

University of Southern California
ECON 604 – GAME THEORY SPRING 2016
26220D

Meeting time: 9-11.50am, Thursday
Classroom: KAP 319

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Office Hours: after
class; Thursday 12.30-
2pm, or by
appointment.

Course Overview:

This is an advanced course in game theory, intended for students who are interested in pursuing micro theory research or who want a good theory background to do applied work in any economics field, run experiments with games, or do algorithmic/computational engineering research related to strategic environments. The course will cover a combination of standard results and current research topics. I will try to do my best to accommodate your interests and your needs in setting the direction of the class.

As a part of this course, you will be required to present a recent influential paper of your choosing (with my confirmation) that might be a basis for your third year research and hopefully help in building your dissertation.

Prerequisites:

Advanced microeconomics and game theory as introduced in the first year PhD Microeconomic Theory Course **Econ 601, or equivalent**. Please talk to me if you haven't taken this or another equivalent class.

You must feel comfortable with mathematical notation and have training in multivariate calculus, optimization theory, real analysis and probability theory. You should already be comfortable with the level of math in the proofs in *Mas Colell - Micro Theory*. Also, you should have perfect command of *Simon & Blume - Math for Econ*. level math, and be comfortable with *Sundaram - A First Course in Optimization Theory* level optimization theory. You should also be able to follow graduate level (say, *Ok - Real analysis with Economic Applications* level) real analysis and probability theory arguments.

Grading policy:

- ✧ **ATTENDANCE (20pts)**
- ✧ **ASSIGNMENTS (50pts)**

I will deliver **2 assignments (problem sets) (25x2=50 pts)**, the first one halfway through the semester, and the second one close to the end of the semester (before the

presentations) each by Tuesday 9am, and you will submit your answers to me in the class that Thursday 9am (so you will have 48 hours to solve the homework).

They are to be graded coarsely as (C)omplete (16pts), (A)dequate (12 pts) or (I)ncomplete (8pts) or (F)ail (0pts). I will release a brief solution key for these, right after the class. The assignments function as midterms; if you miss any assignments for a justified reason and provide sufficient evidence, your other grade elements will be counted instead, otherwise you will get a score of 0 for that assignment. You cannot miss more than 1 assignment is missing (for a justified reason or not).

You are expected to work on the assignments individually, and you should not discuss the assignments with anybody else before submitting them. You can use any books or online source to solve the assignments.

★ PAPER PRESENTATION (30pts)

You are expected to present a paper on game theory, in class, in the last 3 weeks of the semester (depending on the number of registered and auditing students, we may need more or fewer weeks). Each student will have **1 hour** to present **2 game theory papers (30 mins each, one after the other)**. You are expected to use many slides to explain to the audience the model, the results, and even the method of proofs (at least the intuition of the proofs) if 30 minutes/paper permits it.

The two papers should be published in the last 5 years (2010 onwards) in one of the top general audience or Theory field journals (Econometrica, Journal of Economic Theory, Games and Economic Behavior, Economic Theory, American Economic Review, Quarterly Journal of Economics, Journal of Political Economy, etc...) or it could be a forthcoming (yet unpublished) paper. The papers should have a very strong Theory component, and preferably very important and well received papers. Simulation results, or papers on experiments, papers with solely algorithms/computation flavor are not eligible. The two papers should be rather closely related in terms of the research question and/or the method.

The point is to make you very well acquainted with two theory papers that might trigger your interest in a related research question, and possibly working in that area to publish a research paper ultimately. You are expected to know your papers by heart (including the method of proof in the appendices) and be ready to answer my (and other students') questions during your presentation, as if the paper is your own. You are also expected to read the most important papers in the appendices of the 2 papers, in order to understand the whole contexts of the papers.

You should confirm with me the two papers you'd like to present BEFORE the spring break. The regular auditors of the class are also welcome (and urged) to present papers in class.

Academic Accommodations:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to a TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Academic Integrity Standards

Students are required to review USC's academic integrity standards in the SCAMPUS (www.usc.edu/departments/publications/SCAMPUS/gov). Violations of any of the academic integrity standards set by the University can have serious consequences.

Blackboard page:

The course's blackboard can be found at <https://blackboard.usc.edu> using your USCnetID/password. Please familiarize yourself with the course web site ASAP. I may put lecture notes, papers, assignments, (and their solution key) or other relevant material.

Please put "ECON 604" in the subject of your emails about this class.

Recommended Textbooks:**Basic Game Theory**

M. Osborne and A. Rubinstein, *A Course in Game Theory* [OR],
S. Tadelis, *Game Theory: an Introduction* [T],

Advanced Game Theory

G. Mailath and L. Samuelson, *Repeated Games and Reputations*,
D. Fudenberg, J. Tirole, *Game Theory*,
Borgers, Krahmer, Strausz "An Introduction to the theory of Mechanism Design"

Learning in Games and Behavioral Game Theory

I. Brocas, J. Carillo, *The Psychology of Economic Decisions*, 2 Volumes
A. Rubinstein, *Modeling Bounded Rationality*,
R. Spiegler, *Bounded Rationality and Industrial Organization*,
C. Chamley, *Rational Herds*,
D. Fudenberg, D. Levine, *The Theory of Learning in Games* [FL]
P. Young, *Strategic Learning and its Limits*
P. Young, *Individual Strategy and Social Structure*

Lecture Notes that will be put on board for reference:

Jonathan Levin's (Stanford) lecture notes

Muhammet Yildiz's (MIT) lecture notes

Navin Kartik's (Columbia) lecture notes

T O P I C S

The following list is clearly too much for one semester's work; I will try to accommodate your interests and needs in choosing the subset of topics we will cover. In the first lecture, we will end up with a shortlist of topics and lectures that will fit a 12 weeks lecture (and 3 weeks of presentations) program.

OR= Osborne & Rubinstein "Game Theory- An Introduction"

R= Rubinstein "Modeling Bounded Rationality"

L= Jonathan Levin's Lecture Notes

LECTURE 1 Solution Concepts (Basic Game Theory redux) - Normal Form Games

Nash equilibrium, Bayesian equilibrium, analysis of Zero Sum games

L notes, OR Chapter 2

LECTURE 2 Solution Concepts (Basic Game Theory redux) - Normal Form Games

Correlated equilibrium, Evolutionary Stable Strategies, Rationalizability

L notes, OR Chapter 3,4

LECTURE 3 Solution Concepts (Basic Game Theory redux) - Extensive Form Games

With perfect information: *L notes, OR Chapter 6*

LECTURE 4 Solution Concepts (Basic Game Theory redux) - Extensive Form Games

With imperfect information: *OR 11, 12*

LECTURE 5 Knowledge, Common Knowledge

OR chapter 5, R Chapter 3, L notes

LECTURE 6 Auction Theory and Mechanism Design

L notes, Borgers "Introduction to the theory of Mechanism Design"

LECTURE 7 Supermodular Games, Global Games: Coordination and Higher Order Uncertainty

L notes

LECTURE 8-9-10 Repeated Games

Perfect Monitoring **OR Chapter 8, L notes**

Imperfect Public Monitoring **L notes**

Imperfect Private Monitoring **L notes**

LECTURE 11 Reputation in Repeated Interaction

OR Chapter 12 Chain Store paradox, Gang of Four paper (1982)

LECTURE 12 Theories of Learning for Individuals

Bergemann's notes on learning, Easley & Kiefer (1988), multi armed bandit problems, Pandora's Box; Weitzman (1979)

LECTURE 13 Observational Learning, Informational Herds and Cascades, Bayesian Persuasion

Chamley & Gale "Rational Herds", Gentzkow & Kamenica (2009)

LECTURE 14 Learning in Games

Fictitious Play, Replicator Dynamics, Adjustment Models, Mutations, Reinforcement Learning, Sophisticated Learning...

L notes, P. Young (Strategic Learning and its Limits), Muhammet Yildiz' notes

LECTURE 15 Bounded Rationality and Game Theory

Modeling Limited Memory: *R* Chapter 4, *R* Chapter 7

Agents with biases in information processing and other Bounded Rationality models

LECTURE 16 Behavioral Game Theory

Consequence based and Intention Based Fairness & reciprocity, Dual Self Models, Psychological Games, *L notes*

LECTURE 13

--PRESENTATIONS--

LECTURE 14

--PRESENTATIONS--

LECTURE 15

--PRESENTATIONS--