

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

AEC 525: Applied Econometrics

Fall term 2021, 4 credits

Professor

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Course Description

This course emphasizes general principles of applied econometric research, including model building, data analysis, hypothesis testing, and evaluation and interpretation of results. A variety of estimator and estimation approaches are applied to real data, including least squares, panel data, instrumental variables, discrete choice, and limited dependent variable models.

The course is delivered as a hybrid. This means that lectures are delivered through recordings posted on the course Canvas site, and we meet once a week in the classroom to go over questions on the material, additional examples, instruction on how to use the statistical software Stata, and other discussion. Students are responsible for watching the relevant lectures and doing the required readings before our weekly in-class meeting.

Objectives:

The Course objectives are:

- To increase the depth and breadth of students' knowledge and understanding of applied econometric analysis;
- To cover the theory and practice of econometrics at a level appropriate for first year economics graduate students, emphasizing applications and interpretation of results;
- To provide students with experience in analyzing different types of data;
- To enable students to conduct high quality applied econometric research;
- To enable students to critically evaluate econometric research of others; and
- To provide students with experience in effectively applying econometric models and tools using STATA software.

Learning Outcomes:

By the end of this course, students should be able to confidently solve a range of econometric modeling problems using techniques introduced through lectures and grounded in applications through class exercises and assignments. In particular, students will be able to:

- Define what constitutes good applied econometric practice;
- Identify appropriate econometric techniques for different data types and economic models;
- Critically evaluate applied econometric research;
- Solve problems that arise in applied research using real data; and
- Use STATA effectively for a range of econometric modeling problems.

Hybrid Course Delivery***Lectures***

Recorded lectures are posted in the course Canvas page. You are expected to watch these recordings on your own as indicated in the weekly schedule below. Please let me know of technical issues (e.g. sound) with the videos. You are also expected to do the assigned reading for each week.

In – Class Sessions

We will meet in person on Thursdays, 12:00 - 1:20 PM, in Bexel Hall 207, starting September 23. I will briefly summarize highlights of the topics from the preceding week and answer questions. We will then work on additional examples.

Please observe OSU's [face covering](#) requirement policy during in-person class. Students who are not observing this policy will be asked to leave for that session. **If that does not resolve the issue, I reserve the right to cancel that day's class.**

Office Hours

Office hours will be held over Zoom.

Tuesdays from 2:00 – 4:00 PM PST, or by appointment.

Zoom link:

<https://oregonstate.zoom.us/j/91024674875?pwd=VVVPM01NdEZ0VUNCUU1GU2w4cDZtUT09>

Textbooks

Wooldridge, J.M. 2019. *Introductory Econometrics: A Modern Approach*. 7th Edition. Cengage Learning (required).

Baum, C.F. 2006. *An Introduction to Modern Econometrics Using Stata*. Stata Press (recommended).

Angrist, J.D. and J.S. Pischke. 2015. *Mastering 'Metrics*. Princeton University Press (suggested).

Software:

STATA (available through Citrix Apps, see

<https://apps.oregonstate.edu/Citrix/StoreWeb/> or in our computer lab)

Course requirements:

Practice Sets (15%): Five practice sets will be assigned from computer exercises at the end of chapters in Wooldridge (2016). The practice sets provide you with opportunities to run a variety of regressions addressing numerous themes/questions. Answers to the practice sets will be posted. I will not grade practice sets, but you must submit all of them to earn the full 15%. When submitting your practice sets, they should be formatted and include STATA or other statistical software code that you used. You may collaborate on the practice sets, but I encourage you to avoid free-rider issues.

Problem Sets (55%): Four problem sets will be assigned throughout the term. The problem sets have you use STATA to manipulate data, estimate models, and test hypotheses. In your write-up, you are expected to present and interpret your results (answers) in a meaningful, concise, cogent and formatted manner. Each of you must submit an original and unique write-up (i.e., in your own words), even though we anticipate you will collaborate with others on these assignments.

Final Exam (30%): The final exam will test your knowledge about the theory and application of econometric methods and practices including hypothesis testing based on the material covered in class, the textbook and other assigned readings. The exam may include essay, short-answer, and data analysis questions. This is a take-home exam.

Course Content

Week 1

I. Introduction (Wooldridge 1.1 – 1.4; Videos: Introduction Part I, Part II)

Stata Videos: Lab 1a Introduction to Stata

II. Regression Analysis With Cross-Sectional Data

1. Simple Linear Regression (Wooldridge 2.1; Video: Simple Linear Regression)
2. Ordinary Least Squares (Wooldridge 2.2; Video: Ordinary Least Squares)
3. Multiple Linear Regression (Wooldridge 3.1, 3.2, 6.2, 6.3; Video: Multiple Regression Model)
4. Algebraic Properties of the OLS Estimator (Wooldridge 2.3b; Video: Algebraic Properties OLS Estimator)

Stata Videos: Lab 1b Linear Regression and Making Tables

Week 2

5. Nonlinearities (Wooldridge 2.4b, 6.2a – 6.2c; Video: OLS Nonlinearities)
6. Goodness of Fit (Wooldridge 2.3c, 3.2h, 6.3; Video: OLS Goodness of Fit)
7. Statistical Properties of the OLS Estimator (Wooldridge 2.5, 3.3 – 3.5; Video: OLS Statistical Properties).
8. Bias vs. Variance (Wooldridge 3.4b; Video: Bias vs. Variance)
9. Inference – t statistic (Wooldridge 4.1, 4.2, 4.4; Video: OLS Inference I)

Stata Videos: Lab 2 OLS Inference

Practice Problem 1 posted

Problem Set 1 posted

Week 3

10. Inference – F statistic (Wooldridge 4.5, 4.6; Video: OLS Inference II)
11. Large sample properties of the OLS estimator (Wooldridge 5.1 – 5.3; Video: OLS Large Sample Properties)
12. Regression Analysis with Binary Explanatory Variables (Wooldridge 7.1 – 7.4; Video: Dummy Variables)
13. Heteroskedasticity (Wooldridge 8.1 – 8.4; Video: Heteroskedasticity I)

Stata Videos: Lab 3 Dummy Variables

Practice Problem 1 due

Week 4

13. Heteroskedasticity (Wooldridge 8.1 – 8.4; Video: Heteroskedasticity II)
14. Endogeneity and Instrumental Variables Estimation (Wooldridge 9.4, 15.1 – 15.6; Videos: Instrumental Variables I and II)

Stata Videos: Lab 4 Heteroskedasticity

Practice Problem 2 posted

Problem Set 1 due

Week 5

14. Endogeneity and Instrumental Variables Estimation (Wooldridge 9.4, 15.1 – 15.6; Videos: Instrumental Variables III and IV)
15. Simultaneous Equations (Wooldridge 16.1 – 16.3; Video: Simultaneous Equations)

Stata Videos: Lab 5 Instrumental Variables

Practice Problem 2 due

Practice Problem 3 posted

Problem Set 2 posted

Week 6

16. Regression Discontinuity Design (Angrist and Pischke 4.1; Video: Regression Discontinuity).

III. Regression Analysis With Panel Data

1. First-Differencing (Wooldridge 13.1 – 13.5; Video: Panel Data I)
2. Fixed Effects Estimation (Wooldridge 14.1; Video: Panel Data II)

Stata Videos: Lab 6 Regression Discontinuity Design

Practice Problem 3 due

Practice Problem 4 posted

Week 7

3. Random Effects Estimation (Wooldridge 14.2; Video: Panel Data III)
4. Instrumental Variables and Panel Data (Wooldridge 15.8; Video: Panel Data III)
5. Correlated Random Effects (Wooldridge 14.3; Video: Panel Data IV)
6. Differences-in-Differences (Angrist and Pischke 5.1, 5.2, Wooldridge 13.2, 14.4; Video: Diff. in Diff.).

Stata Videos: Lab 7 Panel Data

Practice Problem 4 due

Problem Set 2 due

Problem Set 3 posted

Week 8

IV. Limited Dependent Variable Models

1. Linear Probability Model (Wooldridge 7.5, 8.5; Video: Linear Prob.)
2. Logit and Probit Models (Wooldridge 17.1; Video: Logit & Probit)
3. Multinomial Logit (Video: Multinomial Logit)

Stata Videos: Lab 8 Nonlinear Estimation

Practice Problem 5 posted

Week 9

4. Ordered Probit (Video: Ordered Probit)
5. Tobit Model (Wooldridge 17.2; Video: Tobit)
6. Censored Regression (Wooldridge 17.4; Video: Censored Regression)

Stata Videos: Lab 8 Nonlinear Estimation

No in-class meeting (Thanksgiving)

Problem Set 3 due (Wednesday)

Problem Set 4 posted

Week 10

7. Sample Selection (Wooldridge 17.5; Video: Sample Selection)
8. Poisson Model (Wooldridge 17.3; Video: Poisson)

V. Matching (Video: Matching).

Stata Videos: Lab 9 Matching

Practice Problem 5 due Problem Set 4 due (Friday)

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

Reach Out for Success

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)