

Syllabus

Economics 482

University of Washington

Winter 2017

MW 5:30-7:20 pm SAV 156

Instructor: Gregory M. Duncan

gmduncan@uw.edu

Office: Savery 341

Office Hours: MW 4-5:30PM

TA: Theresa Henry

Lab W 7:30-8:20 pm ART 317

COURSE CONTENT

- Introduction to the analysis of economic data at the undergraduate level; covers the basic methods of econometrics, and some new machine learning methods.
 - Techniques that will help you to use and interpret economic data and models.
 - Practice in the use of computers for economic data analysis.
 - Skills developed are useful in further work in any social science field: either graduate work or employment as a data analyst or researcher .
- This course assumes a good background in statistics and mathematics. Calculus will be used without discussion.
- My goal is making you employable at consulting firms, government agencies and some firms that use analytics heavily (or would like to.) This course will also prepare you for graduate work.

REQUIREMENTS

- 6 problem sets, graded on a simple scale, these must be submitted online.
 - (good, satisfactory, unsatisfactory, no credit) (4,3,1,0) (15%)
 - involve real economic problems and real data, to be done on a PC/ Mac using STATA (or GRETL, R, Python or SAS) and EXCEL.
- One midterm (25%)
- A final (60%).
- Optional sections are once a week. Computer analysis will be handled there.

TEXT

- **Introductory Econometrics: A Modern Approach 6th Ed.** (Jeffrey Wooldridge) (There are really few differences after the second edition except for homework problems.)

PREREQUISITES

- some economics
 - Economics 300 and some macro
- some calculus and math
 - Integral and Differential Calculus Math 124 would be fine
 - Basic exposure to matrices (I assume most of you saw matrices in high school). I will not do matrix derivations, but for notational sanity and to allow you to read empirical papers they are essential.
 - You can, in principle, determine when you can solve and, if appropriate, then solve n linear equations in n unknowns.
- statistics
 - Basic understanding of probability distributions
 - Basic understanding of testing

Readings and Content: I'll add or delete as I go along. At a minimum we will cover Chapters 1-10 plus Appendices A-E from Wooldridge (W). Additionally, I will add some machine learning material on model selection: L2-boosting and the LASSO.

Before first class

Chapter 1, Appendices A,B,C
Chapter 19 (for the first time)

First Section: Quiz in Section on Basics (graded as a homework, very, very simple, but if you do poorly you don't have the background for the course and should drop it).

Appendix D (Matrices; done in Section)

Chapter 2 The Simple Regression Model

Chapter 3 Multiple Regression Analysis: Estimation

Appendix E The Linear Regression Model in Matrix Form

Chapter 4 Multiple Regression Analysis: Inference

Chapter 5 Multiple Regression Analysis: OLS Asymptotics

Chapter 6 Multiple Regression Analysis: Further Issues

Notes on Model Selection: The Lasso and L2-boosting

Chapter 19 (for the second time)

Exam on Regression

Chapter 7 Multiple Regression Analysis with Qualitative Information: Binary (or Dummy) Variables
Chapter 8 Heteroskedasticity
Chapter 10 More on Specification and Data Issues
Chapter 19 (for the third time)
Chapter 13 Basic Regression Analysis with Time Series Data
Chapter 15 Instrumental Variables Estimation and Two Stage Least Squares
Chapter 16 Simultaneous Equations Models

Final: Comprehensive

Software: We will be teaching STATA, R and using EXCEL. I recommend learning SAS as well, because it can get you a job. SAS has a steep learning curve, so I will use the easier, but less industry oriented STATA. Also, with SAS you must renew your license every year, once you are no longer a student it can cost thousands of dollars. Advanced students might want to use R or Python, which we use at Amazon, however, those languages also have steep learning curves. But make sure you can use STATA as well as many firms do not yet use R or Python. Auditors and visitors see me after the first class.

STATA:

For STATA go to the STATA site (URL below) and look at these two versions. Either should be adequate for this course. You might want to consider a perpetual license for \$198, because the Student licenses have restrictions, the perpetual license you can take with you.

STATA (STUDENTS ONLY) :

Stata/IC 12 software with Getting Started Manual
(Windows, Macintosh and Linux)

\$198.00/perpetual license (highly recommended)
\$75.00/6 month license

Small Stata 12 software with Getting Started Manual (there are some homeworks you won't be able to do because it is too small-restricted memory)
(Windows and Macintosh ONLY)

\$38.00/6 month license

<http://www.stata.com/order/new/edu/gradplans/student-pricing/>

SAS can get you a job. Here is the link.

<https://itconnect.uw.edu/wares/uware/sas-statistical-package/>

Very steep learning curve, but SAS can handle huge datasets, STATA cannot. Here is a link to Phil Spector's very fine SAS tutorial

<http://www.stat.berkeley.edu/classes/s100/sas.pdf>

Other Software:

There is freeware called GRET.

<http://gretl.sourceforge.net/>

It is really quite good. No one will give you a job because you know GRET however.

If you really want to learn this stuff, program it yourself using R.

<http://cran.r-project.org/>

If you are planning to take my course Data Science for Economists in Spring 2014, R will be a requirement.

I will accept homework written using all. But you cannot be late because you could get your code to work.

Also, tests will be based on STATA form of output, so you'll need to master that.

Also useful is to see what Federal Judges expect from econometric work presented in courts. Here is an URL to the **Reference Manual on Scientific Evidence**. Federal judges use these manuals (one is for multivariate regression, another for basic statistics).

[http://www.fjc.gov/public/pdf.nsf/lookup/sciman00.pdf/\\$file/sciman00.pdf](http://www.fjc.gov/public/pdf.nsf/lookup/sciman00.pdf/$file/sciman00.pdf)