OREGON STATE UNIVERSITY
APPLIED ECONOMICS GRADUATE PROGRAM

AEC 625: Advanced Econometrics I
Winter term, 4 credits

Professor
Christian Langpap
Department of Applied Economics
Office: Ballard 240E; Phone: 737-1473; E-mail: christian.langpap@oregonstate.edu

Teaching Assistant
Senal Weerasooriya
Department of Applied Economics
Office: Ballard 318; E-mail: weerasos@oregonstate.edu

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, **BRC 138**.
Computer Lab Session: Friday 1:00 -1:50 PM, **MCC 201**.

Office Hours
Langpap: Tuesday and Thursday, 11:00 - 12:30 PM. Other times by appointment.
Weerasooriya: Monday, 1:00 – 2:30 PM.

Textbooks

Other good econometrics books:

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. Davidson and McKinnon’s text is similar to that of Greene, but the former has fewer applications.

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. The final project will require students to analyze a data set - model specification, appropriate estimation procedure and statistical tests- and interpret the results. 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 25% (5% each)
Final project 10%
Midterm 30%
Final 35%

Course Content

1. Introduction: Regression analysis, the selection problem, and causal effects:
   Greene 1.1 – 1.4

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
   Ordinary Least Squares: Greene 3.1-3.7
   Finite Sample Properties of the Least Squares Estimator: Greene 4.1-4.3
   Basic Statistical Inference: Greene 4.5
   Multicollinearity: Greene 4.7
   Large Sample (Asymptotic) Properties of Estimators: Greene 4.4, 14.4, 14.9.1

3. Inference and Prediction
   Inference for OLS: Greene 5.1-5.6
   Nonlinear Restrictions: Greene 5.7
   Prediction with OLS: Greene 4.6.

4. Functional Form, Structural Change and Specification Analysis
   Binary Variables: Greene 6.1-6.2 [Reading only, not covered in class]
   Nonlinearity in Variables: Greene 6.3 [Reading only, not covered in class]
   Structural Break: Greene 6.4

5. Nonspherical Disturbances and the Generalized Regression Model
   Introduction: Greene 9.1-9.3
   Heteroskedasticity: Greene 9.4-9.8
   Autocorrelation: Greene 20.1-20.3, 20.5, 20.7-20.9


**Students with Disabilities**

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at [http://ds.oregonstate.edu](http://ds.oregonstate.edu). DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**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://oregonstate.edu/studentconduct/offenses-0](http://oregonstate.edu/studentconduct/offenses-0)