

Economics 4818 : Introduction to Econometrics

Spring 2018 • Economics 117 • TuTh, 11-12:15pm

Instructor: Taylor Jaworski • Email: taylor.jaworski@colorado.edu

Office: Economics 14C • Office Hours: TuTh 3-4:30pm (or by appointment)

Description

This course introduces students to regression methods for analyzing data in economics and related fields. We will cover techniques for estimating regression models as well as problems that arise in estimating such models related to inference, specification, and interpretation. The majority of the course will be spent developing the theory for the ordinary least squares estimator; extensions will include panel data methods and difference-in-difference. The goal of the course is to teach the basics of the theory and practice of econometrics as well as provide exposure to estimating econometric models with actual data.

Course Materials & Statistical Software

There is one required textbook for this course, which are available in the campus bookstore:

- ★ Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach*

Additional course materials—including lectures, readings, and assignments—will be made available on [Desire2Learn](#). Students are also **required** to have access to the statistical software **Stata/IC**. Information on [student pricing](#) is available on the **Stata** website. Alternatively, computers equipped with **Stata** are available in Econ 7.

Grading

Assignments (20% total, $5 \times 4\%$): Students are required to complete 5 assignments. Assignments must be submitted through the dropbox on D2L. Assignments will involve mathematical derivations and empirical analysis using **Stata**. Due dates are listed the course outline below. Complete answers to assignments will be posted on D2L. Emailed assignments will NOT be accepted. Solutions for assignments will be distributed in class.

Exams (80% total, 35% midterm + 45% final): There will be an in-class midterm exam on March 1. Solutions for the midterm will be distributed in class. There will be cumulative final exam on Wednesday, May 9, 4:30-7pm.

Attendance: While attendance and participation do not figure directly into the course grade, I will take attendance and use it for students who fall close to a letter grade cutoff. I will also refer to attendance for students who later ask for letters of recommendation. Students with perfect attendance will receive one extra credit point.

Policy on late work and missed exams: Late assignments will not be accepted. Students who miss the midterm exam for a valid medical reason will have the weight shifted to the final

exam. Students unable to complete coursework for medical reasons must provide written documentation.

Office Hours & Email

I encourage you to attend office hours or to setup a time to meet outside of office hours if the day/time listed above do not work for you. You should come to office hours prepared with questions or ready to discuss the course material (or anything else). Office hours is the appropriate forum for addressing questions about course material or policies. Use email to setup a time to meet outside of office hours, if necessary.

Cell Phones, Laptops, Etc

Laptops, cell phones, and other devices with screens are not to be used during class without permission of the instructor.

Course Policies

I will adhere to class policies on [student disabilities](#) and [religious observance](#). Students and faculty have responsibility for maintaining an appropriate learning environment. See policies at <http://www.colorado.edu/policies/classbehavior.html>. Policies regarding [discrimination and equity](#) will be upheld. All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. Students are responsible for familiarizing themselves with the [Honor Code](#).

Course Outline

Introduction

01/16 What is econometrics?

*Ip, "In Defense of the Dismal Science," *Wall Street Journal*

*Adam Ozimek on the Power of Econometrics and Data, EconTalk podcast.

01/18 Examples of econometric analysis

*Angrist & Pischke, "The Credibility Revolution in Empirical Economics"

*Noah Smith on Whether Economics is a Science, EconTalk podcast.

Review of Probability and Statistics

01/23 Random variables, distributions, conditional and joint distributions

*Wooldridge, appendix B.1-B.4

01/25 Normal distribution, t -distribution, F -distribution

*Wooldridge, appendix B.5

ASSIGNMENT #1 due January 25, hardcopy in-class and on D2L by 11:00am

01/30 Population versus samples, estimators, large samples
*Wooldridge, appendix C.1-C.4

02/01 Confidence intervals, hypothesis testing
*Wooldridge, appendix C.5-C.6

Simple Regression Model

02/06 Assumptions of simple regression model, fitted values and residuals, goodness-of-fit
*Wooldridge, chapter 2.1-2.3

02/08 Interpretation of coefficients, functional form
*Wooldridge, chapter 2.4

ASSIGNMENT #2 due February 8, hardcopy in-class and on D2L by 11:00am

02/13 Unbiasedness of ordinary least squares
*Wooldridge, chapter 2.5a

02/15 Variance of the ordinary least squares estimators, estimating the error variance
*Wooldridge, chapter 2.5b-2.5c

02/20 Extending the simple regression model to two variables
*Wooldridge, chapter 3.1a

ASSIGNMENT #3 due February 20, hardcopy in-class and on D2L by 11:00am

02/22 Extending the simple regression model to several variables
*Wooldridge, chapter 3.1b

02/27 MIDTERM EXAM REVIEW

03/01 MIDTERM EXAM

Multiple Regression Analysis

03/06 Deriving and interpreting the multiple regression model
*Wooldridge, chapter 3.2

03/08 The expected value of the OLS estimator
*Wooldridge, chapter 3.3

03/13 The variance of the OLS estimator
*Wooldridge, chapter 3.4

03/15 The Gauss-Markov Theorem
*Wooldridge 3.5

03/20 Sampling distribution of the OLS estimator
*Wooldridge, chapter 4.1

- 03/22 Hypothesis testing (and confidence intervals) for a single parameter
 *Wooldridge, chapter 4.2-4.4
 ASSIGNMENT #4 due March 22, hardcopy in-class and on D2L by 11:00am
- 04/03 Large sample properties of the OLS estimator
 *Wooldridge, chapter 5
- 04/05 Functional form, goodness-of-fit in multiple regression
 *Wooldridge, chapter 6.2-6-3
- 04/10 Dummy variables, interaction variables
 *Wooldridge, chapter 7
- 04/12 Heteroskedasticity
 *Wooldridge, chapter 8.1-8.2

Panel Data

- 04/17 Combining cross-section and time series data
 *Wooldridge, chapter 13.1-13.2
- 04/19 Fixed effects
 *Wooldridge, chapter 14.1

The Selection Problem

- 04/24 Omitted variable bias
 *Wooldridge, chapter 3.3, 15.1
- 04/26 Regression analysis and quasi-experiments
 *Angrist & Pischke, chapter 2
 *Blake, Nosko, & Tadelis, “Consumer Heterogeneity and Paid Search Effectiveness”
- 05/01 Motivation and setup for the Difference-in-Difference methodology
 *Wooldridge, chapter 13.2-13.5
- 05/03 Application to “What is the impact of immigration on native wages?”
 *Card, “The Impact of the Mariel Boatlift on the Miami Labor Market”
 ASSIGNMENT #5 due May 3, hardcopy in-class and on D2L by 11:00am

The FINAL EXAM will be on, **Wednesday, May 9, 4:30-7pm**, which is the date of [final exam scheduled by the University](#).