

**OREGON STATE UNIVERSITY  
GRADUATE PROGRAM IN APPLIED ECONOMICS**

**AEC 625: Advanced Econometrics I**

Winter term, 4 credits

**Professor**

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**Course Description**

This course emphasizes the basic theory underlying the main types of estimators used in econometrics, as well as their application in empirical research. The course includes derivation, properties, and application of method of moments, maximum likelihood, ordinary and generalized least squares, and instrumental variables estimators, statistical inference and hypothesis testing, and model building and specification analysis. The course provides the necessary foundation for estimation techniques covered in AEC 626.

**Prerequisites:** AEC 525

**Objectives:**

The Course objectives are:

- To introduce students to the theory and practice of econometrics at a level appropriate for first year economics Ph.D. students, with emphasis on estimators used in modern econometric practice;
- To provide students with the basic conceptual tools to understand modern estimation methodology and techniques used in economics and other social sciences;
- To provide students with the necessary background for the next course in the Ph.D. level quantitative methods sequence;
- To enable students to conduct high quality applied econometric research.

**Learning Outcomes:**

Students completing this class successfully will be:

- Able to recall and discuss the basic theory behind the derivation and properties of estimators used in modern econometric practice;
- Able to specify and estimate basic linear empirical models and conduct statistical inference using data;
- Able to apply this theory to other estimation contexts.

## **Lectures**

Monday and Wednesday 10:00 - 11:20 AM, **STAG 112**.

Computer Lab Session: Friday 1:00 -1:50 PM, **BEXL 324**.

## **Office Hours**

Langpap: Tuesday and Thursday, 2:30 – 4:00 PM. Other times by appointment.

Fouzia: Thursday 12:00 – 1:30. Other times by appointment.

## **Textbooks**

W.H. Greene, *Econometric Analysis*, 8<sup>th</sup> edition, Pearson (required).

P. Kennedy, *A Guide to Econometrics*, 6<sup>th</sup> edition, Wiley-Blackwell (recommended).

Other good econometrics books:

J.D. Angrist and J.S. Pischke. *Mostly Harmless Econometrics. An Empiricist's Companion*. Princeton U. Press.

A.C. Cameron and P.K. Trivedi. *Microeconometrics. Methods and Applications*. Cambridge U. Press.

A.C. Cameron and P.K. Trivedi. *Microeconometrics Using Stata*. Stata Press.

J.M. Wooldridge. *Econometric Analysis of Cross Section and Panel Data*. 2<sup>nd</sup> Ed. MIT Press.

J.M. Wooldridge. *Introductory Econometrics. A Modern Approach*. 5<sup>th</sup> Ed. Cengage Learning.

M. Verbeek. *A Guide to Modern Econometrics*. 4<sup>th</sup> Ed. Wiley.

## **Background**

Greene will be the main textbook for this course. It is assumed that students have a good background in math and statistics. If students find the topics in Greene difficult, Wooldridge's introductory textbook might be helpful. Additionally, Kennedy's book is descriptive and provides an intuitive explanation of various econometric topics.

Problem sets will emphasize the course objective - *basic theory and applied econometrics*. Materials in Greene and similar texts will serve as the basis for problem sets. Problems will be both analytical and applications of econometric procedures to real data. Lab sessions will cover the necessary computer skills required for the course and review (graded) problem set materials. For the computer-based problems, we will use Stata.

## **Course requirements:**

5 Problem sets 35% (7% each)

Midterm 30%

Final 35%

**Course Content** (Readings in *italics* are *not* required)

1. Introduction: Regression analysis, the selection problem, and causal effects  
Greene 1.1 – 1.5  
*Angrist & Pischke Ch. 2*
2. The Classical Multiple Linear Regression Model  
Assumptions of the Model: Greene 2.1-2.4  
Estimators  
    Method of Moments: Greene 13.1, 13.2  
    Maximum Likelihood: Greene 14.1-14.3, 14.6  
    Ordinary Least Squares: Greene 3.1-3.7  
Finite Sample Properties of the Least Squares Estimator: Greene 4.1-4.3  
Large Sample (Asymptotic) Properties of Estimators: Greene 4.4, 4.6, 14.4, 14.9.1  
Asymptotic Inference: Greene 5.4  
Robust Inference: Greene 4.5, 9.2
3. Nonspherical Disturbances and the Generalized Regression Model  
Greene 9.1, 9.3 – 9.3.3, 9.4  
Autocorrelation: Greene 20.1-20.3, 20.5, 20.7-20.9
4. Endogeneity and Instrumental Variables Estimation  
Greene 8.1-8.8, 8.10-8.11.  
*Angrist & Pischke 4.1 – 4.1.1, 4.2.1, 4.6.4.*  
  
Frijters, P., D.W. Johnston, M. Shah, and M.A. Shields. 2009. “To Work or Not to Work? Child Development and Maternal Labor Supply.” *American Economic Journal: Applied Economics* 1:3, 97–110.  
  
*Angrist, J.D. and A.B. Krueger. 2001. “Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments.” *Journal of Economic Perspectives* 15(4): 69 – 85.*
5. Regression Discontinuity  
*Angrist & Pischke Ch. 6.*  
  
Lee, David S. and T. Lemieux. 2010. “Regression Discontinuity Designs in Economics.” *Journal of Economic Literature* 48(2): 281 – 355.  
  
Bošković, B., and L. Nøstbakken. 2017. “The Cost of Endangered Species Protection: Evidence from Auctions for Natural Resources.” *Journal of Environmental Economics and Management* 81: 174-192.

### *Students with Disabilities*

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

### *Student Conduct*

OSU policies with regard to academic dishonesty and disruptive behavior will be strictly followed. Oregon State University defines academic dishonesty as: “An intentional act of deception in which a student seeks to claim credit for the work or effort of another person or uses unauthorized materials or fabricated information in any academic work.”

Academic dishonesty includes: Cheating, Fabrication, Assisting, Tampering, Plagiarism. More information is available at:

[http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code\\_of\\_student\\_conduct.pdf](http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code_of_student_conduct.pdf)