ENVIRONMENTAL AND RESOURCE ECONOMICS II
ECG 716, SPRING 2016
T/Th, 10:15-11:30, 3214 Gardner Hall

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Course Description

This course is designed to provide students with a working knowledge of a selected set of current analytical techniques and an understanding of how they are applied in the design and evaluation of public policies aimed at management and conservation of environmental systems. The course focuses on learning technical methods, understanding the smajor open research questions in the field, with the central aim of guiding students towards new research and potential dissertation topics.

The course is split into two modules, with the first being taught by Zack Brown and the second by Laura Taylor. Topics covered in the first submodule will focus on 'environmental micro-econometrics,' and will include general discrete econometric models used in environmental valuation before moving to focus on stated preference methods. The second section focus on revealed preference settings.

Prerequisites

ECG715 or permission of the instructor.

Required Text and Other Materials

There is no text you will be required to purchase. Core readings will be posted on the course website.

There are two software packages we will use in this course: Matlab and Stata. Matlab is available free through NCSU, but can only be used on University-owned machines. Stata must be purchased, but a temporary license can be purchased as a student for approximately the price of a textbook. If you are in a position to do so and are planning on using the econometric techniques you learn in this course in future research, we recommend you purchase Stata/IC Perpetual License, which is $198.

Communication & Office Hours

The best way to communicate with us is via email. We will also need you to provide to us with your preferred email address (one that you check most frequently). Our schedules are erratic due to meetings and work-related travel, and so we do not keep set office hours. However, we are happy to meet with you at any time convenient for you. Send us an email or stop by our offices and we will schedule a meeting convenient for you.

Evaluation

In this course, you will practice a variety of skills that are integral components of being a professional economist. These include (1) econometric analysis of data, (2) synthesizing research literature; (3) evaluating the research of others; (4) attending seminars and giving

feedback to others on their work; (5) developing viable research questions and approaches for answering the questions.

In addition to technical skills, it is critical that you are able to write clear, logical and compelling arguments and present those arguments to an audience. There will be assignments to help develop these skills and give you feedback on where you are relative to a professional.

Evaluation is as follows:

(1) A midterm and a cumulative final, worth 30% and 40%, respectively. These exams may include both in-class and take-home components.
(2) Problem sets and projects – 30% total, with 20% in the first module of the course (distributed across 2 assignments) and 10% in the 2nd module (distributed across 1 assignment).

POLICIES

Attendance policy
If you must miss class for excused reasons on one of the mid-term days, inform me no later than two weeks (4 class periods) in advance, so that we can arrange an alternative time for you to take the exam.

Attendance at all TREE seminars is required for all students, and attendance at CEnREP colloquia is required for NCSU students. You may miss one of each. TREE seminars are at 3:15 on Thursday afternoons at RTI; CEnREP Colloquia are from 12:00-1:00 on Fridays. The dates, time & location of these presentations are posted at: www.ncsu.edu/cenrep/workshops/. NCSU students: you will be given the opportunity to meet with speakers while they are on campus. As a professional economist, we expect you to make use of such opportunities.

There is a common expectation that you will attend class having read assigned readings beforehand. We will be as specific as possible about the readings. If attendance in the class wains significantly or if we get the impression you have not been reading the articles, we will modify the grading scheme to reflect this unfortunate turn of events.

Late-work policy
For take-home assignments, no credit will be granted for work turned in after the due date, unless the student emails the instructor – and clears the late submission – in advance. For late work cleared in advance, the student has one week after the due date to turn the assignment in. Otherwise, no credit will be granted.

Code of Student Conduct
All students are bound by the Code of Student Conduct which governs academic integrity at North Carolina State University. Therefore, students are required to review the definitions of academic dishonesty to avoid behaviors which are in violation of this code. In submitting an assignment, students consent that he/she neither gave nor received unauthorized aid. Students who violate the code of student conduct will receive zero points for that assignment only. Please

see the website for a full explanation of the University Code of Student Conduct
http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php
Unexcused assignments submitted late may be graded on a reduced criteria, at the discretion of the instructor.

University Policy on Incompletes
The NCSU policy on incompletes can be found in the *Graduate Handbook.* Please review this policy – incompletes will be given only when a student makes a formal request and when appropriate documentation accompanies the written request for an incomplete. Please see the university's policy, available at http://www.ncsu.edu/grad/handbook/sections/3.18-grades.html#I.

University Non-discrimination Policies
It is the policy of the State of North Carolina to provide equality of opportunity in education and employment for all students and employees. Accordingly, the university does not practice nor condone unlawful discrimination in any form against students, employees or applicants on the grounds of race, color, religion, creed, sex, national origin, age, disability, or veteran status. North Carolina State University regards discrimination on the basis of sexual orientation to be inconsistent with its goal of providing a welcoming environment in which all its students, faculty, and staff may learn and work up to their full potential. The University values the benefits of cultural diversity and pluralism in the academic community and welcomes all men and women of good will without regard to sexual orientation.

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, (919) 515-7653. For additional information, see http://www.ncsu.edu/provost/offices/affirm_action/dss/. For more information on NC State's policy on working with students with disabilities, please see
http://www.ncsu.edu/policieis/academic_affairs/courses_undergrad/REG02.20.1.php

End of Semester Evaluations
Online class evaluations will be available for students to complete during the last 2 weeks of each semester. Students will receive an email message directing them to a website where they can login using their Unity ID to complete evaluations. All evaluations are confidential; instructors will not know how any one student responded to any question, and students will not know the ratings for any instructors.
Evaluation website: https://classeval.ncsu.edu/
Student help desk: classeval@ncsu.edu
More information about ClassEval: http://www.ncsu.edu/UPA/classeval/

Schedule for Module 1 of ECG 716

Subject to change

Date	Topic	Readings
Th 7-Jan	First day of classes	Overview of course, Matlab & Stata access
Tues 12-Jan	Overview of discrete choice modelling I: theory	Train, Ch. 2-3: Overview of models & conditional logit
Th 14-Jan		
Tues 19-Jan	Overview of discrete choice modelling II: empirical methods	Train, Ch. 8: Numerical maximization Stata manual entries for *clogit, mlogit*
Th 21-Jan		
Tues 26-Jan	Overview of discrete choice modelling III: post-estimation & welfare analysis	McConnell, K. E. (1995). Consumer surplus from discrete choice models. *Journal of Environmental Economics and Management*, 29, 263–270. Stata manual entries for *nlcom, lincom, test*
Th 28-Jan		
Tues 2-Feb	Stated choice methods I: Study design & data collection	Ch. 1-2 in *Valuing Environmental Amenities in Stated Choice Studies.* 2006. B. Kanninen (ed.). Springer.
Th 4-Feb		
Tues 9-Feb	Stated choice methods II: Experimental design in discrete choice experiments	Ch. 7 in Valuing Environmental Amenities in Stated Choice Studies. 2006. B. Kanninen (ed.). Springer. Ferrini, S., & Scarpa, R. (2007). Designs with a priori information for nonmarket valuation with choice experiments: A Monte Carlo study. *Journal of Environmental Economics and Management*, 53(3), 342–363.
Th 11-Feb		
Tues 16-Feb	Stated choice methods III: Econometric models for discrete choice experiments	**(Feb. 16) Take-home assignment #1 due** Ch. 9 in Valuing Environmental Amenities in Stated Choice Studies. 2006. B. Kanninen (ed.). Springer.
Th 18-Feb		

Tues	23-Feb	Stated choice methods IV: Econometric models for discrete choice experiments	Applications *Student presentations reviewing published or working papers using stated preference methods in an environmental application. (Papers to choose from are listed at end of syllabus)*
Th	25-Feb		
Tues	1-Mar		
Th	**3-Mar**	**Midterm**	
Tues	8-Mar	*Spring break*	
Th	10-Mar		

Readings for Module 2 of the Course (6 weeks)
Schedule for the course and associated assignments may change. You will be given verbal and written notices of any changes to the course, its readings or assignments, with plenty of advanced warning before anything might be due.

Each section has a discussion in *italics* with more information on the readings.

I. Background References

Books on nomarket valuation to use as resources.

Readings/books below are not required, but listed as references. Champ et al. is a good, simple introduction to most topics. Freeman is a classic and covers many topics. Bockstael & McConnell is excellent.

Champ, Boyle and Brown (eds.), *A Primer on Nonmarket Valuation* (Kluwer, 2004; new edition forthcoming 2017).

Freeman, *The Measurement of Environmental and Resource Values: Theory and Methods, 2nd edition* (RFF, 2003)

Bockstael, Nancy, and Kenneth McConnell. *Environmental and Resource Valuation with Revealed Preferences: A Theoretical Guide to Empirical Models*. Springer, Dordrecht, 2007

I. The Hedonic Model: Review

Taylor (2003). "Hedonic Methods," in *A Primer on Non-Market Valuation*.

Phaneuf (2012). "Property Value Models, Chapter 18" in Phaneuf and Requate (book forthcoming; a copy of the chapter is provided to class).

Palmquist (2004). "Property Value Models," in Karl-Göran Mäler and Jefferey Vincent, eds., Handbook of Environmental Economics, volume 2, Elsevier North Holland, 2004.

The above chapters provide good reviews of the hedonic method. Taylor is an introductory chapter for good for advanced M.A. students or an easy read for PhD students. Palmquist is the most complete in terms of theoretical welfare measurement with the hedonic models (and very good on estimation too, but does not include current empirical models (i.e., does not include sorting models or quasi-experimental approaches). Phaneuf is slightly more technical that Taylor, lying between Taylor and Palmquist.

II. The Hedonic Model: 1st Stage Estimation of MWTP

The next three papers are illustrations of 1st stage hedonic model applications. The fourth paper is for your reference with regards to choice of specification for the hedonic price function.

Ihlanfeldt and Taylor, 2004. "Externality Effects of small-scale hazardous waste sites: evidence from urban commercial property markets," *Journal of Environmental Economics and Management.*

Kiel and Williams, 2007. The Impact of Superfund Sites on Local Property Values: Are All Sites the Same?, *Journal of Urban Economics*, 61(1): pp. 170-92.

Taylor, Phaneuf and Liu, 2016. Disentangling the Impacts of Environmental Contamination from Locally Undesirable Land Uses: Implications for Post-Cleanup Stigma, working paper, Center for Environmental and Resource Economic Policy, North Carolina State University.

Kuminoff, Parmeter, and Pope, 2010. "Hedonic Price Functions: Guidance on Empirical Specification," *Journal of Environmental Economics and Management,* 60(3):145-60.

III. The Hedonic Model: 2nd Stage Estimation of WTP

In the next seven papers, Palmquist and Boyle et al are examples of multi-market second-stage analyses and Chattopadhyay provides a single-market approach example. Bishop and Timmins provide an alternative approach to single-market estimation (and build on the two Ekeland et al. papers). Klaiber & Phaneuf is a straightforward sorting-model example.

Palmquist, R.B. 1984. "Estimating the demand for the characteristics of housing," *The Review of Economics and Statistics*, 66(3):394-404.

Boyle, Poor and Taylor, 1999. Estimating the demand for protecting freshwater lakes from eutrophication, *American Journal of Agricultural Economics*, 85:1118-1122.

Chattopadhyay, 1999. "Estimating the demand for air quality: new evidence based on the Chicago housing markets," *Land Economics*, 75(1):22-38.

Bishop and Timmins, 2015. "Estimating the Marginal Willingness to Pay Function Without Instrumental Variables," working paper.

Ekeland, Heckman, Nesheim, 2002. Identifying Hedonic Models, *American Economic Review*, 92(2): 304-09. 7

Ekeland, Heckman, Nesheim, 2004. Identification and Estimation of Hedonic Models, *Journal of Political Economy*, 112(1): S60-109.

Klaiber and Phaneuf, 2010. "Valuing Open Space in a Residential Sorting Model of the Twin Cities," *Journal of Environmental Economics and Management*, 60(2).

IV. Natural and Quasi-Experiments: Background

The first three papers give a nice overview & framework for thinking about quasi-experimental designs; Heckman, Lalonde and Smith and Angrist & Krueger are more technical references; the two Todd readings are succinct introductions to matching estimators; and the last two readings are specific to quasi-experiments in property value models.

Meyer, Bruce D., (1995). "Natural and Quasi-experiments in Economics". *Journal of Business and Economic Statistics*. 13 (2): 151-61.

Moffit, Robert (1991) "Program Evaluation with Non-experimental Data" *Evaluation Review,* Vol: 15(3): 291-314.

Smith, Jeffrey (2000) "A Critical Survey of Empirical Methods for Evaluating Active Labor Market Policies". *Swiss Journal of Economics and Statistics*. Vol: 136 (III): 247-268.

Heckman J., R. Lalonde and J. Smith (1999), "The Economics and Econometrics of Active Labor Market Programs", in: O. Ashenfelter and D. Card, eds., Handbook of Labor Economics Volume 3A, Amsterdam, 1865-2097.

Angrist, Joshua D. and Krueger, Alan B. (1999) "Empirical strategies in labor economics" O. Ashenfelter & D. Card (ed.) Handbook of Labor Economics, chapter 23, pages 1277-1366, 1999.

Todd, Petra (1999) "A Practical Guide to Matching Estimators," working paper.

Todd, Petra (2006) "Matching Estimators", in the *Palgrave* (version is a draft manuscript).

Parmeter and Pope, 2008. "Quasi-Experimental Methods and Hedonic Property Value Methods, forthcoming in *Handbook of Experimental Economics and the Environment*.

Kuminoff, Nicolai V. and Jaren C. Pope. "Hedonic Equilibria, Land Value Capitalization, and the Willingness to Pay for Public Goods," working paper.

V. Natural and Quasi-Experiments: Applications

Ferraro, Paul, Craig McIntosh, and Monica Ospina (2007) "The effectiveness of the US endangered species act: An econometric analysis using matching methods". Journal of Environmental Economics and Management. 54 (3): 245-261.

List, J.A., Millimet, D.L., Fredriksson, P.G., and McHone, W.W.. 2003. "Effects of environmental regulations on manufacturing plant births: Evidence from a propensity score matching estimator." Review of Economics and Statistics, 85 (4): 944-952.

Kellogg and Wolf, 2008. Daylight time and energy: Evidence from an Australian experiment, Journal of Environmental Economics and Management 56: 207–220.

Greenstone and Gallagher, 2008. Does Hazardous Waste Matter? Evidence from the Housing Market and the Superfund Program, *Quarterly Journal of Economics*, August 2008.

Pope, 2008. Buyer information and the hedonic: the impact of a seller disclosure on the implicit price for airport noise, Journal of Urban Economics, v63:498-516.

Davis, 2004. The effect of health risk on housing values: evidence from a cancer cluster," American Economic Review, v94:1693-1704.

Lee and Taylor, 2015. "A Quasi-experimental Approach to Estimating the Value of Reducing Mortality and Morbidity Risks," working paper.

List of choice modelling studies to consider in your paper reviews

Adamowicz W, Dickie M, Gerking S, Veronesi M, Zinner D: **Household Decision-Making and Valuation of Environmental Health Risks to Parents and their Children**. *J Assoc Environ Resour Econ* 2013, **1**:481–519.

Börger T: **Are Fast Responses More Random? Testing the Effect of Response Time on Scale in an Online Choice Experiment**. *Environ Resour Econ* 2015.

Burton M, Rigby D: **Hurdle and Latent Class Approaches to Serial Non-Participation in Choice Models**. *Environ Resour Econ* 2008, **42**:211–226.

Colombo S, Christie M, Hanley N: **What are the consequences of ignoring attributes in choice experiments? Implications for ecosystem service valuation**. *Ecol Econ* 2013, **96**:25–35.

Crastes R, Beaumais O, Arkoun O, Laroutis D, Mahieu P-A, Rulleau B, Hassani-Taibi S, Barbu VS, Gaillard D: **Erosive runoff events in the European Union: Using discrete choice experiment to assess the benefits of integrated management policies when preferences are heterogeneous**. *Ecol Econ* 2014, **102**:105–112.

Dickinson K, Paskewitz S: **Willingness to pay for mosquito control: how important is West Nile virus risk compared to the nuisance of mosquitoes?** *Vector-Borne Zoonotic Dis* 2012, **12**:886–92.

Ek K, Persson L: **Wind farms — Where and how to place them? A choice experiment approach to measure consumer preferences for characteristics of wind farm establishments in Sweden**. *Ecol Econ* 2014, **105**:193–203.

Johnston, R.J., E.T. Schultz, K. Segerson, E.Y. Besedin and M. Ramachandran. 2012. **Enhancing the Content Validity of Stated Preference Valuation: The Structure and Function of Ecological Indicators**. *Land Economics* 88(1): 102-120.

Morey E, Thacher J, Breffle W: **Using Angler Characteristics and Attitudinal Data to Identify Environmental Preference Classes: A Latent-Class Model**. *Environ Resour Econ* 2006, **34**:91–115.

Oleson KLL, Barnes M, Brander LM, Oliver TA, van Beek I, Zafindrasilivonona B, van Beukering P: **Cultural bequest values for ecosystem service flows among indigenous fishers: A discrete choice experiment validated with mixed methods**. *Ecol Econ* 2015, **114**:104–116.

Poulos C, Yang J-C, Patil SR, Pattanayak S, Wood S, Goodyear L, Gonzalez JM: **Consumer preferences for household water treatment products in Andhra Pradesh, India**. *Soc Sci Med* 2012, **75**:738–746.

Rodrigues, L.C. et al., 2015. **The Cost of Mediterranean Sea Warming and Acidification: A Choice Experiment Among Scuba Divers at Medes Islands, Spain**. *Environmental and Resource Economics*.

Rolfe, J. & Windle, J., 2014. **Do Respondents Adjust Their Expected Utility in the Presence of an Outcome Certainty Attribute in a Choice Experiment?** *Environmental and Resource Economics*, 60(1), pp.125–142.

Sælen H, Kallbekken S: **A choice experiment on fuel taxation and earmarking in Norway**. *Ecol Econ* 2011, **70**:2181–2190.

Scarpa R, Zanoli R, Bruschi V, Naspetti S: **Inferred and Stated Attribute Non-attendance in Food Choice Experiments**. *Am J Agric Econ* 2012, **95**:165–180.

Thiene, M., Boeri, M. & Chorus, C.G., 2011. **Random Regret Minimization: Exploration of a New Choice Model for Environmental and Resource Economics**. *Environmental and Resource Economics*, 51(3), pp.413–429.

Thiene M, Meyerhoff J, De Salvo M: **Scale and taste heterogeneity for forest biodiversity: Models of serial nonparticipation and their effects**. *J For Econ* 2012, **18**:355–369.

Train, K., 2015. Welfare calculations in discrete choice models when anticipated and experienced attributes differ: A guide with examples. *Journal of Choice Modelling*, 16, pp.15–22.

Zhang T, Gensler S, Garcia R: **A Study of the Diffusion of Alternative Fuel Vehicles: An Agent-Based Modeling Approach**. *J Prod Innov Manag* 2011, **28**:152–168.