

ECON 6630: Applied Econometrics

University of Utah - Department of Economics
Spring 2020

Instructor: Ellis Scharfenaker
Department: Economics
Email: ellis.scharfenaker@economics.utah.edu
Tel: 801-581-7481
Office: Gardner Commons 4333
Office Hours: Wednesdays 1-3pm and by appointment

Location: Gardner Commons 2675
Time: Mondays 6:00 – 9:00 p.m.
Credit Hours: 3

Course Description:

Drawing inferences about meaningful economic hypothesis and from data is central to economic research. The philosophy of this course is that econometrics addresses the problem of evaluating quantitative evidence for and against meaningful economic and political-economic claims and that there is no unequivocal way of doing so. This course is an introduction to econometric theory and applied estimation methods that will cover both the frequentist and Bayesian approaches to inference. The topics we will cover will include the philosophy of inference, probability theory, linear and non-linear regression, single- and multi-variate regression, OLS, maximum likelihood estimation, hypothesis testing, Bayesian posterior inference, panel econometrics, and causal inference. This course will make extensive use of the statistical program R for all applied statistical analysis.

Prerequisites: College algebra and Elementary calculus. ECON 4010, 4020, 4650 and 6610.

Student Learning Outcomes: Students will learn the basic methods of statistical inference and be able to apply these methods to a variety of economic models and data. This course will also be an immersive learning experience in statistical programming in R. Students will gain the ability to work with large datasets and perform advanced statistical analysis in R.

Teaching and Learning Methods: This course is a traditional lecture based course. Some lecture content will be made available online. The best material will always be presented in class during lecture. It will be useful to bring your computer to class for the programming portion of lectures.

Homework Policy:

All R exercises must be submitted as a clear and executable script. Homework will be marked down a grade for each day it is late (From an A to B, not from A to A-). Problem sets should be clearly written or preferably typed and turned in as a hard copy in class the day they are due. If you do not receive full credit for a problem, you can resubmit the problem for half-credit. For me to keep track of resubmissions please clearly mark which problem you are resubmitting. You must also attach your initial submission when resubmitting homework. All resubmissions must be turned in **no later than one week after they are returned**. Unlike the initial submission, no late resubmissions will be accepted.

Communication Policy: PLEASE NOTIFY ME AHEAD OF TIME IF YOU KNOW YOU WILL NOT BE ABLE TO FULFILL ANY COURSE REQUIREMENTS.

Attendance: You will not be graded on attendance, however, it is a must for this course if you wish to pass. The probability of failing the course conditional on students not attending lectures is $p[\text{fail} \mid \text{did not attend lectures}] \sim \text{Beta}[100, 1]$

	Scale	Score
	A	93-100
	A-	90-92
	B+	87-89
	B	83-86
	B-	80-82
Grading Policy: Homework (40%), Midterm (30%), Final (30%).	C+	77-79
	C	73-76
	C-	70-72
	D+	67-69
	D	63-66
	D-	60-62
	E	0-59

Important Dates:

Martin Luther King Jr. Day holiday	January 20
Presidents' Day holiday	February 17
Spring Break	March 9-13

Useful Resources:

- R - <http://www.r-project.org>
- RStudio - <http://www.rstudio.com>

Required Text: All books can be found at www.used.addall.com or in the University library.

- R. Carter Hill, W E. Griffiths, G.C. Lim, (2011). *Principles of Econometrics*, Wiley. 4th ed.
- W. Bolstad and J. Curran, (2017). *Introduction to Bayesian Statistics*, Wiley. (2nd or 3rd ed.)

Recommended Texts:

- F. Heiss, (2016). *Using R for Introductory Econometrics*, Create Space.
Available free at <http://www.urfie.net/>.
- C. Hank, et al. (2018) *Introduction to Econometrics with R*.
Available free at <https://www.econometrics-with-r.org/>.
- M. H. DeGroot and M. J. Schervish, (2012). *Probability and Statistics*, Pearson, 3rd or 4th Ed.
- D. V. Lindley, (1965), *An Introduction to Probability and Statistics from a Bayesian Viewpoint*, Wiley.

Tentative Course Outline:

1. *Introduction to Probability Theory* (Weeks 1-2)

Required Readings:

- Bolstad: Preface and Ch.1-2, 4
- Degroot and Schervish: Ch. 1-2
- E. T. Jaynes, *Probability Theory: The Logic of Science*. Preface and Ch.1

- E. T. Jaynes, “Bayesian Methods: General Background: An Introductory Tutorial,” in *Maximum Entropy and Bayesian Methods in Applied Statistics*, J. H. Justice, (ed.), Cambridge University Press. 1985.

Recommended Readings:

- D. V. Lindley, (2006), *Understanding Uncertainty*, Wiley. Ch.3-5
- A. Zellner, (1971). *An Introduction to Bayesian Inference in Econometrics*, Wiley. Ch. 1
- C. Sims, (1996). “Macroeconomics and Methodology,” *The Journal of Economic Perspectives*, 10:1
- C. Sims, (2011). Nobel Prize Lecture. <https://www.nobelprize.org/mediaplayer/index.php?id=1743>
- Hill, Griffiths, Lim: Ch. 1 Intro to Econometrics

2. *Random Variables, Bayes’ Theorem, Binomial Distribution* (Weeks 3-4)**Required Readings:**

- Bolstad: Ch. 5-9

Recommended Readings:

- Degroot and Schervish: Ch. 3-4
- D. V. Lindley, (2006), *Understanding Uncertainty*, Wiley. Ch.6-7
- A. Gelman and C. Shalizi, (2013). *Philosophy and the practice of Bayesian statistics*. *British Journal of Mathematical and Statistical Psychology*, 66, pp.8-38
- Hill, Griffiths, Lim: Ch. 1 Probability Primer

3. *Inference for the Normal Distribution* (Weeks 5-6)**Required Readings:**

- D. V. Lindley, (1965), *An Introduction to Probability and Statistics from a Bayesian Viewpoint*, Wiley. Ch.5
- Bolstad: Ch. 11-12, 15, 17

Recommended Readings:

- A. Zellner, (1971). *An Introduction to Bayesian Inference in Econometrics*, Wiley. Ch. 2

4. *Error Models: The Normal Linear Regression Model* (Weeks 7-8)**Required Readings:**

- Bolstad: Ch. 14
- Hill, Griffiths, Lim: Ch. 2-3

Recommended Readings:

- A. Zellner, (1971). *An Introduction to Bayesian Inference in Econometrics*, Wiley. Ch. 3
- Degroot and Schervish: Ch. 7, 9, 11

5. *Multiple Regression Model* (Weeks 9-10)**Required Readings:**

- Bolstad: Ch. 19
- Hill, Griffiths, Lim: Ch. 5-6

Recommended Readings:

- R. Davidson, J. G. MacKinnon (2003) *Econometric Theory and Methods*, Oxford University Press. Ch. 2 The Geometry of Least Squares.

6. *Non-Linear Regression and Dummy Variables* (Weeks 11-12)**Required Readings:**

- Hill, Griffiths, Lim: Ch. 7, 16

Recommended Readings:

- Gelman and Hill: Ch. 6

7. *Panel Data* (Weeks 13-14)**Required Readings:**

- Hill, Griffiths, Lim: Ch. 15
- Gelman and Hill: Ch. 11-13

Recommended Readings:

- J. D. Angrist and J. Pischke, (2010). "The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics," *Journal of Economic Perspectives*, 24(2): 3-30.
- C. Sims, (2010). "But Economics Is Not an Experimental Science," *Journal of Economic Perspectives*, 24(2): 59-68.
- A. Deaton and N. Cartwright, (2016). "Understanding and misunderstanding randomized controlled trials." NBER Working Paper No. 22595.
- J. D. Angrist and J. Pischke, (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton.

8. *Instrumental Variables* (Weeks 15-16)**Required Readings:**

- Hill, Griffiths, Lim: Ch. 10

Recommended Readings:

- Gelman and Hill Ch. 9-10

Note: This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the Course Schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under Announcements.

Academic Honesty:

"The term plagiarism includes, but is not limited to: (i) use by paraphrase or direct quotation of the published or unpublished work of another person without fully and properly crediting the author with footnotes, citations or bibliographical reference; (ii) unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials; or (iii) unacknowledged use of original work/material that has been produced through collaboration with others without release in writing from collaborators."

There are many types of plagiarism, all are serious offenses and will be treated according to the University of Missouri Rules and Procedures of Student Conduct Matters. Using another author's or researcher's work

without attribution is plagiarism. Rewriting another author's or researcher's work (changing words or word order) while retaining the structure and ideas of the work is plagiarism. Submitting your own work from other courses without permission is plagiarism. Sloppy citations, such as missing quotations marks even when a footnote appears, are plagiarism. Any incidents of plagiarism will result in a grade of zero for the assignment. All essays and assignments must be written in your own words with proper citations.

See the The Code of Student Rights and Responsibilities at <https://regulations.utah.edu/academics/6-400.php> for more details.

University Policies:

1. The Americans with Disabilities Act. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services. [The Addressing Sexual Misconduct Statement is strongly suggested on every course syllabus. According to University policy, at minimum instructors must include the contact information of the Title IX Coordinator.]
2. Addressing Sexual Misconduct. Title IX makes it clear that violence and harassment based on sex and gender (which Includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).
3. All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.