Economics 8010 **Microeconomic Theory III** **Spring 2024**

Maxim Engers

Office: Monroe 230 **Phone**: 924-3130 **Email**: maxim@virginia.edu
Office Hours: Thursdays 3.30 to 4.45 pm or by appointment
Class Web Page: Available on Canvas
Teaching Assistant: Moonju Cho (email mc4zh@virginia.edu)
TA Office Hours: (to be announced)
Texts: Robert Gibbons: ***Game Theory for Applied Economists***, Princeton, 1992.
Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green: ***Microeconomic Theory***, New York, Oxford, 1995.

The University of Virginia Library offers a free online version of Gibbons at
http://proxy1.library.virginia.edu/login?url=http://www.degruyter.com/isbn/9781400835881
The license for this ebook allows for **unlimited simultaneous users**, so all students in the class should be able to access it.

Lectures: Tuesday & Thursday, 11:00-12:15 and 2:00-3:15
Discussions: Friday 10:00-10:50 & 11:00-11:50,
Note: 8010 runs for the 2nd part of the semester, using both the 7030 and 8010 time slots
First Class: Thursday March 14
Last Classes: Tuesday April 30

Exams: There will be a **midterm** held during discussion sections on **April 12**
The **final exam** will be held at **on Friday, May 10 at 9 am**
Grading: The test is worth 25% of the grade, and the final exam worth 50%.
There will also be assignments, worth the remaining 25%.

Assignments: You are allowed to work together on them, but the maximum group size is the same as in 7030. You must write out your answers yourself and list the other people you worked with on the first page of the assignment, and pledge. As indicated below, you are not to use outside material (such as previous students' notes, online guides, the answer book etc.) for the answers, and doing so is considered a violation of the UVA honor code. The exercises are intended to complement the lecture material. Please keep each answer on a separate page with your name on it.

Use of Class Material from Past Semesters, Answer Keys or Solutions Manuals
I expect that students will *not* use exams, problem sets or other materials from previous semesters of this course to study for the exams or to complete assignments. In this class, using materials from past semesters, or using answer keys, or solutions manuals is considered a violation of the UVA honor code.

Punctuality: I expect you to be on time for classes. Late arrival disrupts everyone's concentration. Very occasionally, because of unusual circumstances, you may be late. If you are late, send me, by the end of the working day, an email message explaining why you were late and outlining the steps you are taking to make sure that you will be not be late again.

Additional References:

Charalambos D. Aliprantis and Kim C. Border: *Infinite Dimensional Analysis: A Hitchhiker's Guide* (3rd edition) New York, Springer 2006
Claude Berge: *Topological Spaces,* Mineola NY, Dover 1997
Kim C. Border: *Fixed Point Theorems with Applications to Economics and Game Theory*, New York, Cambridge, 1985.
Michael Carter: *Foundations of Mathematical Economics*, Cambridge, MIT, 2001
James Friedman: *Game Theory with Applications to Economics*, (2nd edition), New York, Oxford, 1990.
Drew Fudenberg and Jean Tirole: *Game Theory*, Cambridge, MIT, 1991.
David M. Kreps: *A Course in Microeconomic Theory*, Princeton University Press, 1990.
Vijay Krishna: *Auction Theory* (2nd edition), San Diego, Academic Press, 2010.
Roger B. Myerson: *Game Theory*, Cambridge, Harvard, 1991.
Martin Osborne: *An Introduction to Game Theory*, New York, Oxford, 2004
Martin Osborne and Ariel Rubinstein: *A Course in Game Theory*, Cambridge, MIT, 1994.
Eric Rasmusen: *Games and Information* (2nd edition), Cambridge, Blackwell, 1994
Jean Tirole: *The Theory of Industrial Organization*, Cambridge, MIT, 1988 (especially Chapter 11).

The course is an introduction to noncooperative game theory and the economics of information, emphasizing applications to microeconomics. The main references are **Mas-Colell** *et al*. and **Gibbons**, but I have also provided some references to **Kreps**, **Tirole**, **Krishna**, and **Fudenberg and Tirole**. **Tirole**'s final chapter is still an excellent short reference to the subject but it is terse. **Rasmusen** proceeds at an easier pace, (it's essentially an undergraduate text), but is not as good as **Tirole**. **Osborne** is also an undergraduate text, with lots of good exercises, many of them with solutions posted on the author's website. **Fudenberg and Tirole** is recommended but goes well beyond the course requirements. You either love **Kreps** or hate it. Sufficiently few students loved it when I assigned it that it is no longer a required text. **Myerson** and **Osborne-Rubinstein** have their virtues but are more theoretical and less applied than this course. **Krishna** is a good reference for the parts of the course dealing with auctions, although its notation and approach differ a bit from that used in class. The main difference between the 2nd edition and the 1st edition is extra coverage of multi-unit auctions, which goes beyond the material we cover in this class

Border is a good basic reference for much of the math used in game theory. A wider-ranging coverage (together with lots of worthwhile exercises) is found in **Carter.** **Berge** is a reprint of the translation of the 60s French classic that first provided a textbook treatment of the continuity of correspondences. For those who need to apply infinite-dimensional fixed point theorems (which come up surprisingly often in applied work) **Aliprantis and Border** is a useful compendium of results.

A couple of lower-tech books worth reading are Avinash **Dixit** and Barry **Nalebuff**: *Thinking Strategically*, New York, Norton, 1991 and R. Duncan **Luce** and Howard **Raiffa**: *Games and Decisions*, New York, Dover, 1989. The first, aimed at the general public, has good examples and is more fun to read than most stuff written by

economists. The second is a reprint of a 1957 classic, now extremely dated, but justly famous for its clarity and thoroughness. Also see Thomas **Schelling**'s classic *The Strategy of Conflict*, Cambridge, Harvard, 1960, for an early presentation of some key ideas whose importance was appreciated only much later. In 2008 Dixit and Nalebuff brought out a sequel to *Thinking Strategically,* titled *The Art of Strategy.*

Slides Online

I will be posting slides in the Files section of the class UVACanvas website. Ahead of time, to help you to prepare for upcoming classes (but trying to prevent class itself from being a boring recitation of material you have already seen) I will post preliminary versions of the slides. These preliminary versions, in the **Pre** folder, leave as questions some of the results we will cover in class. The full versions of the slides will be posted later, after class, in the **Post** folder.
I think that the best way to approach 8010 is to read the preliminary version of the slides before each class and try to answer the questions that come up. Even if you can't always figure out the answers, trying to do this will help you focus on what you don't already know and need to learn. It will also help you to start thinking about what questions you might want to ask or what issues you might want to raise in class.

ECONOMICS 8010 READING LIST

I. Introduction to Noncooperative Game Theory.

*Mas-Colell, Whinston, and Green (MWG): pp. 217-234
Kreps (K) pp. 355-384;
Tirole (T) pp. 423-425; Fudenberg and Tirole (FT) pp. 3-6.

II. Static Games of Complete Information.

*MWG 235-253
*Gibbons Chapter 1
K 387-417; R 16-48, 67-89; T 425-428; FT 6-29, 45-48.

Theory: Dominant Strategies and Nash Equilibrium
Existence of Equilibrium.

Applications: "Button" Auctions and Second Price Auctions
Bertrand and Cournot Oligopoly
Arbitration
Provision of a Public Good
Hotelling's Location Model.

III. Dynamic Games of Complete Information.

*Gibbons Chapter 2
*MWG 267-281
K 417-425; T 428-432; FT 67-100.

Theory: Backward induction and subgame perfect equilibrium.

Applications: Stackelberg Oligopoly
Repeated Games
Rubinstein and Stahl Bargaining Models.
A Bank Run Model (time permitting)
Durable Goods Monopoly (time permitting)

IV. Static Games of Incomplete Information.

*Gibbons Chapter 3
*MWG 253-259
Krishna, 1-75
K 463-497; R 48-62; T 432-436; FT 207-216, 321-356.

Theory: Bayesian Nash Equilibrium.

Applications: Private Value and Common Value Auctions

Cournot Equilibrium with Private Information

Revelation Games

Revenue Equivalence and Optimal Auction Design

V. **Dynamic Games of Incomplete Information and Applications**.

*MWG 282-295
*Gibbons Chapter 4.

K 463-497; R 143-159; T 432-436; FT 207-216, 321-356.

Theory: Perfect Bayesian Equilibrium, Signaling Games, and Refinements.

Specific Applications

Adverse Selection, Screening, and Signaling:
*MWG Chapter 13
K 625-650; R 223-269; T 108-110, 441-453.

Moral Hazard and Agency:
*MWG Chapter 14
K 577-608; R 163-216; T 34-41, 51-55.

VI. **Further Applications (**time permitting**).**

The Harsanyi interpretation of mixed strategies.

Bilateral Trade and the Myerson-Satterthwaite Theorem

A Simple Reputation Game

Sequential Bargaining under Incomplete Information

Reputation in the Finitely-Repeated Prisoner's Dilemma
with Incomplete Information

Further Reading

For a core class like this it seems appropriate to assign the readings mainly from the texts. The journal literature is, of course, enormous and not always easy to read. The following classic papers are a worthwhile, but tiny, sample.

Milgrom, Paul and Ilya Segal (2002). "Envelope Theorems for Arbitrary Choice Sets". *Econometrica* **70** (2): 583–601.

Myerson, Roger (1981). "Optimal Auction Design". *Mathematics of Operations Research* **6**: 58–73.

Riley, John G. and William S. Samuelson (1981). "Optimal Auctions". *American Economic Review* **71** (3): 381–392.

Rubinstein, Ariel (1982). "Perfect Equilibrium in a Bargaining Model". *Econometrica* 50 (1): 97–109.

Segal, Ilya (2003). "Optimal Pricing Mechanisms with Unknown Demand". *American Economic Review* **93** (3), 509-529

Vickrey, William (1961). "Counterspeculation, Auctions, and Competitive Sealed Tenders," *Journal of Finance* **16** (1): 8–37.