamotuan communities.”

**Part III - Using a Financial Criterion – Introduction to Financial Appraisal (SESSIONS 7-10)**

A. Introduction to concepts of financial analysis; discounting and treatment of inflation; Depreciation, Annual Costs, Discounted Cash Flow Analysis


B. Investment Decision Rules


C. Capital Budgeting
Part IV – Project Appraisal and Shadow Pricing (SESSIONS 11-21)

A. Valuing Benefits and Costs in Primary Markets

BGVM, Ch. 4.

Welfare Effects of Nonprice Allocation Schemes

Background Readings:
L-G: Ch. 1 (Drèze and Stern)
L-G: Ch. 2 (Sen)

B. Valuing Benefits and Costs in Secondary Markets

BGVM, Ch. 5.


C. The social rate of discount

BGVW, Ch. 10.


Background Reading


Poulos, Christine, and Dale Whittington. “Individuals’ Rates of Time Preference in Developing Countries: Results of a Multi-country Study.” Environmental Science and Technology. April 15, 2000. 43:8 1445-1455. [pubs.acs.org/isubscribe/journals/esthag/34/i08/pdf/es990730a.pdf]


D. The shadow value of investment

  L-G: Introduction, pp. 25-44
  L-G: Ch. 3 (Stiglitz)


E. Shadow pricing labor, employment, time savings

  BGVW, Ch. 16
  BGVW, Ch. 17
  L-G: Ch. 7


F. Valuing risks to life

BGVW, Ch. 16
L-G: Ch. 8 (Rosen) and Ch. 9 (Jones-Lee)

Valuing Mortality Risk Reductions in Global Benefit-Cost Analysis, Lisa A.

Background readings:

Viscusi, Kip. "The Value of Risks to Life and Health." Journal of Economic


G. Integrating concerns about poverty & income distribution; equity weights

BGVM, Ch. 19
L-G: Ch. 5 (Layard and Walters)


Background Reading:

H. Discussion of Hirschman’s Development Projects Observed


I. Dealing with risk and uncertainty in project appraisal

BGVM, Ch. 7-8.
L-G: Ch. 4.

Background Readings:


Part V - Nonmarket Valuation Techniques (SESSIONS 22-28)

A. Introduction


B. Stated Preference Methods: Contingent Valuation Method, Choice Experiments

BGVW, Ch. 15.


Background readings


C. Hedonic Property Value Models

BGVW, Ch. 14.


Background Reading


D. The Travel Cost Method

BGVW, Ch. 14.


E. Economic Benefits of Improvements in Health: The Cost-of-Illness Approach; Damage Functions

BGVW, Ch. 14.


F. Benefit Transfer

BGVW, Ch. 16 & 17.

Background Readings


G. New approaches for measuring subjective well-being


Background Readings


Part VI – Concluding Remarks (Session 29)

**Final Exam: Friday, May 4, 8:00-11:00 AM**
# Schedule Overview – Spring 2018

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<tr>
<th>JANUARY</th>
<th>Public Investment Theory</th>
<th>Lecturer</th>
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<tr>
<td>Thurs, Jan. 11</td>
<td>Session 1 – Introduction – Policy Analysis Framework, History of CBA</td>
<td>Whittington</td>
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<tr>
<td>Tues, Jan. 16</td>
<td>Session 2 – Decision Matrices &amp; Problem Types</td>
<td>Whittington</td>
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<tr>
<td>Thurs, January 18</td>
<td>Session 3 – The Concept of Economic Value (I)</td>
<td>Whittington</td>
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<tr>
<td>Tues, January 23</td>
<td>Session 4 – The Concept of Economic Value (II), Ethical debates about CBA</td>
<td>Whittington</td>
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<tr>
<td>Thurs, Jan. 25</td>
<td>Session 5 – CBA: Bridge Example,</td>
<td>Whittington</td>
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<tr>
<td>Tues, Jan. 30</td>
<td>Session 6 – Discussion of Numerical Exercise: Bridge CBA; Teaching Case: Tahiti Electrification</td>
<td>Whittington</td>
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<tr>
<td>Thurs, Feb. 1</td>
<td>Session 7 – Financial Appraisal I – Basic Concepts, Dealing with Inflation</td>
<td>Whittington</td>
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<tr>
<td>Tues, Feb. 6</td>
<td>Session 8 – Financial Appraisal II – Investment Decision Rules</td>
<td>Whittington</td>
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<tr>
<td>Thurs, Feb. 15</td>
<td>Session 11 – Valuing Benefits and Costs in Primary Markets (I)</td>
<td>Whittington</td>
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<tr>
<td>Tues, Feb. 20</td>
<td>Session 12 – Valuing Benefits and Costs in Primary Markets (II)</td>
<td>Mark Radin</td>
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<tr>
<td>Thurs, Feb. 22</td>
<td>Session 13 – Valuing Benefits and Costs in Secondary Markets Assignment No. 1 (Part A) due</td>
<td>Whittington</td>
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<tr>
<td>Tues, Feb. 27</td>
<td>Session 14 – Social rate of discount</td>
<td>Whittington</td>
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<tr>
<th>MARCH</th>
<th>Public Investment Theory</th>
<th>Lecturer</th>
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<tr>
<td>Thurs, March 1</td>
<td>Session 15 – Shadow value of investment</td>
<td>Whittington</td>
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<tr>
<td>Tues, March 6</td>
<td>Session 16 – Shadow pricing time savings, pricing labor, employment</td>
<td>Whittington</td>
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<tr>
<td>Thurs, March 8</td>
<td>Session 17 – Valuing Risks to Life</td>
<td>Dr. Yana Jin</td>
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<tr>
<td>Tuesday, March 13</td>
<td><strong>SPRING BREAK</strong></td>
<td>N.A.</td>
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<tr>
<td>Thurs, March 15</td>
<td><strong>SPRING BREAK</strong></td>
<td>N.A.</td>
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<tr>
<td>Tues, March 20</td>
<td>Session 18 – Integrating concerns about poverty, equity, and distribution;</td>
<td>Whittington</td>
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<tr>
<td>Date</td>
<td>Session</td>
<td>Instructor</td>
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<td>Thurs, March 22</td>
<td>Session 19 – Class Discussion of <em>Development Projects Observed</em></td>
<td>Whittington</td>
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<td><em>Assignment No. 1 (Part B) due</em></td>
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<tr>
<td>Tues, March 27</td>
<td>Session 20 - Dealing with risk and uncertainty in project appraisal in CBA and Financial Appraisal</td>
<td>Prof. Marc Jeuland</td>
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<tr>
<td>Thurs, March 29</td>
<td>Session 21 – Risk &amp; Uncertainty (cont.)</td>
<td>Prof. Marc Jeuland</td>
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<td><strong>April</strong></td>
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<tr>
<td>Tuesday, April 3</td>
<td>Session 22 – Nonmarket valuation: SP methods I</td>
<td>Whittington</td>
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<tr>
<td>Thursday, April 5</td>
<td>Session 23 – Nonmarket valuation: SP Methods II</td>
<td>Whittington</td>
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<tr>
<td>Tuesday, April 10</td>
<td>Session 24 – <strong>Class Debate – The Use of Existence Values in CBA</strong></td>
<td>Whittington</td>
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<tr>
<td>Thursday, April 12</td>
<td>Session 25 – Nonmarket valuation: RP Techniques – Hedonic Property Value Models; <em>Assignment No. 2 due (class discussion)</em></td>
<td>Whittington</td>
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<tr>
<td>Tuesday, April 17</td>
<td>Session 26 – Nonmarket valuation: Revealed Preference (RP) Techniques - Travel Cost Models</td>
<td>Whittington</td>
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<tr>
<td>Thursday, April 19</td>
<td>Session 27 – Nonmarket Valuation: RP Techniques – Cost of Illness, “Coping Cost,” Damage Functions</td>
<td>Whittington</td>
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<tr>
<td>Tuesday, April 24</td>
<td>Session 28 – Case Study: A Benefit-cost Analysis of Phasing out Coal in Power Plants and in Households in Beijing (Benefit Transfer Techniques)</td>
<td>Dr. Yana Jin</td>
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<tr>
<td>Thursday, April 26</td>
<td>Session 29 – Nonmarket Valuation Techniques – Measures of Subjective Well-being as Benefit Estimates; Wrapping up – Things Not to Forget</td>
<td>Whittington</td>
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<tr>
<td><strong>May</strong></td>
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<tr>
<td>Friday, May 4</td>
<td><strong>Final Exam 8:00 – 11:00 am or Assignment No. 3 due</strong></td>
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