Experimental Game Theory
UHON 390 – 3 credit hours
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General Description

Strategic behavior is all around us in daily life, from delegating household chores to online video games to presidential elections. Game theory is the study of how people act in strategic situations. This honors seminar introduces students to game theory through the methodology of experimental economics. The course begins with classic games like the Prisoners' Dilemma, and it builds toward a strategic understanding of uncertainty, cooperation, and more. Throughout the course, students experience game theory firsthand through classroom experiments. Students learn the basics of experimental design and complete a project designing their own game theory experiment. The course takes a multidisciplinary approach to game theory, drawing from economics, political science, history, and popular culture for examples.

Texts

Dixit, Avinash and Barry J. Nalebuff. *The Art of Strategy: A Game Theorist's Guide to Success in Business and Life.* New York: W.W. Norton, 2008.

Spaniel, William. *Game Theory 101: The Complete Textbook*. Scotts Valley: CreateSpace, 2011.

Smith, Vernon L. "An Experimental Study of Competitive Market Behavior." *Journal of Political Economy* 70, no. 2 (1962), 111-137.

Smith, Vernon L. "Economics in the Laboratory." *Journal of Economic Perspectives* 8, no. 1 (1994), 113-131.

Levitt, Steven D. and John A. List. "What Do Laboratory Experiments Measuring Social Preferences Reveal About the Real World?" *Journal of Economic Perspectives* 21, no. 2 (2007), 153-174.

Akerlof, George A. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *The Quarterly Journal of Economics* 84, no. 3 (1970) 488-500.

Course Outline

Week 1: Introduction to Game Theory

- Reading: *Art of Strategy* Chapter 1 (3-31)

Week 2: Prisoners' Dilemmas

- Reading: *Art of Strategy* Chapter 3 (64-77, 99-101), *Game Theory 101* 1.1 & 1.2 (1-32)
- Experiment: Public Goods

Week 3: Nash Equilibrium

- Reading: *Art of Strategy* Chapter 4 (102-136), *Game Theory 101* 1.3 & 1.4 (33-59)
- Homework 1 due
- Experiments: Exclusive Club, Beauty Contest

Week 4: Mixed Strategies

- Reading: *Art of Strategy* Chapter 5 (141-172), *Game Theory 101* 1.5 & 1.6 (59-88)
- Homework 2 due
- Experiment: Colonel Blotto

Week 5: Backward Induction

- Reading: *Art of Strategy* Chapter 2 (32-63), *Game Theory 101* 2.1 & 2.2 (110-128)
- Homework 3 due
- Experiment: Ultimatum Game

Week 6: Introduction to Experiments

- Reading: Smith (1962, 1994), Levitt & List (2007)
- Homework 4 due
- Experiment: Competitive Market

Week 7: Commitment

- Reading: *Art of Strategy* Chapter 6 (173-181) & Chapter 7, *Game Theory 101* 2.4 & 2.5 (137-152)
- Homework 5 due

Week 8: Repeated Games

- Reading: *Art of Strategy* Chapter 3 (72-98) & Chapter 9, *Game Theory 101* 1.8 (98-109)
- Experiment: Repeated Prisoners' Dilemma

Week 9: Midterm Exam

- Homework 6 due
- Paper presentations

Week 10: Information & Uncertainty

- Reading: *Art of Strategy* Chapter 8 (235-269), Akerlof (1970)
- Paper presentations

Week 11: Auctions & Contests

- Reading: *Art of Strategy* Chapter 10 (301-334), *Game Theory 101* 4.1.6 (266-269)
- Paper presentations
- Experiment: Tullock Contest

Week 12: Games with Uncertainty (Cuban Missile Crisis application)

- Paper presentations
- Project proposal due

Week 13: Voting

- Reading: *Art of Strategy* Chapter 12 (359-387), *Game Theory 101* 4.1.3 (256-258)
- Paper review due
- Design document due

Week 14 & 15: Final Projects

- Run student experiments in class
- Homework 7 due
- Final papers due during finals week

Grading and Assignments

Final grades are based on the following:

- Participation (20%)
- Homework (20%)
- Paper presentation & review (10%)
- Midterm exam (20%)
- Experimental design project (30%)

Participation
Participation points are based on completion of in-class exercises, experiments, and discussions. Participation activities are graded for completion, not accuracy. Makeup work for missed participation activities must be completed within a week of the missed class.

Homework
There are seven homework assignments, equally weighted. Homework may involve either problem sets or short essays. Homework will be turned in as hard copies. Late homework is subject to a 10-point deduction for every 24-hour period after the deadline.

Paper presentation & review
For the paper review, each student selects a game theory or experimental economics academic paper and writes a summary and review of the paper. The student gives a short presentation explaining the paper and leads discussion on it. Both components are worth 5% of the final grade each.

Midterm exam
The midterm exam is held in class during week 9. Students are permitted to use one double-sided, handwritten 3x5 inch index card and a calculator of their choice. The exam is a combination of problem solving and short answer questions. There is no final exam.

Experimental design project
The experimental design project is a course-long assignment which the semester builds toward. Students work in small groups to design an experiment to answer a game theoretical question. The instructor works closely with students to guide them toward interesting questions with a feasible experiment. Students are encouraged to think about research questions relevant to their major and overall interests. The students implement the experiment in class, then write up their results. The final report includes a literature review. The project consists of three parts: a proposal (7.5% of the final grade), a design document (7.5% of the final grade), and the final report (15% of the final grade).

In-Class Experiments

Throughout the semester, students participate in a series of game theory experiments. These experiments are designed to both illustrate game theory concepts and showcase the methodology of experimental economics. Students' performance in the experiments earn "Coyote Bucks" that are used as lottery tickets in a prize-drawing on the last day of class. Students also earn Coyote Bucks from participating in classmates' experiments from the design project. Students must be present to earn Coyote Bucks and experiment participation cannot be made up. Performance in the experiments has no impact on the course grade.

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