Economics of Uncertainty
01:220:481
Rutgers University, Department of Economics
Spring 2017
Professor Barry Sopher
Email: barry.sopher@rutgers.edu

Office: 301A New Jersey Hall
Office Hours: 9:00-11:00am Monday, and 2:30-4:30pm Tuesday, and by appointment
Class meets Monday and Thursday 11:30am-12:50pm, Murry 213 (College Avenue Campus)
Prerequisites: Calculus II (01:640:136 or 152), Statistics (01:960:211 or 285), and Intermediate Microeconomics (01:220:320).

Introduction

This is an Upper-Level Elective in the economics curriculum. In this course we will explore the important topics of uncertainty and information in economics. While the standard course in microeconomics focuses on a static world with complete information and certainty, we will focus on more typical and realistic situations in which economic decisions must be made without complete knowledge about current or future conditions. The main objective of the course is to introduce students to the standard model of decision making under uncertainty, the *expected utility* model, to explore various aspects of this standard model in detail, and then proceed to investigate various questions concerning uncertainty and information in individual decision making and in market interactions in economics, when decision makers are modeled as expected utility maximizers. These include (but are not limited to) the following:

What is the Expected Utility model and where did it come from?
What is the risk-bearing optimum of the individual in a market with state uncertainty?
How can we measure risk attitudes?
How does uncertainty affect market equilibrium?
How can welfare implications of different market allocations be analyzed in a world with uncertainty?
How should one's beliefs change when new information arrives?
When does it make sense to pay for additional information?
When is it possible for information held by others to be revealed to you?

The theory we will be studying is foundational to a great deal of important work in economics, particularly related to financial markets, insurance and contracts.

There is one required book for the course:

The Analytics of Uncertainty and Information, by Jack Hirshleifer and John G. Riley.

The book should be available at the Rutgers Bookstore (B&N), but it is surely available via online outlets as well. We will cover material in both Part I and Part II of the book by the end of the course. Part I is concerned with the analysis of situations with a given structure of

uncertainty in which individuals must make decisions. The basic theory that we will be investigating in this part was developed in the middle of the 20th century, with the finer points completed by about 1970. Individuals such as John von Neumann, Kenneth Arrow, John Pratt and Gerard Debreu made the fundamental contributions which are the focus of our study, though there are much earlier scholars, such as Daniel Bernoulli (1700-1782), who made important contributions. Part II is concerned with situations with uncertainty in which it is possible for an individual to take *informational actions* (e.g., paying for additional information) in an attempt to reduce uncertainty before making a final decision. The contributions of Thomas Bayes (1702-1761) are central to this part of our study, as are those of the 20th century statistician David Blackwell, among others.

Related Courses in the Economics Curriculum

There is a separate course, the Economics of Information (01: 220:483), which explores topics from the latter part of the course in greater detail. We will be focusing upon informational issues as they relate to individual decision making and to market equilibrium resulting from such decisions, while the other course focuses upon informational issues as they relate to strategic decision making—for example, the question of how to design contracts when different parties have different information, and there are a small number of decision makers interacting. Another course, Game Theory and Economics (01:220:482) also touches on related issues, as does the course Behavioral and Experimental Economics (01:220:480). These courses may be taken in any order. The current course is fundamental to all of them, however, as the expected utility model lies at the heart of a great deal of modern economic theory.

Learning Objectives

The specific objectives for this course touch on all of the general learning goals that the Department of Economics has established. Students will learn the vocabulary of analyzing economic behavior under uncertainty, and will be expected to be able to accurately explain the functioning of markets and the behavior of individual decision makers using this vocabulary (Economic Literacy). Students will learn the quantitative methods for modeling and drawing implications from models in light of the features of these models that introduce uncertainty and informational dimensions into decision making (economic numeracy). Students will learn about the implications of the analysis they do for the welfare and functioning of the larger society, and will learn to consider how various alternative government policies may affect these items of concern (economic citizenship). Finally, through an independent search for and critical analysis of a book in the general area of the economics of uncertainty, students will engage in the preliminary stages of formulating a research question (economic scholarship).

Organization of the Course

There will be two exams: an in-class midterm and a final exam. Besides the exams, the other main requirement of the course will be to write an extended book review on a topic of interest to

you within the scope of the course. Your choice of a book to review must be approved by me. More details on the book review requirement appear below. The midterm will count 25% and the final exam will count 40% towards your final grade. The book review will count for 25% of your grade. The remaining 10% of your grade will be based on occasional homework or "lab" assignments.

Important Dates

Homework assignments will be due approximately once every two weeks. There will be six separate assignments. Your lowest score from these six assignments will be dropped. Homework assignments are designed to be representative of the types of questions you will be likely to see on exams so, though they do not count for a great deal by themselves, they are very useful things to do, and may have high indirect value. Assignments will be posted in Sakai approximately two weeks prior to the due date and the solutions will be worked out in class subsequent to the due dates.

Midterm exam: March 6, 2017, in class.
Book Review proposal due March 9, 2017 in class, to be returned to you on March 20, 2017.
Book Review: The completed book review will be due by the last day of class, May 1, 2017.
Final exam: May 4, 2017, 8am - 11am, usual classroom.

Topics and Readings

We will begin with Chapter 1 and will cover most of Part I of the book and selected chapters from Part II. Some sections may be skipped, so it is best to attend class to keep up on reading assignments. I expect to cover parts of all of chapters (1-4) in Part I, and most of chapter 5 and 6 in Part II. Here is a tentative schedule of topics and associated readings. Dates for homework, exams, etc. are firm. Topics may be adjusted in time.

Week	Topics	Reading	Dates	Comments
1	Intro, general equilibrium under certainty, etc.	Review Intermediate Microeconomics	1/19/17	First day of class
2	Elements of decision making under uncertainty	Ch. 1, HR	1/23, 1/26/27	
3	The expected utility model	Ch. 1, HR	1/30, 2/2/17	HW1 due 1/30//17
4	The risk bearing optimum with elementary state	Ch. 2, HR	2/6, 2/9/17	
5	claim and assets		2/13, 2/16/17	HW2 due 2/13/17
6	comparative statics of the the risk bearing optimum	Ch. 3, HR	2/20, 2/23/17	
7	with state claims and assets		2/27, 3/2/17	HW3 due 2/27/17
8	Midterm 3/6/17		3/6/17	Book review
	Mean/variance analysis	Ch. 4, HR	3/9/17	proposal due 3/9/17

SPRING BREAK March 12 – March 19

9	Market Equilibrium under Uncertainty; Complete and	Ch. 4, HR	3/20, 3/23/17	Last day to drop with W, 3/20/17
10	incomplete markets		3/27, 3/30/17	HW4 due 3/27/17
11	Information and Informational	Ch. 5, HR	4/3, 4/6/17	
12	decisions		4/10, 4/14/17	HW5 due 4/10/17
13	Economics of Emergent public	Ch. 6, HR	4/17, 4/20/17	
14	information		4/24, 4/27/17	HW6 due 4/24/17
15	Summing up and concluding		5/1/17	Last day of class Book review due
FINAL EXAM			**5/4/17**	

Book Review

One of the requirements of the course is to write an extended book review. Here are some more details and guidelines for the review. The review is to be in the form of a critical review of a book on a subject of interest to you lying within the scope of the course.   The book that you choose to write about must be approved by me. By March 9 (just after the midterm, just before spring break), I would like you to give me a brief proposal stating what topic you are interested in, what issues interest you, and the book you would like write about. You may propose more than one book, but you must finally write your review about only one book. This proposal need not be more than a page or two. I will read and return your proposal at our first class after spring break, either approving your proposal or suggesting (or insisting) that you do something different. Why would I not approve a proposal? It could be that the book is too simple, or too difficult, too far off-topic, etc. The important thing is that you choose something of interest to you, serious enough to be challenging and interesting, but not so technical as to be beyond the level of the course or you own abilities.

The paper should critically review the book you choose.   You will mainly report on what is in the book, relating it to the relevant course content, but you should also take a position as to what the contribution or value, as you see it, of the book is. As for the reporting part of your review, you should think in terms of summarizing and explaining the book or article to your audience (which, in this case, is the rest of the class) at a level they can understand. This might include explaining things in terms of a simple example that illustrates the essential features of the theoretical framework employed in the book or article. As for judging the value of the book or article, there are different criteria one might apply, and you will need to decide what is appropriate for the topic you choose. For example, if your topic has to do with a real-world problem such as management of environmental risk, then feasibility of implementing different plans and the implications for economic efficiency would be important criteria. On the other hand, if you report on a theoretical generalization of expected utility theory, then you might ask

whether the gain in descriptive accuracy that the new theory provides compensates for the additional complexity of the theory. And so on.

The final paper should be about 10 pages, exclusive of title page, figures, tables, and references. That is, you should have about 10 pages of pure text. The paper should be typewritten, double-spaced, with normal-sized font and normal-sized (an inch all-around) margins. The paper should be your work alone. Your paper must be submitted via Turnitin.com. Details on exactly how to submit your paper will be provided in due course. I will also provide more details about the general rubric that will be applied in grading your book reviews.

Homework Assignment Schedule (for easy reference)

Homework Assignment #	General Topic Area	Due Date
1	Edgeworth Box (General Equilibrium) problem under certainty.	1/30/17
2	The Nature of Expected Utility Preferences	2/13/17
3	Risk bearing optimum, including comparative statics	2/27/17
4	General equilibrium with uncertainty	3/27/17
5	Nature of Bayesian Updating	4/10/17
6	Information services and emergent public information	4/24/17