

**Public Affairs 881: Cost-Benefit Analysis**  
**Fall 2017**

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**Class Meetings:** Mondays/Wednesdays  
8:00– 9:15 a.m.  
Education L159

**Office Hours:** Mondays & Wednesdays, 9:30–11:30 a.m. and 2:45–4:00 p.m., North Hall 215.  
Meetings with project teams immediately after class encouraged.  
Appointments for other times welcome.

**Course Objectives:** Cost-benefit analysis (CBA) has both narrow and broad applications. In its narrow application, it serves as a decision rule for selecting policies for maximizing economic efficiency. In its broader application, it provides concepts, techniques, and conventions for assessing economic efficiency, or components of economic efficiency, when efficiency is only one of the social goals relevant to policy choice. This course provides the conceptual foundations and craft skills to prepare you to be sophisticated consumers and producers of CBA.

The course contributes to a number of the Student Learning Goals set out for MPA students. Most fundamentally, it requires demonstration of the following three goals:

“Students will communicate in clear written language: a real-world problem, relevant scholarly studies and practical applications, a policy-analytic method to investigate the problem, and client-oriented advice to mitigate the problem.” (Goal III A)

“Students will demonstrate the ability to maintain fidelity to objective social science-based research methods.” (Goal IV D)

“Students will complete high-quality group projects, including demonstration of effective project management and teamwork.” (Goal V B)

**Prerequisites:** Some familiarity with the basic concepts of microeconomics and statistical inference is assumed. Those taking the course should have completed Public Affairs 880 and Public Affairs 819, or their equivalents.

**Course Requirements and Grades:** Four requirements promote the course objectives:

First, I expect active participation in class and diligence in the completion of problem sets and other assignments. Our class time will be split between lectures and discussion. If this format is to be effective both for you as an individual and for your classmates, then you must be prepared to participate in discussion. Sometimes discussion will be around assigned problems, including some that require reading about topics not yet covered in lecture. It is important that you put effort into these problems so that you can fully participate in their discussion. The effort will also

reward itself in terms of the depth of your understanding of course material. *Ten percent* of your course grade will be based on class participation and assignments.

Second, an in-class midterm examination (**October 30**) will give you an opportunity to demonstrate your mastery of the basic concepts of CBA. *Thirty percent* of your course grade will be based on your performance on the midterm examination.

Third, although the theory of CBA can be easily learned in the classroom, the craft for actually doing it in a complex world, with inevitable limitations on the availability time, data, and expertise, probably cannot. To get practice in actually doing CBA, you will participate in a team project on a real issue for an actual client. During the semester, each team will make several oral and written progress reports. A complete report is due on **December 6**. December 11 and 13 will be devoted to presentations of the projects. A revised draft is due **December 18** in PDF format. In addition, you should plan on participating in a briefing on the final report at your client's convenience, most likely after the end of the semester. As most policy analysts work in teams, you should view your participation in the project as an important part of your development as a policy analyst. I expect team members to be professional in interactions with their clients as well as among themselves. I also expect each team member to be fully engaged with the project, and I reserve the right to penalize individuals who are not fully familiar with all aspects of their team's products. *I will ask each team member to evaluate the effort and contributions of other team members*, and I will consider the responses in assigning individual grades. *Forty percent* of your course grade will be based on the team project. I cannot overemphasize the importance of the effort you put into the project for your future ability to do cost-benefit analysis. Please do not take this course if you are unwilling or unable to give the project a high priority. I reserve the right to lower the grade of anyone who does not contribute fully to his or her team. I also reserve the right to give a failing grade in the course for anyone who acts unprofessionally.

Fourth, there will be a take-home final examination **distributed December 18 and due December 20 at noon**. *Twenty percent* of your course grade will be based on the final examination. If class attendance after the midterm examination is regular (almost everyone attending each class), and a majority of the class wishes, then I will waive the final and allocate its grade percentage to the final project.

**Textbook:** We will make extensive use of the following text (BGVW):

Anthony E. Boardman, David H. Greenberg, Aidan R. Vining, and David L. Weimer, *Cost-Benefit Analysis: Concepts and Practice*, 4<sup>th</sup> ed. (Upper Saddle River, New Jersey: Prentice Hall, 2011).

Copies are available in the bookstore and a copy is on reserve at the College Library. Other readings and class materials, including some related to specific projects, are available at learn@UW.

**Team Projects:** The topics for team projects are as follows:

1. Innovative 3D capture technology has been shown to be a powerful tool in crime scene investigations, yet this technology has not seen widespread adoption across policing units. When compared to traditional data gathering methods, 3D capture technology offers both improved data quality and greater time savings for investigators. Despite the apparent efficiencies, no systematic study has taken place to compare evidence gathering outcomes using traditional and 3D capture methods. The team will work with the Living Environments Laboratory to conduct a cost-benefit analysis comparing traditional crime scene investigation techniques with crime scene investigation techniques using 3D capture technologies and virtual reality devices. Using data collected from an ongoing collaboration between the Living Environments Laboratory and the Dane County Sheriff's Office, metrics for data quality, cost of equipment, and time costs for investigators will be developed for use in the immediate and future cost-benefit analyses. During the course of the project, the team will have the opportunity to experience state-of-the-art virtual reality technology (such as the CAVE system) and interface with CSI and emerging technology experts. The analysis should be developed to inform municipalities as they consider adopting this technology. Client: Kevin Ponto, Living Environments Laboratory, Wisconsin Institute for Discovery, [3d-csi@lists.wisc.edu](mailto:3d-csi@lists.wisc.edu).
2. Penfield Children's Center provides multi-disciplinary Early Intervention (EI) services for children of low-income families in Milwaukee. Their Special Care Nursery (SCN) is a childcare program for medically fragile children through age 3 years who require nursing care. The clients include children born extremely premature, victims of child abuse, and children with congenital defects. Funding from the state is limited, with a large fraction of salaries and materials for RNs, PTs, OTs, and SLPs coming from charities. The Penfield Children's Center seeks to provide evidence to legislators that these services improve outcomes for children and families enrolled, including health outcomes, developmental scores, school readiness, and economic potential. The team will conduct a cost-benefit analysis of the SCN based on the impact of the EI services on these outcomes. If net benefits are positive, then the team will supplement its analysis with a briefing document to help persuade policy-makers to increase reimbursement rates, and better invest in the EI services for children (and future adults) in Milwaukee. The team will draw on the research literature on EI services to support its assessments of impacts. Additionally, some relevant data can be gathered on outcomes from children who have received Penfield services as well. Because of the demographics of Penfield's enrollees, this project has the potential not just to improve funding for these services, but to reduce disparities in health and socioeconomic status for a generation of children in Milwaukee. Client: DeMarco Bowen, MD-MPH Candidate, UW SMPH, and Penfield Children's Center, [dabowen@wisc.edu](mailto:dabowen@wisc.edu).
3. Consolidation of services has been of interest to local governments for many years, particularly because of a pronounced increase in demand for municipal public safety

services. The impacts of state mandates on municipal budgets are creating even more pressure to find ways to reduce costs, while citizens continue to demand improved levels of service. Consolidation of Emergency Medical Services (EMS) has been attempted in various communities throughout Wisconsin, with varying levels of success reported. The Village of Cambridge, Village of Rockdale, Town of Oakland, Town of Lake Mills and the town of Christiana successfully consolidated emergency medical services (Cambridge Area EMS) through an intergovernmental agreement. There is strong potential that consolidation of EMS services among additional contiguous jurisdictions could be accomplished successfully and expanded to include the Village of Deerfield, the Village of Cottage Grove, the Town of Cottage Grove, and the Town of Pleasant Springs served by the Deer-Grove EMS District. Current EMS services are provided by these two separate organizations (Cambridge Area EMS and Deer-Grove EMS District). Village and town officials, administrators, and EMS chiefs from the two organizations have initiated positive discussions about consolidation and are now ready to engage in the assessment of its costs and benefits. The project team will evaluate alternatives along a spectrum of consolidation, including shared training and personnel, shared equipment, and a joint EMS district with the goal of providing an improved level of service that will meet the needs of future challenges. The team will assess the fiscal impacts and net social benefits of each alternative. Findings and recommendations will be presented to elected officials in each jurisdiction for consideration. Client: Bob Salov, Director, Cambridge Area Emergency Medical Services, [director@cambridgeems.org](mailto:director@cambridgeems.org).

4. Wisconsin and Minnesota have large deposits of sand valued as a high-quality proppant in extraction of oil and natural gas through hydraulic fracturing. The mining, processing, and transportation of this “frac” sand adds particulate matter to the air. Currently, the federal standards for PM 10 and PM 2.5 are not being enforced at frac sand mines in Wisconsin. Further, no federal standards currently apply to non-workplace silica dust, which may have adverse health and environmental impacts. Your first task is to develop alternative systems of air quality standards, monitoring, and enforcement to reduce silica and particulate matter emissions from frac sand production and transportation in Wisconsin. Your second task is to estimate the social costs and benefits of the systems you propose. Predictions of costs should take account of additional resources needed to meet standards as well as to monitor and enforce compliance with the standards. Prediction of benefits should take account of reduced health and environmental risks. Client: Kimberlee Wright, Executive Director, Midwest Environmental Advocates, [kwright@midwestadvocates.org](mailto:kwright@midwestadvocates.org).

### **Tentative Schedule**

***Introduction*** (Sept. 6)

BGVW, Chapter 1

Team projects organized

Note: Projects from several previous years and spreadsheets for exercises are available at learn@UW.

***Class Discussion of Team Projects from Previous Years*** (Sept. 11)

BGVW, Chapter 11

***Conceptual Foundations*** (Sept. 13 and 18)

BGVW, Chapter 2 (Prepare exercises 2, 3, and 4 for class)

***Valuing in Primary Markets*** (Sept. 20, 25, and 27)

BGVW, Chapter 3 (Prepare exercises 1 and 2 for class)

BGVW, Chapter 4 (Prepare exercises 1, 2, and 3 for class)

Robert H. Haveman and David L. Weimer, "Public Policy Induced Changes in Employment: Valuation Issues for Benefit-Cost Analysis," *Journal of Benefit-Cost Analysis* 6(1) 2015, 112–153.

Spreadsheet Exercise 3.3

Spreadsheet Exercise 4.4

**Project report due (Sept. 20):** Each team should prepare a five- to seven-page (double-spaced) report that describes the issue being addressed in the project and sketches a plan for completion.

***Valuing in Secondary Markets*** (Oct. 2)

BGVW, Chapter 5 (Prepare exercises 1, 2, and 3 for class)

Spreadsheet Exercise 5.4

***Basics of Discounting for Time/Social Discount Rate*** (Oct. 4 and 9)

BGVW, Chapter 6 (Prepare exercises 1, 3, and 4 for class)

BGVW, Chapter 10 (Prepare exercise 1 for class)

Scan: OMB Guidelines

[www.whitehouse.gov/omb/circulars\\_a004\\_a-4](http://www.whitehouse.gov/omb/circulars_a004_a-4)

UK Guidelines (The Green Book)

[www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government](http://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government)

Canadian Guidelines

[www.tbs-sct.gc.ca/rtrap-parfa/analys/analys07-eng.asp#Toc178397874](http://www.tbs-sct.gc.ca/rtrap-parfa/analys/analys07-eng.asp#Toc178397874)

New Zealand Guidelines

[www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/guide](http://www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/guide)

CPI Calculator

[www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm)

Spreadsheet Exercise 6.6

**Project report due (Oct. 9):** Each team should prepare an annotated bibliography of the ten most relevant studies to its topic that it can find. Give highest priority to finding published CBAs on similar topics.

***Expected Values, Value of Information, and Sensitivity Analysis*** (Oct. 11, 16, and 18)

BGVW, Chapter 7 (Prepare exercises 1, 3, 4, and 6 for class)

Consider WSIPP displayed results: <http://www.wsipp.wa.gov/BenefitCost>

David L. Weimer and Mark A. Sager, “Early Identification and Treatment of Alzheimer’s Disease: Social and Fiscal Outcomes,” *Alzheimer’s & Dementia* 5(3) 2009, 215–226.

**(Oct. 18) Bring write-up of exercise 5 to class — Spreadsheet Exercise 7.5**

**Project report due (Oct 18):** Each team should prepare a list of the relevant categories of costs and benefits, and indicate how each can be measured. *Read BGVW, Chapter 16, to get an idea of available shadow prices from secondary sources.*

***Option Price and Option Value*** (Oct. 23)

BGVW, Chapter 8

Spreadsheet Exercise 8.3

***Life-Cycle Analysis*** (Oct. 25)

Joule A. Bergerson and Lester B. Lave, “Should We Transmit Coal, Gas, or Electricity: Cost, Efficiency, and Environmental Implication,” *Environmental Science and Technology* 39(16) 2005, 5905–5910.

Visit: [www.eiolca.net](http://www.eiolca.net) and do the tutorial for the EIO-LCA model .

***Midterm Examination*** (Oct. 30)

***Estimation Based on Revealed Preferences: Demonstrations and Experiments*** (Nov. 1)

BGVW, Chapter 12 (Prepare exercise 2 for class)

***Estimation Based on Revealed Preferences: Natural Experiments*** (Nov. 6 and 8)

BGVW, Chapter 13 (Prepare exercises 1 for class)

BGVW, Chapter 14 (**Bring write-up of exercise 3 to class on Nov. 8**)

Spreadsheet Exercise 13.2

David L. Weimer and Michael Wolkoff, "School Performance and Housing Values: Using Non-Contiguous District and Incorporation Boundaries to Identify School Effects," *National Tax Journal* 54(2) 2001, 231–253.

W. Kip Viscusi and Joseph E. Aldy, "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World," *Journal of Risk and Uncertainty* 27(1) 2003, 5–76.

Trudy Ann Cameron, "Euthanizing the Value of a Statistical Life," *Review of Environmental Economics and Policy* 4(2) 2010, 161–178.

***Contingent Valuation*** (Nov. 13, 15, and 20)

BGVW, Chapter 9 (Passive use)

BGVW, Chapter 15 (Prepare exercise 2 for class)

Robert P. Berrens, Alok K. Bohara, Hank C. Jenkins-Smith, Carol L. Silva, and David L. Weimer, "Information and Effort in Contingent Valuation Surveys: Application to Global Climate Change Using National Internet Samples," *Journal of Environmental Economics and Management* 47(2) 2004, 331–363.

Mark Dickie and Victoria L. Messman, "Parental Altruism and the Value of Avoiding Acute Illness: Are Kids Worth More than Parents?" *Journal of Environmental Economics and Management* 48(3) 2004, 1146–1174.

EcoResources Consultants, *Evidence of the Socio-Economic Importance of Polar Bears for Canada*, June 2011.

James K. Hammitt and Kevin Haninger, "Valuing Fatal Risks to Children and Adults: Effects of Disease, Latency, and Risk Aversion," *Journal of Risk and Uncertainty* 40(1) 2010, 57–83.

Blomquist, Glenn C., Paul A. Coomes, Christopher Jepsen, Brandon, C. Koford, and Kenneth R. Troske, "Estimating the Social Value of Higher Education: Willingness to Pay for Community and Technical Colleges," *Journal of Benefit-Cost Analysis* 5(1) 2014, 3–41.

Dale Whittington, "Improving the Performance of Contingent Valuation Studies in Developing Countries," *Environmental and Resource Economics* 22(1&2) 2002, 323–367.

***Project Consultation*** (Nov. 22)

***Contingent Valuation (continued)*** (Nov. 27)

Review Survey for Bishop et al. contingent valuation of BP Oil Spill

Richard C. Bishop, Kevin J. Boyle, Richard T. Carson, David Chapman, W. Michael Hanemann, Barbara Kanninen, Raymond J. Kopp, Jon A. Krosnick, John List, Norman Meade, Robert Peterson, Stanley Presser, V. Kerry Smith, Roger Tourageau, Michael Welsh, Jeffrey M. Woodridge, Matthew DeBell, Colleen Donovan, Matthew Konopka, and Nora Scherer, "Putting a Value on Injuries to Natural Assets: The BP Oil Spill," *Science* 356(6335) 2017, 253–254.

***Cost-Effectiveness*** (Nov. 29)

BGVW, Chapter 18 (Prepare exercise 2 for class)

Spreadsheet Exercise 18.3

***Implications of Behavioral Economics for CBA*** (Dec. 4 and 7)

David L. Weimer, "Implications of Behavioral Economics for Cost-Benefit Analysis: Benefit Validity when Sovereign Consumers Make Mistakes" (manuscript).

**Team reports due December 6**

***Presentations*** (Dec. 11 and 13)

**Revised project report (PDF) and explanation of revisions due December 19**

**Evaluation of teammates due December 18**

***Final Examination*** (distributed December 18 by e-mail; due at noon December 20)