Econ 208: Game Theory Winter 2010 Syllabus

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1 Course description

This is an advanced Ph.D. course in game theory, intended both for students interested in producing research in game theory, and those who are interested in behavioral theory, decision theory, and experimental economics, as well as applied areas such as macroeconomics, industrial organization, and development. The first third of the course will cover essential equilibrium concepts at a more advanced level than in Econ 200c. 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: WebCT

Login at webct.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 three 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. 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.

3. One take-home final exam

The final exam covers mechanism design. You must work independently. Late final exams will be docked three grade categories per day late.

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

- 1. One 45-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 textbooks for the course:

- Osborne and Rubinstein (1994)
- Mailath and Samuelson (2006)
- Krishna (2009)

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 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

All readings are suggested. Required readings are marked with asterisks. Readings suitable for student presentation are marked "P."

Part I: Equilibrium concepts

- January 4th: Nash equilibrium
 - Osborne and Rubinstein (1994), chapters 2–3.3, *(2.4, 3.1.1, 3.3)
- January 6th: Nash equilibrium, Correlated equilibrium
 - Reny (1999)
 - Rahman (2009)
- January 11th: Common knowledge (Guest lecturer: Nageeb Ali)
 - *Osborne and Rubinstein (1994), chapter 5
 - *Monderer and Samet (1989)
- January 13th: Perfect Bayesian equilibrium, Sequential equilibrium
 - Osborne and Rubinstein (1994), chapters 11–12, *(12.1–12.3.1)
 - Fudenberg and Tirole (1991)
 - Battigalli (1996)
- January 18th: Martin Luther King, Jr. Holiday
- January 20th: Nash bargaining (Student presentation: Ben Horne)
 - P *Osborne and Rubinstein (1994), chapter 15

Part II: Repeated games (under construction)

- January 20th: The perfect monitoring folk theorem
 - Mailath and Samuelson (2006), chapters 2–3
- January 25th: Imperfect public monitoring basics
 - Mailath and Samuelson (2006), chapters 7–8
- January 27th: The imperfect public monitoring folk theorem
 - Mailath and Samuelson (2006), chapter 9
- February 1st: Private strategies with imperfect public monitoring
 - Mailath and Samuelson (2006), chapter 10
- February 3rd: Imperfect monitoring in continuous time (Guest lecturer: Aislinn Bohren)
 - Sannikov (2005)
 - Shumway (2003)
 - Sannikov (2007)

- Faingold and Sannikov (2007)
- · February 8th: Reputation with short-lived players
 - Mailath and Samuelson (2006), chapter 15
- February 10th: Student presentations; choose from the following:
- February 15th: Presidents' Day Holiday
- February 17th: Topics in reputation (Guest lecturer: Jeff Ely)

Part III: Mechanism design (under construction)

- February 22nd: Private values
 - Krishna (2009), chapters 2-3 and 5
- February 24th: Interdependent values
 - Krishna (2009), chapter 6-7
 - Chung and Ely (2006)
- March 1st: Dynamic mechanism design foundations
- · March 3rd: Dynamic mechanism design applications
- March 8th: Student presentations; choose from the following:
- March 10th: Student presentations; choose from the following:

References

- Charalambos D. Aliprantis and Kim C. Border. *Infinite Dimensional Analysis: A Hitchhiker's Guide*. Springer, Berlin, 2nd edition, 1999.
- Pierpaolo Battigalli. Strategic independence and perfect Bayesian equilibria. *Journal of Economic Theory*, 70(1):201–234, July 1996.
- Kim-Sau Chung and Jeffrey C. Ely. Ex-post incentive compatible mechanism design. Working paper, May 2006. URL http://kimsauchung.googlepages.com/expost.pdf.
- Eduardo Faingold and Yuliy Sannikov. Reputation effects and equilibrium degeneracy in continuous-time games. Working paper, August 2007. URL http://cowles.econ.yale.edu/P/cd/d16a/d1624.pdf.
- Drew Fudenberg and Jean Tirole. Perfect Bayesian equilibrium and sequential equilibrium. *Journal of Economic Theory*, 53(2):236–260, April 1991.
- Vijay Krishna. Auction Theory. Academic Press, Burlington, MA, second edition, 2009.
- George J. Mailath and Larry Samuelson. *Repeated Games and Reputations: Long-Run Relationships*. Oxford University Press, New York, 2006.
- Dov Monderer and Dov Samet. Approximating common knowledge with common beliefs. *Games and Economic Behavior*, 1(2):170–190, June 1989.

- Martin J. Osborne and Ariel Rubinstein. *A Course in Game Theory*. MIT Press, Cambridge, Massachusetts, 1994.
- David Rahman. But who will monitor the monitor? Working paper, September 2009.
- 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.
- Tyler Shumway. Continuous-time stochastic processes. Lecture Notes, Fall 2003. URL http://www-personal.umich.edu/~shumway/courses.dir/f872.dir/ctintro.pdf.