

ECON635
ECONOMETRIC THEORY

Fall 2017
MWF 2:00 – 3:15 p.m.
Clark C-307

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Clark C-316

Course Objectives

This course which will present students with the standard first-year Ph.D. econometric analysis. We start by reviewing some statistical theory and then consider the Classical Linear Regression Model (CLRM) and estimators of the parameters of the model. We will then turn to hypothesis testing, prediction, choosing functional forms, and model specification. With the basic model at hand, we will turn to models which ease some of the assumptions of the CLRM and to multiple-equation models.

Review of the models presented in this course requires knowledge of linear algebra. *Students will be expected to know relevant linear algebra and to have reviewed an introductory statistics review.* Students will receive hands on experience by applying what they have learned in class to data sets. Their empirical analysis will involve using MATA (the matrix version of the STATA software).

Upon completion of this course, a successful student should

- 1) understand and be able to explain the characteristics of the CLRM and of the Generalized Linear Regression Model (GLRM), and understand the contexts in which each is used,
- 2) understand the concept of an estimator of a model's parameters and be able to identify estimators for the CLRM and GLRM parameters,
- 3) be able to interpret estimates of population parameters of a given model,
- 4) be able to undertake hypothesis tests of parameters of a model and hypothesis tests regarding model specification,
- 5) be able to write programs which estimate the parameters of the CLRM and the GLRM, and which calculate statistics used in hypothesis tests, and
- 6) be able to implement all econometric methods learned in class in the STATA and MATA econometric programming language.

Textbook and Notes

Greene, William H. 2012. *Econometric Analysis* (8th ed.) Pearson: New York, N.Y.

Angrist, Joshua and Jörn-Steffen Pischke (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press: Princeton, NJ. (Hereafter, **A&P**.)

I will also put most of my class notes on the course Canvas page. The notes are designed to supplement assigned materials and identify relevant materials in Greene and in Angrist. The notes have not been proofread. Use of the notes is optional. I make my notes available to help students who will benefit from them. You do not have to use the notes if they do not help you learn the materials.

Contact Hours: Each week students will be expected to spend the following time on this course

Activity Contact Hours per Week

Attend Class	3
Review Assigned Readings	2
Review Class Notes, problem sets, and prepare for tests	<u>4</u>
Total	9

Grading

There will be *three examinations*: two midterms and a final. The first exam will be administered after we complete a review of statistics, the second exam will be administered after our review of the Classical Linear Regression Model, and the final exam will cover our review of the Generalized Linear Regression Model and Treatment Effects models.

There will be three or four problem sets. The problem sets will be worth the remaining 25% of the course grade. Each problem set will be worth the same percentage of the course grade. That percentage will depend on the number of problem sets assigned. Any statistical analysis in a problem set will be undertaken with the STATA programming language.

Accommodations for Students with Disabilities: University policy regarding students with disabilities is defined at <http://rds.colostate.edu/>

Office Hours MW 3:15 - 4:15 pm and by appointment.

Academic Integrity:

The course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog and the Student Conduct Code.

Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, we will ask to you sign the CSU Honor Pledge as part of completing all of our major assignments. While you will not be required to sign the honor pledge, we will ask each of you to write and sign the following statement on your papers and exams:

"I have not given, received, or used any unauthorized assistance"

COURSE CONTENT NOTE: CSU's Discrimination, Harassment, Sexual Harassment, Sexual Misconduct, Domestic Violence, Dating Violence, Stalking, and Retaliation policy designates faculty and employees of the University as "Responsible Employees." This designation is consistent with federal law and guidance, and requires faculty to report information regarding students who may have experienced any form of sexual harassment, sexual misconduct, relationship violence, stalking or retaliation. This includes information shared with faculty in person, electronic communications or in class assignments. As "Responsible Employees," faculty may refer students to campus resources (see below), together with informing the Office of Support and Safety Assessment to help ensure student safety and welfare. Information regarding sexual harassment, sexual misconduct, relationship violence, stalking and retaliation is treated with the greatest degree of confidentiality possible while also ensuring student and campus safety.

- Any student who may be the victim of sexual harassment, sexual misconduct, relationship violence, stalking or retaliation is encouraged to report to CSU through one or more of the following resources:
 - Emergency Response 911
 - Deputy Title IX Coordinator/Office of Support and Safety Assessment (970) 491-1350
 - Colorado State University Police Department (non-emergency) (970) 491-6425

Course Outline

Topic	Reading
(Unless stated otherwise, chapter and page references are to Greene)	
O. Matrix Algebra Review (<i>Not covered in class.</i>)	Appendix A & Notes
I. Introduction	Ch. 1
II. Statistics Review	Primarily Notes.
<i>(A) Probability and Distribution Theory</i>	App. B, §§ 1-4, 6-8.
<i>(B) Statistical Inference</i>	App. C, §§ 1-5, App. D.
III. Linear Regression Model	Chs. 2-4.
IV. Hypothesis Testing and Practical Issues Which Arise In Model Estimation	
<i>(A) Hypothesis Tests and Model Selection</i>	Ch. 5
<i>(B) Functional Form, Difference in Differences and Structural Change</i>	Ch. 6
<i>(C) Endogeneity and Instrumental Variable Estimation</i>	Ch. 8.
V. Generalized Classical Regression Models	
<i>(A) General Principles</i>	Ch. 9 §§ 1 to 4
<i>(B) Heteroskedasticity</i>	Ch. 10 §§ 5 - 7
<i>(C) Autocorrelation</i>	Ch. 20 §§ 1-3,5,7-9
<i>(D) Spatial Autocorrelation</i> (time permitting)	pp. 389 - 394 & notes
VI. Systems of Equations	
<i>(A) Seemingly Unrelated Regressions</i> (time permitting)	Ch. 10 § 2.
<i>(B) Simultaneous Equation Models</i>	Ch.10 §§ 1 & 4.
VII. Treatment Effects & Natural Experiments	Ch. 6 §§ 3 & 4. A&P: Chs. 1, 2, 5.2, 6.1.