

Spring 2023

Economics 7110: Microeconomic Theory II

Modeling Strategic Behavior: Game Theory and Mechanism Design

January 9, 2023

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This is a graduate introduction to game theory and mechanism design. While it is designed for first year Economics Ph.D. students, others are welcome. While I provide more background verbally on many of the examples, I assume that students have seen some undergraduate game theory (such as covered in Osborne, 2004, Tadelis, 2013, and Watson, 2013). In addition, some exposure to intermediate microeconomics and decision making under uncertainty is helpful.

Logistic Overview

1. **Lectures** will be delivered during the regularly scheduled class time (Tuesdays and Thursdays, 1:45pm-3:15pm) in PCPSE 100.
2. **Problem sets** will be assigned weekly and are due in class on Tuesday.
3. **The final grade** will be determined by two midterms (25%) and the final exam (50%).
4. **Recitations** will meet on Fridays, 10:15–11:45am in PCPSE 200, starting on January 20.
5. **The midterm exams** will be given in class around the one third and two third point (Feb 14 and Mar 29).
6. **The final exam** will be given at the scheduled time.

Logistic Details

1. **Canvas** is used to post announcements, slides, homework assignments, homework solutions, additional handouts, and other important materials. You are responsible for regularly checking, downloading and reading materials posted on the site, as they form an integral part of the class.
2. **Problem sets** will be assigned every week. They are an important part of the course; you should spend a great deal of time and effort on them. You are encouraged to work in

groups on the problem sets. However, before meeting in the group you should have attempted each question—groups work well when they allow you to learn from each other, they do *not* work well when they are used to facilitate a division of labor (you learn nothing from copying another student's answer; a similar comment applies to copying from the posted solutions!).

3. **Regrades:** Any request for a regrade must be in writing with a written explanation of the issue. The entire exam is regraded, and there is no guarantee that the grade will not go down (this does not apply if the issue is a mistake in totaling the final score). While we make every effort to avoid errors, errors do occasionally creep in. Without an “all regrade” policy, a bias towards only correcting errors in one direction is introduced.

Course Material

1. The current version of the lecture slides is posted on Canvas. These may be updated.
2. The structure of the course follows my text, Mailath (2019). While the book is available from Amazon, a cheaper (and slightly updated) alternative is the *free* PDF available on my website at <http://web.sas.upenn.edu/gmailath/books/modeling-strategic-behavior/>.

Three other books you may find useful:

- (a) Mas-Colell, Whinston, and Green (1995). For many years the standard first year graduate micro text.
 - (b) Kreps (1990a). While a little older (and perhaps a little idiosyncratic, though no more so than Mailath, 2019), this book is another excellent first year graduate micro text with extensive discussion of the strengths and weaknesses of game theoretic modeling. (Some of the best material from Kreps, 1990a, is in Kreps, 1990b.)
 - (c) Jehle and Reny (2011). A little less technical than the other two books. If you decide to purchase this online, make sure you buy the **third edition**, which is significantly different and improved from the second edition.
3. Solutions to the most of the problems in Mailath (2019) are posted on Canvas.

Course Outline

The current course schedule with readings will be available on canvas.

1. Normal and Extensive Form Games
2. A First Look at Equilibrium
3. Games with Nature and Games of Incomplete Information
4. Existence of Nash Equilibrium

5. Dynamic Games, Sequential Rationality, Perfect Bayesian and Sequential Equilibria
6. Signaling
7. Repeated Games
8. Topics in Dynamic Games (Markov Perfect Equilibrium, the Coase conjecture, and/or Reputations)
9. Bargaining
10. Mechanism Design, Revelation Principle and Revenue Equivalence
11. Principal-Agent Settings with Hidden Action

References

- JEHLE, G. A., AND P. J. RENY (2011): *Advanced Microeconomic Theory*. Pearson Education, third edn.
- KREPS, D. M. (1990a): *A Course in Microeconomic Theory*. Princeton University Press, Princeton, NJ.
- (1990b): *Game Theory and Economic Modelling*. Oxford University Press, Oxford.
- MAILATH, G. J. (2019): *Modeling Strategic Behavior: A Graduate Introduction to Game Theory and Mechanism Design*. World Scientific Press.
- MAS-COLELL, A., M. D. WHINSTON, AND J. GREEN (1995): *Microeconomic Theory*. Oxford University Press, New York, NY.
- OSBORNE, M. J. (2004): *An Introduction to Game Theory*. Oxford University Press, New York.
- TADELIS, S. (2013): *Game Theory: An Introduction*. Princeton University Press.
- WATSON, J. (2013): *Strategy: An Introduction to Game Theory*. WW Norton.