Course Description
This class is designed as a Ph.D.-level class in natural resource and environmental economics that expands on the material covered in AREC/ECON 540 and AREC/ECON 541. The first half will focus on externalities, public goods, the design of environmental markets and institutions and how these topics are examined theoretically, empirically, and experimentally. There will also be a section on valuation through experimental methods. The second half will focus on dynamic models of natural resource allocation, and introduce numerical methods for solving dynamic problems that are generally intractable analytically. The material will largely developed around the theme of ecosystem services, including valuation and payment for ecosystem services (PES) schemes.

Course Objectives
Students will become familiar with the core literature in the field of natural resource and environmental economics, and learn to apply analytical, numeric, statistical and experimental tools to problems of natural resource management and environmental valuation. The portfolio of techniques and literature will contribute to the necessary background for future research and teaching in the natural resource and environmental economics field.

Recommended Texts, Readings, and Software
As an advanced graduate level class, there is no one textbook that covers the all of the class material; instead, we will draw from a number of books and journal articles. Both instructors will provide relevant reference lists. Readings, homework assignments, etc. are posted on https://sites.google.com/site/740spring2014/home

Coursework and Exams
Given the nature of the course, no exams will be given in the class. Instead, a number of problem sets and paper presentations will be assigned to aid in your understanding of the concepts discussed in class and to further explore related topic material.

Grading
Kroll: Two problem sets (worth 5% each), plus one experimental project:
Each student will select a recent theoretical or empirical (non-experimental) article from Journal of Environmental Economics and Management (JEEM), Environmental and Resource Economics (ERE), Land Economics (LE) or an environmental/resource economics paper from a different journal, design
and program an experiment in order to test the results from the selected paper, and present paper and experimental design in class. Grades are based on: (1) presentation of paper and design (10%); (2) experimental idea, design and program (10%); (3) paper (20%).

Warziniack: Four problem sets (worth 5% each), plus one computational paper:
Each student will select a computational model, with guidance and approval of the instructor, covered in class or currently being used for natural resource policy. The student will first replicate, then extend the model. The extension will be the basis of the paper (10-15 pages in length). Grades are based on: (1) understanding of the model and its importance for natural resource policy (10%), (2) accurate use of the model and experimental methods (10%), and (3) effective communication of model and interpretation of the results (10%).

Outline and Reading List
Below is a tentative course outline.

Week 1 (Jan. 21 and 23): Introduction to Experimental Economics and zTree
Nobel Prize Scientific Background Papers on Alvin Roth (and Lloyd Shapley, 2012), Elinor Ostrom (and Oliver Williamson, 2009), and Vernon Smith and Daniel Kahneman (2002).


Week 2 (Jan. 28 and 30): Externalities

Week 3 (Feb. 4 and 6): Public Goods


Week 4 (Feb. 11 and 13): Public Goods/Market Design

**Week 5 (Feb. 18 and 20): Market Design**


**Week 6 (Feb. 25 and 27): Market Design/Valuations through Experimental Auctions**


Selected parts from

**Week 7 (Mar. 4 and 6): Valuations through Experimental Auctions**


**End of the first half--------------------------------------**

**Week 8 (Mar. 11 and 13): Overview of ecosystem services and beginning model development**


March 18 and 20: Spring Break

Week 9 (Mar. 25 and 27) Ecosystem Valuation and Payments for Ecosystem Services. Exercise 1 due


Week 10 (Apr. 1 and 3) Land Use and Open Space. Exercise 2 due


Week 11 (Apr. 8 and 10) Growth and Natural Resources


Week 12 (Apr. 15 and 17) Growth and Natural Resources (cont.) Exercise 3 due


**Week 13 (Apr. 22 and 24) Link Economic-Ecosystem Models**


**Week 14 (Apr. 29 and May 1) Policy and Welfare Effects (if time permits). Exercise 4 due**


**End of the second half-----------------------------------------------**

**Week 15 (May 6 and 8)**

Student Presentations

**Finals Week (May 16)**

Both papers are due.