

Syllabus - Economics 713, Part 1

Course Description

Economics 713 is a semester long course on game theory and information economics. I will teach the first half of the course (mostly game theory) and Larry Samuelson will teach the second half (mostly information economics).

Reading Materials

Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green (1995).
Microeconomic Theory. Oxford.

Drew Fudenberg and Jean Tirole (1991). *Game Theory*. MIT.

Roger Myerson (1991). *Game Theory: Analysis of Conflict*. Harvard.

Eric van Damme (1991). *Stability and Perfection of Nash Equilibria*,
2nd ed. Springer.

In-Koo Cho and David M. Kreps (1987). "Signaling Games and Stable
Equilibria," *Quarterly Journal of Economics* 102, 179-221.

R. Duncan Luce and Howard Raiffa (1957). *Games and Decisions:
Introduction and Critical Survey*. Wiley.

Klaus Ritzberger (2002). *Foundations of Non-Cooperative Game Theory*.
Oxford.

The majority of our readings will come from the textbooks of Mas-Colell, Whinston, and Green and of Fudenberg and Tirole. We will also look at two short sections from Myerson's book and one chapter from van Damme's book. The article by Cho and Kreps will be covered toward the end of the class. Finally, Luce and Raiffa's book is the best known of the early textbooks on game theory, while Ritzberger's book is the most recent graduate level treatment of the subject.

A list of references to all of the works I will cite in lecture can be found at the end of the syllabus.

Readings, Problem Sets, and Exams

The course is divided into five sections whose contents are described in the course outline below. The readings for the sections are as follows:

- Section 1: MWG, Sec. 1.B, 3.C, and 6.B, and Ch. 7
FT, Sec. 3.4
- Section 2: MWG, Sec. 8.A, 8.B, 8.C, and 8.D
Myerson, Sec. 3.8 and 3.12
FT, Sec. 2.2
van Damme, Ch. 1
- Section 3: MWG, Sec. 8.F, 9.A, 9.B, and 9.C
FT, Sec. 8.3 and 8.4
- Section 4: FT, Sec. 6.1, 6.2, 6.3, and 6.4
MWG, Sec. 8.E and 9.D
Cho and Kreps, Sec. 1, 2, 3.1, 4.1, 4.2, and 4.3
- Section 5: FT, Sec. 4.1, 4.2, 4.3, and 5.1

The due dates for the first four problem sets are as follows: #1, Tuesday, Jan. 25; #2, Tuesday, Feb. 8; #3, Tuesday, Feb. 22; #4, Tuesday, March 1. The fifth problem set will not be collected.

The lone exam will take place on Thursday, March 10.

Contact information

My office is 7436 Social Science. You can reach me by e-mail at whs@ssc.wisc.edu or by phone at 263-3858. My office hours are on Tuesdays and Thursdays from 4:00 to 5:00 or by appointment. The course website is:

<http://www.ssc.wisc.edu/~whs/teaching/713>

Course Outline

- Section 1 (2 lectures): von Neumann-Morgenstern expected utility
Normal form games
Extensive form games
Mixed strategies and behavior strategies
- Section 2 (4 lectures): Solution concepts for normal form games
Dominance
Rationalizability
Nash equilibrium
Correlated equilibrium
The Minmax Theorem
Existence of Nash equilibrium
- Section 3 (4 lectures): Equilibrium refinements for extensive form games
Subgame perfect equilibrium
Sequential equilibrium
Equilibrium refinements for normal form games
- Section 4 (2 lectures): Information economics: terminology
Bayesian games
Signaling games
Signaling game equilibrium refinements
- Section 5 (3 lectures): Repeated games
The one-shot deviation principle
Folk theorems
Factorization and self-generation

References

- Abreu, D. (1988). "On the Theory of Infinitely Repeated Games with Discounting," *Econometrica* 56, 383-396.
- Abreu, D., Dutta, P. K., and L. Smith (1994). "The Folk Theorem for Repeated Games: A NEU Condition," *Econometrica* 62, 939-948.
- Abreu, D., Pearce, D. G., and E. Stacchetti (1990). "Toward a Theory of Discounted Repeated Games with Imperfect Monitoring," *Econometrica* 58, 1041-1063.
- Aumann, R. J. (1974). "Subjectivity and Correlation in Randomized Strategies," *Journal of Mathematical Economics* 1, 67-96.
- Bernheim, B. D. (1984). "Rationalizable Strategic Behavior," *Econometrica* 52, 1007-1028.
- Brandenberger, A., and E. Dekel (1993). "Hierarchies of Beliefs and Common Knowledge," *Journal of Economic Theory* 59, 189-198.
- Brown, G. W. (1951). "Iterative Solutions of Games by Fictitious Play," in *Activity Analysis of Production and Allocation*, T. C. Koopmans, Ed., New York: Wiley.
- Cho, I.-K. and D. M. Kreps (1987). "Signaling Games and Stable Equilibria," *Quarterly Journal of Economics* 102, 179-221.
- Dantzig, G. B. (1956). "Constructive Proof of the Min-Max Theorem," *Pacific Journal of Mathematics* 6, 25-33.
- Dufwenberg, M., and M. Stegeman (2002). "Existence and Uniqueness of Maximal Reductions under Iterated Strict Dominance," *Econometrica* 70, 2007-2023.
- Fan, K. (1952). "Fixed-point and Minimax Theorems in Locally Convex Topological Spaces," *Proceedings of the National Academy of Sciences* 38, 121-126.
- Foster, D. P., and R. Vohra (1997). "Calibrated Learning and Correlated Equilibrium," *Games and Economic Behavior* 21, 40-55.
- Friedman, J. (1971). "A Noncooperative Equilibrium for Supergames," *Review of Economic Studies* 38, 1-12.
- Fudenberg, D., and E. Maskin (1986). "The Folk Theorem in Repeated Games with Discounting and Incomplete Information," *Econometrica* 54, 533-554.
- Gale, D. (2000). *Strategic Foundations of General Equilibrium*. Cambridge: Cambridge University Press.
- Glicksberg, I. L. (1952). "A Further Generalization of the Kakutani Fixed Point Theorem, with Application to Nash Equilibrium Points," *Proceedings of the American Mathematical Society* 3, 170-174.
- Harsanyi, J. C. (1967, 1968). "Games with Incomplete Information Played by Bayesian Players," *Management Science* 14, 159-182, 320-334, 486-502.
- Harsanyi, J. C. (1973). "Games with Randomly Disturbed Payoffs: A New Rationale for Mixed-Strategy Equilibrium Points." *International Journal of Game Theory* 2, 1-23.

- Hart, S., and D. Schmeidler (1989). "Existence of Correlated Equilibria," *Mathematics of Operations Research* 14, 18-25.
- Jackson, M. O., L. K. Simon, J. M. Swinkels, and W. R. Zame (2002). "Communication and Equilibrium in Discontinuous Games with Incomplete Information," *Econometrica* 70, 1711-1740.
- Kohlberg, E. and J.-F. Mertens (1986). "On the Strategic Stability of Equilibria," *Econometrica* 54, 1003-1037.
- Kreps, D. M., and R. Wilson (1982). "Sequential Equilibria," *Econometrica* 50, 863-894.
- Kreps, D. M., P. Milgrom, J. Roberts, and R. Wilson (1982). "Rational Cooperation in the Finitely-Repeated Prisoners' Dilemma," *Journal of Economic Theory* 27, 245-252.
- Kuhn, H. W. (1953). "Extensive Games and the Problem of Information," in *Contributions to the Theory of Games II*, H. W. Kuhn and A. W. Tucker, eds., *Annals of Mathematics Study* 28. Princeton: Princeton University Press.
- Loomis, L. H. (1946). "On a Theorem of von Neumann," *Proceedings of the National Academy of Sciences* 32, 213-215.
- Mailath, G. J., L. Samuelson, and J. M. Swinkels (1993). "Extensive Form Reasoning in Normal Form Games," *Econometrica* 61, 273-302.
- Marx, L., and J. M. Swinkels (1997). "Order Independence for Iterated Weak Dominance," *Games and Economic Behavior* 18, 219-245. Corrigendum, 31 (2000), 324-329.
- Mertens, J.-F., and S. Zamir (1985). "Formulation of Bayesian Analysis for Games with Incomplete Information," *International Journal of Game Theory* 14, 1-29.
- Myerson, R. B. (1978). "Refinements of the Nash Equilibrium Concept," *International Journal of Game Theory* 7, 73-80.
- Nash, J. F. (1950). "Equilibrium Points in n -Person Games," *Proceedings of the National Academy of Sciences* 36, 48-49.
- Nash, J. F. (1951). "Non-Cooperative Games," *Annals of Mathematics* 54, 286-295.
- Neeman, Z. (2004). "The Relevance of Private Information in Mechanism Design," *Journal of Economic Theory* 117, 55-77.
- Okada, A. (1981). "On the Stability of Perfect Equilibrium Points," *International Journal of Game Theory* 10, 67-73.
- Pearce, D. G. (1984). "Rationalizable Strategic Behavior and the Problem of Perfection," *Econometrica* 52, 1029-1050.
- Reny, P. J. (1999). "On The Existence of Pure and Mixed Strategy Nash Equilibria in Discontinuous Games," *Econometrica* 67, 1029-1056
- Rosenthal, R. (1981). "Games of Perfect Information, Predatory Pricing, and the Chain-Store Paradox," *Journal of Economic Theory* 25, 92-100.
- Rubinstein, A. (1982). "Perfect Equilibrium in a Bargaining Model," *Econometrica* 50, 97-109.
- Schelling, T. (1960). *The Strategy of Conflict*. Cambridge: Harvard University Press.

- Selten, R. (1965). "Spieltheoretische Behandlung eines Oligopolmodells mit Nachfragertragheit," *Zeitschrift für die Gesamte Staatswissenschaft* 121, 301-324, 667-689.
- Selten, R. (1975). "Reexamination of the Perfectness Concept for Equilibrium Points in Extensive Games," *International Journal of Game Theory* 4, 25-55.
- Ståhl, I. (1972). *Bargaining Theory*. Stockholm: Stockholm School of Economics.
- van Damme, E. (1984). "A Relation between Perfect Equilibria in Extensive Form Games and Proper Equilibria in Normal Form Games," *International Journal of Game Theory* 13, 1-13.
- Ville, J. (1938). "Noté sur la Théorie Générale des Jeux où intervient l'Habilité des Joueurs," in *Applications de Jeux de Hazard* by E. Borel and J. Ville. *Traité du Calcul des Probabilités et de ses Applications IV*. Paris: Gauthier-Villars.
- von Neumann, J. (1928). "Zur Theorie der Gesellschaftsspiele," *Mathematische Annalen* 100, 295-320. Translated by S. Bargmann as "On the Theory of Games of Strategy" in *Contributions to the Theory of Games IV*, A. Tucker and R. D. Luce, eds. (1957). *Annals of Mathematics Study* 40. Princeton: Princeton University Press.
- von Neumann, J., and O. Morgenstern (1944). *Theory of Games and Economic Behavior*. Princeton: Princeton University Press.