

**Economics 454**  
**Benefit-Cost Analysis**  
**Autumn 2017**  
**Prof. Robert Halvorsen**

Benefit-cost analysis is a widely applied method for evaluating government projects, policies, and regulations. This course reviews the theoretical foundations of benefit-cost analysis and derives formulas and procedures for the monetization of benefits and costs, aggregation over time, valuation of uncertain benefits and costs, and aggregation over individuals. By the end of the quarter, students should have a firm understanding of the issues, techniques, and practical difficulties involved in benefit-cost analysis and the ability to critique real-life benefit-cost analyses.

Two, non-cumulative, exams will count for 80% of the course grade, with the (curved) grade for the exam on which you do better receiving a weight of 0.6 and the exam on which you do worse receiving a weight of 0.4. Last year's exams are posted on the class website and can be used both as a preview of the types of questions that will be asked and as sources of practice questions in studying for this Quarter's exams. Please refer to the next page for very important information concerning exam rules and policies with respect to academic integrity.

Eight required problem sets will count for 10% of the course grade and six in-class quizzes will account for the remaining 10%. Detailed answer sheets will be provided for the problem sets and quizzes. Previous students have frequently reported that doing the problem sets was a very good way to learn the material.

There is no textbook or course pack for this course. Lecture notes will be posted on the course webpage, which can be accessed through MyUW. Practice exams, problem sets, answers to problem sets and quizzes, as well as other course materials will also be posted there.

My office hours during the Spring Quarter are 10:00-11:00 on Monday, Tuesday, and Friday in Savery 351. An appointment to meet at another mutually convenient time can be made in person after class, by phone at 206-543-5546, or by email at halvor@uw.edu. You can also use email to ask any short questions that may arise as you review your notes or work on the problem sets.

## Exam Rules

### I Exam Absence Policy

1. If you are unable to make it to an exam period due to illness or another unexpected happening, do the following:
  - i. Notify me no later than the time of the exam that you are not able to take the exam and why.
  - ii. If you missed the exam for health reasons, you need to show me a note issued by a medical professional documenting the reason you missed the exam.
  - iii. If there was some other reason for missing the exam come and see me to explain the reason. You will need to show appropriate documentation. Not waking up or missing your bus/plane is not an acceptable excuse.
2. If you know that you are going to be away due to a University-related activity, such as participation in an away sport or debate, let me know well in advance so that arrangements can be made.

### II Exam Taking Rules

1. Material allowed during an exam.
  - i. You must use a large bluebook for your answers.
  - ii. All books, papers, notebooks, etc., must be placed inside your backpack or other type of bag, which must be securely and fully closed. If you do not have a bag, you must place all your material out of your reach.
  - iii. No electronic devices, including calculators, can be accessible during the exam. Cell phones must be turned off and placed in your closed bag (not in your pocket). If your cell phone is observed at any point during the exam, your exam will be taken away and assigned a grade of zero.
  - iv. Baseball caps and any other kinds of headgear that conceal your eyes are not permitted.
2. Attendance and special accommodation
  - i. You are not allowed to leave the room during the exam. This includes restroom use; be sure to use the restroom before the beginning of the exam.
  - ii. If you arrive late to an exam, you cannot expect to get extra time after the official end of the exam to make up for the missing time at the beginning.
  - iii. If you have a documented disability, please show me documentation from the Office of Disability Resources for Students on the first day of class, so that I can make any arrangements required for accommodations.

### III Academic Integrity

1. Exams are individual work and cheating will not be tolerated. Looking at notes or your neighbors' answers will result in the immediate termination of your exam time and a grade of zero for the exam.
2. Altering an exam before submitting it for a review of the grading, obtaining an advance copy of an examination, or arranging for a surrogate test-taker are all flagrant violations of University policy.
3. Cheating of any kind may result in expulsion from the University. The Department will follow University policy in case of academic misconduct. I strongly recommend that you review University policy at <http://www.washington.edu/uaa/advising/help/academicintegrity.php>. Students found to have engaged in academic dishonesty will be subject to sanctions, which range from a disciplinary warning to permanent expulsion from the University, depending on the seriousness of the misconduct.

## Lecture and Exam Schedule

Dates shown for lectures, quizzes, and the first exam are subject to revision

### September 27<sup>th</sup>: Lecture 1

#### Introduction

Course requirements

Benefit-cost analysis as four-way aggregation

Standing

#### Evaluation criteria

Social welfare criterion

### October 2<sup>nd</sup>: Lecture 2

Social welfare criterion, continued

Pareto criterion

Potential compensation criterion

### October 4<sup>th</sup>: Lecture 3

#### Aggregation over commodities

Valuation principles

Demand curve, willingness to pay, and consumer surplus

Supply curve, opportunity cost, and producer surplus

Aggregate Consumer and Producer Surplus

Valuation of inputs and outputs in perfectly competitive markets

Market price not affected

### October 9<sup>th</sup>: Lecture 4 and Quiz 1

Project's output affects market supply

Project's input affects market demand

Valuation of inputs and outputs in distorted markets

Mandatory acquisition of inputs: eminent domain

Price controls

Agricultural price supports

Minimum wage

### October 11<sup>th</sup>: Lecture 5

Valuation in distorted markets, continued

Per unit tax

#### Aggregation over Time

Basic principles

Rate of Time Preference

Opportunity Cost Rate

Dynamic efficiency

### October 16<sup>th</sup>: Lecture 6 and Quiz 2

Present value of consumption criterion

Capital markets and dynamic efficiency

Net present value formula

Accounting for inflation  
Net present value decision rules  
Numerical example

### **October 18<sup>th</sup>: Lecture 7**

Continuous discounting  
Special cases of discounting formulas  
    Perpetuity  
    Annuity  
    Annualized value  
Alternative investment decision rules  
    Benefit-cost ratio  
    Internal rate of return  
    Rationales for using the alternative rules

### **October 23<sup>rd</sup>: Lecture 8 and Quiz 3**

Implications of dynamic inefficiency  
    Sources of dynamic inefficiency  
    Social value of private investment  
    Net social benefit formula  
    Sensitivity analysis  
    US procedures

### **October 25<sup>th</sup>: Lecture 9**

#### **Aggregation over States of the World**

Introduction  
Numeric example  
Expected monetary value  
Certainty equivalent  
Risk aversion

### **October 30<sup>th</sup>: In-class review for first exam**

**November 1<sup>st</sup>: First exam covers material through aggregation over time.**

### **November 6<sup>th</sup>: Lecture 10**

Expected utility  
Examples of application  
Critiques of expected utility theory  
EMV as approximation of CE, outcomes uncorrelated with income  
    Degree of risk aversion  
    Degree of uncertainty  
    Size of outcomes relative to income

### **November 8<sup>th</sup>: Lecture 11**

EMV as approximation of CE, outcomes correlated with income  
Methods used in practice

## **Aggregation over Individuals**

Class survey

Methods using explicit distributional weights

- Potential compensation formula

  - Relation to social welfare formula

  - Rationales for using it

## **November 13<sup>th</sup>: Lecture 12 and Quiz 4**

- Feldstein's constant elasticity formula

- Harberger's alternative cost approach

Methods not using explicit distributional weights

- Disaggregation by income level

- Pareto criterion

- Quasi-Pareto criterion

- Social welfare dominance criterion

## **November 15<sup>th</sup>: Lecture 13**

### **Valuation of Commodities for Which Market Data Are Incomplete**

Limited observations on price and quantity

Use of market data for similar commodities

Hedonic technique

## **November 20<sup>th</sup>: Lecture 14 and Quiz 5**

Cost of alternative supply

### **Valuation of Commodities for Which Market Data Are Nonexistent**

Use of market data for related commodities

- Effects on supply curves

- Effects on demand curves

Travel cost technique

## **November 22<sup>nd</sup>: Lecture 15**

Cost effectiveness analysis

Value of a statistical life (VSL)

Estimation of the value of a statistical life

- Stated preference

- Hedonic estimation

- Compensating wage differentials

## **November 27<sup>th</sup>: Lecture 16**

Factors affecting VSL

- Attitude toward risk

- Income

- Age

Risk-risk analysis

**November 29<sup>th</sup>: Lecture 17 and Quiz 6**

Stated preference methods

Use vs non-use values

Theoretical foundation of stated preference

Potential biases

Applications

**December 4<sup>th</sup>: In-class review for second exam**

**December 6<sup>th</sup>: Second exam covers material since aggregation over time.**