Syllabus

ARE 212: Econometrics	**Instructor:**	Maximilian Auffhammer
Multiple Equation Estimation	**Office:**	321 Giannini Hall
Spring Semester 2018	**OH:**	M 1:30-2:30pm (book slot via bcourses)

Lecture:	MW 10:00-noon	**Phone:**	(510) 643-5472
	219 Dwinelle	**Email:**	auffhammer@berkeley.edu
		Class Page:	http://bcourses.berkeley.edu
Section:	F 10-11 am	**GSI:**	Ed Rubin
	240 Mulford	**OH:**	F 8-10 am (236 Giannini)

Course Description

This is the second course in the graduate Econometrics sequence, immediately following ARE 211, which covered probability theory. You are expected to have a working knowledge of linear algebra. The goal of this course is to provide you with an in-depth understanding the classical multiple linear regression model (CLRM) and what happens when we relax the assumptions of the CLRM. Lectures will focus on technical material and increasingly provide illustrations of applications. Assignments will deal with the application of techniques covered in class to (real world) data sets as well as the voluntary completion of several proofs. Two in class (with a take home component) exams will test your understanding of the technical material. There will be two 110 minute lectures each week. The discussion section will focus on computation.

Textbook(s)

I do not think that there is a single book, which covers this introductory material well. Greene is a cookbook and standard reference. The Kennedy text stresses the intuition behind the technical material covered in class. I especially recommend it, if you have not seen any econometrics in more than a year. Many econometricians like grown up Wooldridge , which is a stellar but more advanced text. Cameron and Trivedi's text has also become very popular. I regard Greene and Wooldrige as complements not substitutes. The Davidson and Mackinnon text below is really good too. If you are going to read one undergraduate textbook, I suggest "baby" Wooldridge.

References

William H. Greene. 2011. *Econometric Analysis.* Prentice Hall. ISBN: 0131395386

A. Colin Cameron and Pravin K. Trivedi. *Microeconometrics: Methods and applications.* Cambridge University Press, New York, May 2005

Russell Davidson and James G. MacKinnon. 2004. *Econometric Theory and Methods.* Oxford UP. ISBN: 0-19-512372-7.

Russell Davidson and James G. MacKinnon. *Estimation and Inference in Econometrics.* Oxford UP. ISBN: 0-19-506011-3.

Fumio Hayashi. 2000. *Econometrics.* Princeton UP. ISBN: 0-961-01018-8

Peter Kennedy. 2003. *A Guide to Econometrics.* ISBN: 0-262-61183-X .

Paul A. Ruud. 2000. *An Introduction to Classical Econometric Theory.* Oxford UP. ISBN: 0195111648

Jeff Wooldridge. 2010. Econometric Analysis of Cross Section and Panel Data. MIT Press. ISBN: 0935730990.

Jeff Wooldridge. 2002. Introductory Econometrics: A Modern Approach. South-Western College Pub. ISBN: 0324113641.

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Grading

There will be one "single-authored" Midterm worth 30% of your grade, one "single-authored" take-home final exam worth 40% of your grade and five to six problem sets worth 30% of your grade. Both the midterm and final will have a one hour in class theory component and a take home part (computation). The problem sets are graded fail (0%), tried and came close (70%) and pass (100%).

Problem Sets

You are allowed to cooperate on the problem sets/empirical exercises in groups of up to three. Each group has to hand in a complete pdf via bcourses **including the code**, clearly identifying the names of the all group members. Each problem set will involve estimation. You must use R. You may not use canned routines (exceptions are pdfs and cdfs). You will use matrix operations. It is free, rapidly replacing Stata and what statisticians use.

Class Notes

The notes I am lecturing from are typed and available on bcourses. You are welcome to download them and bring them to class and scribble on them. **Do not distribute them - especially electronically.** In order to improve these notes for future generations, I am putting up a fine bottle of wine as a reward for the person who points out the most typos.

Readings, Website & Feedback

I make extensive use of bcourses. You should check it frequently for announcements, additional readings, problem sets and answers.

Course Outline[1]

- Part 0 - Linear Algebra Basics. On your own time.

- Part 1 - The Classical Linear Regression Model (CLRM)

    - Classical Assumptions (WG Ch. 2.1 - 2.4)
    - The Algebra of Least Squares (WG Ch. 3.1 - 3.6 (3.4 on your own))
    - Finite Sample Properties of OLS (WG Ch. 4.1 - 4.6)
    - Hypothesis Testing (WG Ch. 4.7, 6.1 - 6.3)
    - Data Problems - Multicollinearity and Influential Observations (WG Ch. 4.9)
    - Generalized Least Squares (10.1 - 10.2.1)
    - Maximum likelihood estimation (Notes and WG Ch. 17)
    - Asymptotic distribution theory (Notes and WG Appendix D)
    - Large Sample Properties of OLS (WG Ch. 5.1 and 5.2)
    - Hypothesis Testing - Large Sample Results (WG Ch. 6.4)

- Part 2 - Violations of the Classical Assumptions

    - Non-spherical Disturbances (WG Ch. 10.2.2, 10.3, 10.5)
    - Heteroskedasticity (WG Ch. 11)
    - Serial Correlation (WG Ch. 12)
    - Instrumental Variables (WG Ch. 5.4, 10.2.4, 15.5)
    - Systems of Equations & Seemingly Unrelated Regressions (SUR) (WG Ch. 14 & Notes)
    - Simultaneous Equations (WG Ch. 15 & Notes)
    - Logit and Probit Models (Notes)

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[1]Subject to change