

# Probability and Decision Theory G4561

## Fall 2010

### **Brief description:**

Our focus in this course will be on a group of topics – e.g., probability and utility -- that emerge naturally from the study of rational choice. It is perhaps not too much of a stretch to view a majority of the most interesting human activities as instances of rational choice. In light of this it should come as no surprise that many of the topics that we will consider are also discussed at length in other subjects such as economics, psychology, and statistics. Despite this apparent overlap, our concern with these topics will be a bit different from what is typical in the context of these other disciplines. For example, it is often maintained that scientists are concerned primarily with explaining or predicting facts. On this view the study of rational choice is of interest to economists and psychologists to the extent that it allows such scientists to explain or predict psychologically or economically relevant facts. In contrast, our interest in rational choice will be mostly *foundational* in the sense that our ultimate goal is to understand the structure of (and relations between) the concepts that are presupposed in such applications.

### **Instructor information:**

Jeff Helzner

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721 Philosophy Hall

**Office Hours:** TBA

**Time:** MW 4:10-5:25

**Location:** Hamilton Hall 516

### **Grading:**

Exam 1 25%

Exam 2 25%

Final Paper 50%

### **Readings:**

*An Introduction to Decision Theory* by Martin Peterson

Additional readings will be posted on CourseWorks.

## **Schedule:**

### **Introduction**

9/8

Chapter 1 in Peterson

“Rational Choice: A Survey of Contributions from Economics and Philosophy” (Sugden)

“Utilities, Attitudes, Choice: A Review Note” (Arrow)

### **General Framework**

9/13

“Maximization and the Act of Choice” (Sen)

“Picking and Choosing” (Ullmann-Margalit and Morgenbesser)

9/15

Chapter 2 in Peterson

Excerpt from *Notes on the Theory of Choice* (Kreps)

Excerpt from *A Course on Microeconomics* (Rubinstein)

## Probability

9/20

Chapter 6 and 7 in Peterson

"The Two Concepts of Probability" (Carnap)

"Truth and Probability" (Ramsey)

9/22

"Difficulties in the Theory of Personal Probability" (Savage)

"When Fair Betting Odds Are Not Degrees of Belief" (Seidenfeld, Schervish, and Kadane)

## Utility

9/27 \*\*\* Exam 1 is assigned \*\*\*

"Representational Measurement Theory" (Luce and Suppes)

"On the Nature and Purpose of Measurement" (Adams)

9/29

Chapter 5 in Peterson

"Classic and Current Notions of Measureable Utility" (Ellsberg)

Excerpt from *Games and Decisions* (Luce and Raiffa)

Excerpt from *The Foundations of Statistics* (Savage)

10/4

"A Model of Riskless Choice" (Adams and Fagot)

"Simultaneous Conjoint Measurement" (Luce and Tukey)

"Measurement Structures and Psychological Laws" (Krantz)

## Decision making under uncertainty

10/6 \*\*\* Exam 1 is due \*\*\*

Chapter 3 in Peterson

Excerpt from *Games and Decisions* (Luce and Raiffa)

10/11

Excerpt from *Games and Decisions* (Luce and Raiffa)

10/13

"Risk, Ambiguity, and the Savage Axioms" (Ellsberg)

"Unreliable Probabilities, Risk Taking, and Decision Making" (Gardenfors and Sahlin)

10/18

"The Paradoxes of Allais and Ellsberg" (Levi)

10/20

"Decision Theory without Independence or Without Ordering" (Seidenfeld)

## **Descriptive theories**

10/25 \*\*\* Exam 2 is assigned \*\*\*

"From the Descriptive to the Normative in Psychology and Logic" (Thagard)

"Logic: Normative or Descriptive?" (Resnik)

10/27

Chapter 14 in Peterson

"Rationality" (Shafir and LeBoeuf)

"Judgment Under Uncertainty: Heuristics and Biases" (Kahneman and Tversky)

"How to Make Cognitive Illusions Disappear: Beyond Heuristics and Biases" (Gigerenzer)

11/1

"Ending the Rationality Wars: How to Make Disputes about Human Rationality Disappear" (Samuels et al.)

11/8 \*\*\* Exam 2 is due \*\*\*

"Decisions from Experience and the Effect of Rare Events in Risky Choice" (Hertwig et al.)

"Information Asymmetry in Decision from Description versus Decision from Experience" (Hadar and Fox)

## **Theoretical decision making**

11/10

Excerpt on statistical decision theory from *Games and Decisions* (Luce and Raiffa)

11/15

"Two Dogmas of Belief Revision" (Rott)

"Economics and Economy in the Theory of Belief Revision" (Rott)

11/17

"Information and Inference" (Levi)

"Truth, Fallibility and the Growth of Knowledge" (Levi)

## **Causal decision theory and other departures**

11/22

Chapters 9 and 10 in Peterson

## **Interactive decision making**

11/24

Chapter 11 in Peterson

11/29

Chapter 12 in Peterson

12/1

"Subjective Probability and the Theory of Games" (Kadane and Larkey)

"What is Rational about Nash Equilibria?" (Risse)

## **Social choice**

12/6

Chapter 13 in Peterson

12/8

TBD

12/13 \*\* Final paper is due \*\*\*

TBD

### **Policy on late assignments:**

Late papers will be penalized at the rate of one position on the following scale:

A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F.

For example, a paper that would have earned a B if submitted on time will, if handed in two days late, receive a C+.

**Exceptions to this policy are restricted to those situations in which I have a written excuse from a physician or your academic adviser.**

### **Policy on cheating:**

I will not tolerate any form of cheating. If I catch you cheating, then I will do everything that I can to make sure that you receive the most severe punishment that is allowed at this institution.