Econ 208: Game Theory Fall 2011 Syllabus

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1 Course description

This is an advanced Ph.D. course in game theory, intended for students interested in producing research in game theory; students interested in behavioral theory, decision theory, and experimental economics; and students interested in applying game theory to topics in macroeconomics, industrial organization, development, and other areas. The first third of the course will cover essential equilibrium concepts at a more advanced level than in Econ 200. The middle third will focus on repeated games and reputation, and the last third will focus on mechanism design and auctions.

The overarching goal is to help prepare you for your dissertation research, in two specific ways. First, we'll cover the essential foundational material in each of the three main topics. Second, we'll cover several hot topics of current research within these areas.

1.1 Course website: Ted

Login at ted.ucsd.edu. Registered students will have their accounts automatically activated at the start of the quarter. The syllabus and all non-textbook reading materials will be posted as PDF files on the course website. These files are for class use only; they are not to be distributed or posted publicly. In addition, all written assignments should be submitted in PDF form via the website.

1.2 Assignments & Grading

Your final grade is the minimum of two interim grades. Your interim *coursework grade* is your average grade on the following two written assignments. All written assignments must be submitted in PDF format on the course website.

1–2. Two problem sets

The first problem set covers equilibrium concepts; the second covers repeated games and mechanism design. You are encouraged to work together on these problem sets, but you must write up your own solutions (acknowledge your co-workers in writing). Late problem sets will be docked one grade category per day late. The second problem set—essentially a take-home exam—is due at 5pm on the last day of final exams.

Your interim *participation grade* is your average grade on the following four assignments:

- 1. One 40-minute class presentation on a paper from the syllabus
- 2. Class attendance
 - 0–1 unexcused absences: A
 - 2 unexcused absences: A-minus
 - 3 unexcused absences: B-plus
 - etc.
- 3. Participation in class discussion
 - Superlative: one category above class attendance grade
 - Satisfactory: same as class attendance grade
 - Unsatisfactory: one category below class attendance grade
- 4. One-hour office visit with Prof. Miller to discuss your research interests
 - Satisfactory: A
 - Unsatisfactory: C
 - No visit: F

If you elect S/U grading, the minimum standard for an S grade is the same as for a B-minus letter grade.

1.3 Readings

There are three required readings for the course:

- Osborne and Rubinstein (1994) This book is available as a free download (with registration) at http://theory.economics.utoronto. ca/books/.
- Mailath and Samuelson (2006)
- David A. Miller. Lecture Notes for Econ 208. Working notes, 2011.

In addition, from time to time (but mainly in Part I), I will refer to theorems from Aliprantis and Border (1999), which is a useful mathematical reference. Furthermore, we will cover selected published articles and unpublished working papers, listed in section 2.

1.4 Contact info and office visits

Though I will not hold regular office hours, I am keen to talk with you about both the course material and your research interests more generally. To encourage you, I have made it a course requirement to visit me at least once, to discuss your research interests. Of course you may visit multiple times if you like, to discuss the course material or further interests. Email me at d9miller@ucsd.edu to schedule a visit. I recommend that students in the third year and above visit me relatively early in the quarter.

2 Schedule of topics

Required readings are marked with asterisks. Other readings are listed for your reference.

Part I: Equilibrium concepts

- September 23: Nash equilibrium
 - *Osborne and Rubinstein (1994), chapters 2.4 and 3.1
 - *Lecture Notes, prefatory material and chapter 1
- September 26: Nash equilibrium
 - Reny (1999)
- September 30: Correlated equilibrium
 - *Osborne and Rubinstein (1994), chapter 3.3
 - *Lecture Notes, chapter 2
 - Rahman (2010)
- October 3-7: Perfect Bayesian equilibrium and Sequential equilibrium
 - *Osborne and Rubinstein (1994), chapters 12.0-12.3.1
 - *Lecture Notes, chapter 3
 - Background: Osborne and Rubinstein (1994), chapter 11
 - Fudenberg and Tirole (1991)
 - Battigalli (1996)
- October 10: No meeting (reschedule)
- October 14: Contractual equilibrium
 - *Watson (2006)

Part II: Repeated games

- October 17: Perfect monitoring
 - *Mailath and Samuelson (2006), chapters 2.0-2.5.3, 3.0-3.5, 3.7-3.8
 - *Lecture Notes, chapter 4
- October 21–28: Imperfect public monitoring
 - *Mailath and Samuelson (2006), chapters 7.0-7.5, 9.0-9.2, 9.4-9.5, 10
 - *Lecture Notes, chapters 5–6
- October 31: Contractual equilibrium in repeated games
 - *Miller and Watson (2010)
- November 4: Imperfect monitoring in continuous time (Guest lecturer: J. Aislinn Bohren)
 - *Sannikov (2005)

- *Sannikov (2007)
- November 7: Reputation with short-lived players
 - *Mailath and Samuelson (2006), chapter 15
 - *Lecture Notes, chapter 7
- November 11: No meeting (Veterans' Day)

Part III: Mechanism design

- November 14: Ex post implementation
 - *Lecture Notes, chapter 8
 - Chung and Ely (2006)
- November 18: Dynamic mechanism design: Efficiency
 - *Athey and Segal (2007)
 - *Bergemann and Välimäki (2010)
- November 21: Dynamic mechanism design: Revenue maximization
 - *Pavan, Segal, and Toikka (2009)
- November 25: No meeting (Thanksgiving weekend)
- November 28: No meeting (reschedule)

Part IV: Student presentations

• December 2 and two makeup sessions to be determined

References

- Charalambos D. Aliprantis and Kim C. Border. *Infinite Dimensional Analysis: A Hitchhiker's Guide*. Springer, Berlin, 2nd edition, 1999.
- Susan Athey and Ilya Segal. An efficient dynamic mechanism. Working paper, February 2007. URL http://kuznets.harvard.edu/~athey/EfficientDynamic.pdf.
- Pierpaolo Battigalli. Strategic independence and perfect Bayesian equilibria. *Journal of Economic Theory*, 70(1):201–234, July 1996.
- Dirk Bergemann and Juuso Välimäki. The dynamic pivot mechanism. *Econometrica*, 78(2):771–789, march 2010.
- Kim-Sau Chung and Jeffrey C. Ely. Ex-post incentive compatible mechanism design. Working paper, May 2006. URL http://sites.google.com/site/kimsauchung/expost.pdf.
- Drew Fudenberg and Jean Tirole. Perfect Bayesian equilibrium and sequential equilibrium. *Journal of Economic Theory*, 53(2):236–260, April 1991.

- George J. Mailath and Larry Samuelson. *Repeated Games and Reputations: Long-Run Relationships*. Oxford University Press, New York, 2006.
- David A. Miller and Joel Watson. A theory of disagreement in repeated games with renegotiation. Working paper, July 2010. URL http://dss.ucsd.edu/~d9miller/files/MillerWatson-Disagreement. html.
- Martin J. Osborne and Ariel Rubinstein. *A Course in Game Theory*. MIT Press, Cambridge, Massachusetts, 1994.
- Alessandro Pavan, Ilya Segal, and Juuso Toikka. Dynamic mechanism design: Revenue equivalence, profit maximization and information disclosure. Working paper, August 2009. URL http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1620662.
- David Rahman. But who will monitor the monitor? Working paper, September 2010. URL http://www.econ.umn.edu/~dmr/monitor.pdf.
- Philip J. Reny. On the existence of pure and mixed strategy Nash equilibria in discontinuous games. *Econometrica*, 67(5):1029–1056, September 1999.
- Yuliy Sannikov. Notes on stochastic calculus. Lecture Notes, Fall 2005. URL http://www.econ. berkeley.edu/~sannikov/stochastic.pdf.
- Yuliy Sannikov. Games with imperfectly observable actions in continuous time. *Econometrica*, 75(5): 1285–1329, September 2007.
- Joel Watson. Contract and game theory: Basic concepts for settings with finite horizons. Working paper, January 2006. URL http://goo.gl/NFtle.