AREC 740 – Advanced Resource and Environmental Economics
Department of Agricultural and Resource Economics
Colorado State University
Fall, 2014

Course Syllabus

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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).

Fischbacher, Urs (2007), "z-Tree: Zurich Toolbox for Ready-Made Economic Experiments," *Experimental Economics* 10(2): 171-178.

Falk, Armin and James J. Heckman (2009), "Lab Experiments Are A Major Source of Knowledge in the Social Sciences," *Science* 326, 535-538.

Ehmke, Mariah D. and Jason F. Shogren (2009), "Experimental Methods for Environment and Development Economics," *Environment and Development Economics* 14(4), 419-456.

Henrich, Joseph et al. (2001), "In Search of Homo Economicus: Behavioral Experiments in 15 Small-Scale Societies," *American Economic Review* 91(2), 73-78.

Week 2 (Jan. 28 and 30): Externalities
Plott, Charles (1983), "Externalities and Corrective Policies in Experimental Markets," *Economic Journal* 93:106-127.

Week 3 (Feb. 4 and 6): Public Goods
Kotchen, Matthew and M. R. Moore (2007), "Private Provision of Environmental Public Goods: Household Participation in Green-Electricity Programs," *Journal of Environmental Economics and Management* 53(1): 1-16.

Fehr, Ernst and Simon Gächter (2000), "Cooperation and Punishment in Public Goods Experiments," *American Economic Review* 90(4), 980-994.

Fischbacher, Urs, Simon Gächter and Ernst Fehr (2001), "Are People Conditionally Cooperative? Evidence from a Public Goods Experiment," *Economics Letters* 71: 397-404.

Kroll, Stephan, Todd L. Cherry and Jason F. Shogren (2007), "Voting, Punishment and Public Goods," *Economic Inquiry* 45(3): 557-570.

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

Kosfeld, Michael, Akira Okada and Arno Riedl (2009), "Institution Formation in Public Goods Games," *American Economic Review* 99(4), 1335-1355.

Week 5 (Feb. 18 and 20): Market Design
Shobe, William, Karen Palmer, Erica Myers, Charles Holt, Jacob Goeree and Dallas Burtraw (2009), "An Experimental Analysis of Auctioning Emissions Allowances under a Loose Cap," *Agricultural and Resource Economics Review* 39(2), 162-175.

Goeree, Jacob, Karen Palmer, Charles Holt, William Shobe, and Dallas Burtraw (2010), "An Experimental Study of Auctions versus Grandfathering to Assign Pollution Permits," *Journal of the European Economic Association* 8(2-3), 514-525.

Lefebvre, Marianne, Lata Gangadharan and Sophie Thoyer (2012), "Do Security-Differentiated Water Rights Improve the Performance of Water Markets?" *American Journal of Agricultural Economics* 94(5), 1113-1135.

Week 6 (Feb. 25 and 27): Market Design/Valuations through Experimental Auctions
Ariely, Dan, Axel Ockenfels and Alvin Roth (2005), "An Experimental Analysis of Ending Rules in Internet Auctions," *Rand Journal of Economics* 36/4, 890-907.

Niederle, Muriel and Alvin E. Roth (2009), "Market Culture: How Rules Governing Exploding Offers Affect Market Performance," *American Economic Journal: Microeconomics* 1(2), 199-219.

Selected parts from
Lusk, Jayson L. and Jason F. Shogren (2007), *Experimental Auctions: Methods and Applications in Economic and Marketing Research*, Cambridge University Press.

Week 7 (Mar. 4 and 6): Valuations through Experimental Auctions
Lusk, Jayson L. and Keith H. Coble (2005), "Risk Perceptions, Risk Preference and Acceptance of Risky Food," *American Journal of Agricultural Economics* 87(2), 393-405.

Chang, Jae Bong, Jayson L. Lusk, and F. Bailey Norwood (2009), "How Closely Do Hypothetical Surveys and Laboratory Experiments Predict Field Behavior?" *American Journal of Agricultural Economics* 91(2), 518-534.

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

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

Costanza, Robert, et al. "The value of the world's ecosystem services and natural capital." *nature* 387.6630 (1997): 253-260.

Gómez-Baggethun, Eirk, Rudolf de Groot, Pedro L. Lomas, Carlos Montes (2010), "The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes," *Ecological Economics* 69:1209-1218.

Millennium ecosystem assessment. (2003).

March 18 and 20: Spring Break

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

Farley, Joshua, and Robert Costanza. "Payments for ecosystem services: from local to global." *Ecological Economics* 69.11 (2010): 2060-2068.

Howarth, Richard B., and Richard B. Norgaard. "Environmental valuation under sustainable development." *The American economic review* 82.2 (1992): 473-477.

Jack, B. Kelsey, Carolyn Kousky, and Katharine RE Sims. "Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms." *Proceedings of the National Academy of Sciences* 105.28 (2008): 9465-9470.

Schlager, Edella, and Elinor Ostrom. "Property-rights regimes and natural resources: a conceptual analysis." *Land economics* (1992): 249-262.

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

Armsworth, Paul R., et al. "Land market feedbacks can undermine biodiversity conservation." *Proceedings of the National Academy of Sciences* 103.14 (2006): 5403-5408.

Irwin, Elena G., and Nancy E. Bockstael. "The evolution of urban sprawl: evidence of spatial heterogeneity and increasing land fragmentation." *Proceedings of the National Academy of Sciences* 104.52 (2007): 20672-20677.

Warziniack, Travis. "Efficiency of public goods provision in space." *Ecological Economics* 69.8 (2010): 1723-1730.

Wu, JunJie, and Andrew J. Plantinga. "The influence of public open space on urban spatial structure." *Journal of Environmental Economics and Management* 46.2 (2003): 288-309.

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

Chichilnisky, Graciela. "North-south trade and the global environment." *American economic review* 84.4 (1994).

Matsuyama, Kiminori. "Agricultural productivity, comparative advantage, and economic growth." *Journal of economic theory* 58.2 (1992): 317-334.

Sachs, Jeffrey D., and Andrew M. Warner. "The curse of natural resources." *European economic review* 45.4 (2001): 827-838.

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

Stiglitz, Joseph. "Growth with exhaustible natural resources: efficient and optimal growth paths." *The review of economic studies* 41 (1974): 123-137.

Taylor, M. Scott, and James A. Brander. "The simple economics of Easter Island: A Ricardo-Malthus model of renewable resource use." *The American Economic Review* 88.1 (1998): 119-138.

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

Tschirhart, John. "Biology as a source of non-convexities in ecological production functions." *Environmental and Resource Economics* 51.2 (2012): 189-213.

Crocker, Thomas D, and John Tschirhart (1992). "Ecosystems, Externalities, and Economies," *Environment and Natural Resources* 2:551-567.

Eichner, Thomas, and Rüdiger Pethig. "Pricing the ecosystem and taxing ecosystem services: a general equilibrium approach." *Journal of Economic Theory* 144.4 (2009): 1589-1616.

Finnoff, David, and John Tschirhart. "Inserting ecological detail into economic analysis: agricultural nutrient loading of an estuary fishery." *Sustainability* 3.10 (2011): 1688-1722.

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

Parry, Ian WH, Roberton C. Williams, and Lawrence H. Goulder. "When can carbon abatement policies increase welfare? The fundamental role of distorted factor markets." *Journal of Environmental Economics and Management* 37.1 (1999): 52-84.

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

Week 15 (May 6 and 8)
Student Presentations

Finals Week (May 16)
Both papers are due.