

UNITED STATES NAVAL ACADEMY

Spring 2008 SA475E Section 5041

Quantitative Economics Seminar: The Experimental Economics Seminar

**Mathematics Professor:**

Professor: Professor Charles Mylander  
Phone: x3-6744  
Office hours: TU&TH 0900-1600  
E-mail: [wcm@usna.edu](mailto:wcm@usna.edu),

**Economics Professor:**

Professor: Associate Professor Kurtis Swope  
Phone: x3-6892  
Office hours: TU&TH 0900-1600  
E-mail: [swope@usna.edu](mailto:swope@usna.edu) (the best way to reach me!)

**Link to Course Site:** [www.usna.edu/Users/econ/swope/](http://www.usna.edu/Users/econ/swope/)

Please **READ AND RETAIN** this policy statement.

SA475E is the capstone course for the Quantitative Economics major. In this seminar students are given the opportunity to work on independent research under the close supervision of both the Economics and Mathematics Department Faculty. The course instructors of this section have chosen experimental economics and game theory to be the topics of your seminar.

The focus of the course is your conducting and analyzing an economic experiment, or using a game theoretic model to analyze a multiperson decision situation. Your research will be documented in a paper and presented in a project briefing towards the end of the course. The project paper and briefing are the most important part of the course.

In the first six weeks the course instructors will take about 70% of the class time presenting material on the seminar topics, teaching you about experimental economics and game theory. There will be several sessions devoted to using the computer system *z-tree* in conducting experiments. About 30% of the class time will be devoted to having the students reporting on their progress in developing their project proposals. They will present ideas found in the literature, and describe topics/problems they think may provide a subject for the project portion of the course. Some time will be returned to the students to work on developing their project proposals.

During the remainder of the course you will be working on your research project. One of the seminar leaders will be assigned as your project advisor. You **must confer with your project advisor at least once a week** and on a less frequent basis you will be directed to brief the other seminar leader on your project.

## I. The Course Research Project

In this seminar the students must choose to conduct their research in one of two overlapping areas: game theory or experimental economics.

**Game theory** is broadly interpreted as the study of multiperson decision problems. The disciplines most involved in game theory are economics, mathematics, and military science. Students working on a project using game theory will use concepts and skills acquired in other mathematics and economics courses to formulate a matrix game model and estimate the payoff matrix for several scenarios of their choice. For 2-person game models optimal min-max solutions must be found. Examples of areas using matrix games in analysis include ways to efficiently govern common pool resources; ways to efficiently provide public goods; oligopoly pricing decisions; coordination games; tactics in sports, and anti-submarine tactics.

**Experimental economics** involves the design of experiments using human subjects to support, to develop or refute the predictive powers of models and theories of economic behavior. Experiments have also been used to compare the behavior of economic decisions makers (subjects in an experiment) to a game theoretic solution (i.e. the Nash Equilibrium). For example, game theory indicates that the Nash Equilibrium solution to the voluntary contribution public goods game is for a player to “free-ride”, thereby not contributing to the public good. Experimental economics allows economists to determine if this equilibrium is consistent with human behavior. Finally, economic experiments have also been designed to test the assumptions of consumer and producer behavior in economic models. Students working in this area will choose an economic model or game model and design an experiment using midshipmen playing the roles of the economic agents. The results of the experiment will be analyzed by statistical methods, and compared with the results (or hypotheses) predicted by the theoretic model. In many cases the economic experiment will be a variation of an experiment reported in the literature.

## II. The Course Research Paper

The major focus of this seminar is your research paper. During the first four to six weeks you are to search for a topic for your research paper. You will do a literature search and perhaps a web search for papers using game theory or reporting on economic experiments. Reports of your literature search are required.

Research papers focused on two-person games or military applications of game theory should either analyze some variation of a game analysis presented in a journal article or research report, or expand or create an example of the game model that is presented in a paper. In either case the payoff matrix for an example of the game must be determined and its mathematical solution must be found.

Research papers focused on experimental economics must include: (1) a review of at least three articles dealing with the theory being investigated, (2) a presentation of the experimental procedures used and the research hypotheses, and (3) an analysis of the results of your experiment and how your experimental results fit with those reported in the literature.

Students will be assigned to one of the instructors as Project Advisor. The other faculty member will be a Reader. When working on the project the student must be in close contact with his or her primary advisor. This includes mandatory, weekly office visits to discuss progress on the project

### III. Paper Format

The paper will start with title page, which will include your name, the date, the course and an abstract, which will be about half-a-page in length and single-spaced. The body of the paper will be divided into sections and double-spaced. The body should include: (1) an introduction, (2) a literature review with at least three pertinent articles from quality journals, approved research reports or books, (3) a description of the game (either experimentally or theoretically), (4) the analysis, (5) the results, and (6) the conclusions. Papers should include figures and tables where appropriate. These figures and tables should be discussed in the paper **and** be able to “stand on their own” (which implies a descriptive title is necessary).

Results from computer packages should not merely be stapled to the back, but should be professionally redone as a figure or table to support your results. *Z-tree* code should be documented in an appendix of the paper (you should also email the program to both instructors as the print method is not yet user-friendly, merely a text document). Your paper’s target audience is your classmates and future quantitative economic majors. The data used in most cases will be put into an appendix; the paper may have several appendices.

There will be a section at the end of your paper listing references. Published material will be referenced following the style used in the *American Economic Review* or *The Chicago Manual of Style*. Reference to material to be found on the web should follow the following format:

Author (if known): title or short description, hyperlink address, organization sponsoring the material, the date it was last updated (if given) and the date you located it. For example:

Roth, Alvin E. "Al Roth's game theory and experimental economics page,"

<http://www.economics.harvard.edu/~aroth/alroth.html>, Dept of Economics, Harvard University, last updated 12/10/07, located on 12/12/07.

All pages, except the title page, must be numbered and have a header; this policy statement provides an example of the desired style.

### IV. The Formal Presentation

Twenty minutes will be allotted for each presentation; except when answering questions, the blackboard will not be used. Overhead slides or computer presentations are recommended. Students are strongly encouraged to make several “dry runs” of their presentation. Each presentation will be assigned a discussant. Following the presentation the discussant will comment on the paper. A copy of the paper must be given to the discussant at least 24 hours before the presentation.

### V. Milestones

- Draft Project proposal (can be delivered by email) – **5 February**.
- Final Project proposal – **19 February**.

- Experiments have been run – **7 March**.
- Completion of statistical analysis of experimental results – **25 March**.
- 1<sup>st</sup> draft of paper, which must include an abstract, an introduction, a literature review, and experimental design (if an experimental economics project is chosen) and an outline of unfinished parts of the paper – **31 March**.
- Project presentations – **10 April to 24 April**.
- Complete draft of project report due **15 April**.
- Final submission of project report **28 April**.

Failure to meet one or more deadlines will lower your final grade.

## **VI. Grading**

Interim grades (6 and 12 week) are based on seminar participation, short papers (reviews of the literature), and progress reports. Although the homework assignments and short papers will be graded, the grade received on these will affect the final grade only in borderline grades. The final course grade is driven primarily by the grade on the research paper and quality of the formal, oral presentation of the research paper.

**VIII. Schedule****WEEK ONE:**

Tu 1/8      **Administrative Day and introduction to the course**  
**Participate** in an eminent domain game (sequential game) played using *z-tree*  
**Reading** (1) “Experimental Market Economics”, Vernon Smith and Arlington Williams, Scientific American, December 1992  
(2) Read Prof. Alvin Roth’s web page cited above.

**Be sure to bring a flash-drive** or some other method for saving your programs on Thursday (note: the spam filter may not let your attachment through, so don’t rely on email!)

Th 1/10      **Z-tree tutorial**  
**Discuss** (1) “Experimental Market Economics”, Smith, V. and A. Williams, Scientific American, December 1992.  
**Discuss** (2) The results from Tuesday’s experiment  
**Discuss** (3) How z-tree works and study the z-tree code used in the game. **Be sure to note the way to program matching subjects!** If you forget this later, be sure to ask Prof Swope; the toolbar approach does not work (the program is not entirely finished).  
**Code** (1) Each student will write code for a public good game.  
**At “home” Code** (1) Try to modify the public good code (add more people, change the return rate, etc.) and test it on your machine at home.  
**Reading** (1) Sections 1 and 2 in “z-tree Tutorial”, Urs Fischbacher’s technical report (an electronic version of the entire Tutorial is linked to the course web site).

**Note: Prof. Swope has the program on his flash-drive – you can copy it from him, page 14 of the tutorial clearly explains how to test it on one computer (and you’ll be shown in class).**

**WEEK TWO:**

Tu 1/15      **More on z-tree**  
**Participate** in one randomly selected **student created** public good game using z-tree.  
**Participate** in an ultimatum game (a sequential game) using the *z-tree*.  
**Discuss** (1) The differences in programming a simultaneous versus a sequential game in *z-tree* (comparing the code from the public good game to the ultimatum game).  
**Code** (1) Each student will write code for an ultimatum game – it should be modified from the code presented in class (information differences, first mover “earned”, re-matching changes, etc.).  
**At “home” Code** (1) Finish modifying the ultimatum game code and test it on your machine at home.

**Reading** (1) “The Economics of Fair Play,” Sigmund, K., Fehr, E., and Howak, M.

*Scientific American*, January 2002.

(2) “Heritability of ultimatum game responder behavior,” Björn Wallace, David Cesarini and others, *Proceedings of the National Academy of Sciences*, 104:40 15631-15634 (Oct) 2007

Th 1/17

**More on z-tree**

**Participate** in one randomly selected **student created** ultimatum game using z-tree.

**Discuss** (1) “The Economics of Fair Play,” Sigmund, K., Fehr, E., and Howak, M.

*Scientific American*, January 2002.

(2) “Heritability of ultimatum game responder behavior,” Björn Wallace, David Cesarini and others, *Proceedings of the National Academy of Sciences*, 104:40 15631-15634 (Oct) 2007

**Reading** (1) A paper done in the course in a previous year.

**At “home” Assignment** (1) Write a review of the paper you read; a handout will be provided listing the points that a minimum must be covered in the summary

**WEEK THREE:**

Tu 1/22

**Risk Aversion, and Pencil and Paper Games**

**Participate** in a “risk” experiment

**Reading** (1) “Risk Aversion and Incentive Effects,” Laury, S. and C.

Holt. *American Economic Review*, 92(5), December 2002, 1644-55.

**At “home” Assignment** (1) Write a review of the Laury-Holt paper following the guidelines given.

Th 1/24

**Trust Games and the U. of Virginia Game Site**

**Discuss** (1) Results from the “risk” experiment

(2) “Risk Aversion and Incentive Effects,” Laury, S. and C.

Holt. *American Economic Review*, 92(5), December 2002, 1644-55

**Participate** in a “trust” experiment

**Reading** (1) “Trust, reciprocity and social history,” Berg, J., J. Dickhaut, and

K. McCabe. *Games and Economic Behavior* 10 (1), 122 – 142, (1995).

(2) “The Competitive Advantage of Sanctioning Institutions,” Gurerk, O, B Irlenbush, B. Rockenback. *Science* 312 (7 April), pp 108-111, (2006).

**At “home” Assignment** (1) Write a one-page review of the Berg et al paper following the guidelines given.

**WEEK FOUR:**

Tu 1/29

**TRUST**

**Discuss** (1) Results from the “trust” experiment

- (2) “Trust, reciprocity and social history,” Berg, J., J. Dickhaut, and K. McCabe. *Games and Economic Behavior* 10 (1), 122 – 142, (1995).
- (3) “The Competitive Advantage of Sanctioning Institutions,” Gurerk, O, B Irlenbush, B. Rockenback. *Science* 312 (7 April), pp 108-111, (2006).
- (4) Your draft project proposal is due 5-February.

Th 1/31 No class meeting. Students work on developing ideas for their own project and search the literature.

**WEEK FIVE:**

Tu 2/5 No class meeting. Students work on developing ideas for their own project. **By 1600 send an email to both instructors** proposing an area you want to develop for your course project. Your proposal must be longer than 200 words and reference at least one article in the literature.

Th 2/7 Meeting of groups of students working in similar areas. You will be notified by email of your group assignment and its meeting time.

**WEEK SIX:**

Tu 2/12 Meeting of groups of students working in similar areas. You will be notified by email of your group assignment and its meeting time.

Th 2/14 Be prepared to present your project proposal orally (about a 5-minute presentation). The instructors will provide guideline on writing a research proposal, planning your project and a style guide for you paper. We will also discuss your Final Project proposal due 20-February.

**WEEK SEVEN:**

Tu 2/21 **Turn in your written proposal.** This report will contain an outline of the issues to be studied, and the approach planned. Bring two copies. Finish the rest of the oral presentations of project proposals.

**WEEK ELVEN:**

Tu 3/25 Lecture on what is expected in abstract and introduction of project report and a style guide for your report.

Sunday 3/31 **Email to your advisor** the 1<sup>st</sup> Draft of project report in a Word file. (Send a copy only to your project advisor.)

**WEEK THIRTEEN**

Th 4/10 Oral presentations of project reports.

**WEEK FOURTEEN:**

Tu 4/15      **Turn in** complete draft of project report to both instructors. Oral presentations of project reports.

Th 4/17      Oral presentations of project reports.

**WEEK FIFTEEN:**

Tu 4/22      Oral presentations of project reports.

Th 4/24      Oral presentations of project reports.

**M 4/28**      **Turn in two** copies of your project report to your project advisor and one copy to the other instructor.