OREGON STATE UNIVERSITY
GRADUATE PROGRAM IN APPLIED ECONOMICS

AEC 625: Advanced Econometrics I
Winter term, 4 credits

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 ordinary and generalized method of moments, maximum likelihood, and ordinary and generalized least squares 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.

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:
• Familiar with 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;
• Able to continue with the next part of the Ph.D. level quantitative methods sequence.

Prerequisites:
AEC 523 or equivalent.

Course Structure
Lecture (twice weekly for 90 minutes each) plus lab (once weekly for 60 minutes)

Textbooks


**Course Content**

1. Introduction: Causal effects, the selection problem, and regression analysis: 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 15.1, 15.2
      Maximum Likelihood: Greene 16.1-16.4
      Ordinary Least Squares: Greene 3.1-3.6
   Finite Sample Properties of the Least Squares Estimator: Greene 4.1-4.6
   Basic Statistical Inference: Greene 4.7
   Multicollinearity: Greene 4.8
   Large Sample (Asymptotic) Properties of the Least Squares Estimator: Greene 4.9, 16.9.1

3. Inference and Prediction
   Inference for OLS: Greene 5.1-5.4
   Nonlinear Restrictions: Greene 5.5
   Prediction with OLS: Greene 5.6, 5.7.

4. Functional Form, Structural Change and Specification Analysis
   Binary Variables: Greene 6.1-6.2
   Nonlinearity in Variables: Greene 6.3
   Structural Break: Greene 6.4-6.5
   Specification Analysis and Model Selection: Greene 7.1-7.6

5. Nonspherical Disturbances and the Generalized Regression Model
   Introduction: Greene 8.1-8.3
   Heteroskedasticity: Greene 8.4-8.9

6. Generalized Method of Moments
   Minimum Distance Estimation: Greene 15.3
   The GMM Estimator: Greene 15.4
   Hypothesis Testing: Greene 15.5
   GMM and Maximum Likelihood: Greene 16.8.1
Course requirements:
4 Problem sets 25% (5%, 6%, 7%, 7%)
Final project 10%
Midterm 30%
Final 35%

Students with Disabilities:
Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD 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 SSD should contact SSD immediately at 737-4098.

Expectations for Student Conduct (cheating policies):
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, including the process by which academic dishonesty cases are handled, is available at:
http://oregonstate.edu/admin/stucon/achon.htm