UC Berkeley Department of Economics
Economics 142 – Applied Econometrics
Course Outline

Course Description and Objectives

This course will examine the use of statistical and econometric tools in the analysis of economic and social data. Students will develop familiarity with econometric modeling and research designs for applied social science research. We will also discuss prediction and classification models that are used in Data Science. By the end of the class students will have extensive experience in applying different data analysis methods, and in using experimental and non-experimental research designs to make inferences.

Details

Class lectures will be held Tuesday and Thursday 5:00-6:30 pm in Moffitt 102.
There are also three sections:

Section 101 will meet Wed, 10-11am, Dwinelle 106
Section 102 will meet Wed, 11-12pm, VLSB 2030
Section 103 will meet Wed, 12-1pm, Evans 85

There will be two midterm exams, both held in class:

Midterm 1: Thursday February 21
Midterm 2: Tuesday April 9

There will be a final project in lieu of a final exam, which will be due at the end of the time slot assigned for the regular final exam. If you have a conflict with these times I suggest you drop the class.

Course grade will be based on weekly problem sets (30%), the midterm exams (35%), and the final project (35%).

Course requirements

Students are expected to read all assigned readings, attend all lectures and sections, hand in all problem sets, complete both midterms and hand in the final project on time.

No make up exams will be scheduled. Students will need to have a signed letter from a physician to justify missing a midterm or failing to hand in the final project on time. All others who fail to write the midterm or fail to hand in their project on time will receive grades of 0 on these parts of the course.

Problem sets will be due at the end of the Thursday lecture. **No late problem sets will be accepted**; late assignments will receive a grade of 0.

Computer exercises

Students are expected to have access to a computer with "R" software (which is free and can be downloaded from www.r-project.org). Most problem sets and the final project will require significant data analysis and some coding skills.

Reference Materials

There is no required text for the class. The following are recommended references:

For the first 10 weeks of the class:
Joshua Angrist and Jorn-Steffen Pischke, *Mostly Harmless Econometrics*.
This is a bit advanced but is written by two labor economists so it has a similar perspective on many applied issues as will be adopted in this class.

Jeffrey Wooldridge *Introductory Econometrics: A Modern Approach.*
Any edition from 3 onward will be useful. We recommend trying to buy a used recent edition.

You should also have access to a good book on probability and statistics at the advanced undergraduate level. There are many: for example, DeGroot and Schevish *Probability and Statistics* is extremely clear and methodical.

For the last 5 weeks of the class:
Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani. *An Introduction to Statistical Learning with Applications in R* (ISLR). This book is available for free at http://www-bcf.usc.edu/~gareth/ISL/ : this site also other useful related materials.

Finally, there are many great Wiki's on most of the topics we will cover.

Web Site

There is a class site on "bcourses" where we will post problem sets, data, and reference materials. Students should to check the site frequently for updates. Normally I post the lecture notes a day ahead of the class. There is also a full set of lectures from Fall 2016 when I last taught the class.

List of Topics

Part I - regression modeling (weeks 1-5)

linear regression modeling; properties of regression; omitted variables; decomposition techniques; logit and probit models; problems of inference; fixed effects

Part II - causal modeling (weeks 6-10)

difference in differences; instrumental variables; regression discontinuity

Part III - ideas and methods from statistical learning (weeks 11+)

cross-validation and k-fold; shrinkage - ridge, LASSO; basis functions; tree models