

ECON 342: Introduction to Econometrics**PROFESSOR:** Dr. Caleb S. Fullerwww.calebfuller.com**OFFICE:** HAL 303B**OFFICE PHONE:** (724) 458-2560**EMAIL:** fullercs@gcc.edu**OFFICE HOURS:** M/W/F: 8-10am, T/TR: 11:30am-12:30pm. NOTE: Due to Covid-19, all office hours will be held remotely. Please send me an email to schedule a virtual visit.

This syllabus is a contract between us. Both parties should work hard to uphold the guidelines outlined here. I reserve the right to make changes if necessary.

TEXTS

Required: Stock, James and Mark Watson. 2015. *Introduction to Econometrics, 3rd edition, Updated*. Pearson.

RESOURCES

Wooldridge, Jeffrey. *Introductory Econometrics: A Modern Approach*. Any edition. South-Western College Publishers.

Studenmund, A.H. *Using Econometrics: A Practical Guide*. Any edition. Pearson.

Angrist, Joshua and Jorn-Steffen Pischke. *Mastering Metrics: The Path from Cause to Effect*. Any edition. Princeton University Press.

PREREQUISITES

Math 141 OR Math 161. MNGT 201.

COURSE DESCRIPTION

This course introduces the basics of econometrics, the application of statistical techniques to economic problems. Econometrics differs from pure statistics in that econometric analysis is typically founded on economic theory. We will study linear and multiple regression methods, followed by an exploration of experimental and quasi-experimental designs that have become increasingly important in applied economic research. Emphasis will be placed on estimating the quantitative magnitude of cause and effect relationships.

COURSE OBJECTIVES:

This course is intended to equip students to:

1. Understand and describe linear regression. This will be assessed by three exams, homework, a paper analysis and related in-class presentation. [2, 3, 4, 5, 6, 7, 8, 9]
2. Derive and proof the unbiasedness of least-square estimators. This will be assessed by two exams. [4, 5, 6, 7, 8, 9]
3. Select the proper method of statistical analysis for the question and the available data. This will be assessed by two exams, homework, a paper analysis and related in-class presentation. [4, 6, 7, 8, 9]
4. Interpret the results of statistical analysis. This will be assessed by three exams, homework, a paper analysis and related in-class presentation. [4, 5, 6, 7, 8, 9]
5. Articulate critiques of econometric research. This will be assessed by the final exam, a paper analysis and related in-class presentation. [1, 2]

TENTATIVE SCHEDULE OF TOPICS, ASSIGNMENTS, AND EXAMS

<u>DATE</u>	<u>TOPIC</u>	<u>READING</u>
Jan 26	Introduction	S&W: 1-12 Angrist and Pischke: "Undergraduate Econometrics Instruction: Through our Classes, Darkly" (pp. 125-134)
Jan 28	Random Variables	S&W: 14-23; 26-35
Feb 2	Probability Distributions	S&W: 36-42
Feb 4	Sampling and Sample Statistics	S&W: 43-52; 65-71
Feb 9	Hypothesis Tests and Confidence Intervals	S&W: 71-82
Feb 11	Hypothesis Tests and Confidence Intervals	S&W: 71-82
Feb 16	Simple Linear Regression: Estimation	S&W: 109-119; 141-142
Feb 18	Simple Linear Regression: Measures of Fit	S&W: 119-124
Feb 23	Simple Linear Regression: Inference	S&W: 146-155
Feb 25	Simple Linear Regression: Theoretical Properties	S&W: 124-133; 142-145; 157-165
Mar 2	MIDTERM I	
Mar 4	Multiple Linear Regression: Estimation	S&W: 189-198
Mar 9	Multiple Linear Regression: Inference PAPER APPROVAL DEADLINE	S&W: 217-232 Berk et al.: "Preparing a Referee Report: Guidelines and Perspectives"

Mar 11	Multiple Linear Regression: Multicollinearity	S&W: 199-200; 202-206
Mar 16	Multiple Linear Regression: Omitted Variables	S&W: 182-189; 232-234
Mar 18	Multiple Linear Regression: Model Selection	S&W: 232-244
Mar 23	Dummy Variables	S&W: 155-157; 204
Mar 25	Logged Variables	S&W: 256-278
Mar 30	EASTER BREAK	
Apr 1	EASTER BREAK	
Apr 6	Interactions	S&W: 278-293
Apr 8	Limited Independent Variables	S&W: 385-398
Apr 13	MIDTERM II	
Apr 15	Instrumental Variables	S&W: 424-431
Apr 20	Validity	S&W: 315-330
Apr 22	Validity	S&W: 331-342
Apr 27	Experimental Designs	S&W: 475-493 Angrist and Pischke: "The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics" (optional)
Apr 29	Quasi-Experimental Designs	S&W: 493-502 Athey and Imbens: "The State of Applied Econometrics: Causality and Policy Evaluation"
May 4	Quasi-Experimental Designs Conclusion (if time)	S&W: 502-504 Rizzo: "Praxeology and Econometrics: A Critique of Positivist Economics" (pp. 40-46) in <i>New Directions in Austrian Economics</i>
May 6	Study Day	
May 11	FINAL EXAM: 1-3 PM	

COURSE REQUIREMENTS, EVALUATION, GRADING

Final grades are based on two (2) midterm exams, (approximately) bi-weekly homework, one paper analysis and associated in-class presentation, and one (1) comprehensive final exam. Econometrics covers complex and abstract material. **Thus, it is imperative that you come to class having done the readings to do well on exams.**

Each student will select a published econometrics paper to write about. **As this is an introductory course in econometrics, you should choose a simple paper that uses linear regression.** You will write a "referee report" on the paper of your choice and present your report to the class. Your report and presentation should be sufficiently clear and thorough that someone who has never seen

the paper can understand the author's question, methodology, data source, and potential weaknesses of the paper.

Beginning **March 26**, there will be two presentations each class until the conclusion of the semester (except for the day of exam 2). These presentations cover the content of the students' referee reports. A presentation grading rubric is available on myGCC. The ability to meet deadlines is a skill that is required in virtually every potential opportunity after you graduate. **As a result, (unexcused) late papers will receive a grade of zero.** Your referee report is due on the date you present.

The final grade is calculated as follows:

- (1) Midterm exam 1: 15%
- (1) Midterm exam 2: 20%
- Multiple homework sets: 15%
- (1) Paper + Presentation: 25% (Paper: 15%; Presentation: 10%)
- (1) Comprehensive Final: 25%

Grading Scale:

A: 93-100	A-: 90-92.9	B+: 87-89.9	B: 83-86.9	B-: 80-82.9	C+: 77-79.9
C: 73-76.9	C-: 70-72.9	D+: 67-69.9	D: 63-66.9	D-: 60-62.9	F: <60

If a you must miss an exam, please discuss it with me prior to the exam. In the event of an emergency, you should email me as soon as possible. If you miss an exam for an unexcused reason, a grade of "0" will be given. **If an exam absence is excused, you have two options.** You may elect to take a make-up exam. Alternatively, you may elect to add the weight of the missed exam to the next exam.

The final exam must be taken at the scheduled time. One exception: students who have three or more finals scheduled for the same day may discuss with me an alternative time to take the final.

There will be no make-up assignments. All assignments must be hard-copy and stapled; they are due at the beginning of class.

IN-CLASS EXPECTATIONS

The use of phones and laptops is prohibited in class. I did not make this decision lightly. Many elite institutions, including law schools, have chosen to ban electronics from the classroom on the same grounds that I do so: studies have repeatedly demonstrated that laptop usage exerts a statistically significant, negative effect on classroom outcomes. For example, a recent study of Principles of Economics classes at West Point found that when laptops were banned, students scored, on average, .18 standard deviations higher than their peers in laptop-using classrooms.¹ Several studies also demonstrate that taking notes by hand is, on average, superior for learning and retention than is taking notes by electronic device.² However, the strongest argument for a laptop ban comes from recent studies indicating that laptop usage harms the performance of non-laptop-using students in a laptop-using classroom.³ When someone's activity imposes costs on someone else, economists call it a "negative externality." My policy of banning electronics is an attempt to mitigate negative externalities

¹ See here: <http://educationnext.org/should-professors-ban-laptops-classroom-computer-use-affects-student-learning-study/>.

² See here: <https://www.scientificamerican.com/article/a-learning-secret-don-t-take-notes-with-a-laptop/> or here: <https://sites.udel.edu/victorp/files/2010/11/Psychological-Science-2014-Mueller-0956797614524581-1u0h0yu.pdf>.

³ See here: <http://www.sciencedirect.com/science/article/pii/S0360131512002254?via%3Dihub>.

in the classroom.

Consistent with the College's goal of fostering both a collegial academic environment and a community founded on the Christian ethic, all members of this class will treat each other respectfully, even when disagreeing with a viewpoint expressed by a classmate or the professor. *Ad hominem*, derogatory, or demeaning comments directed at individuals in or outside of our classroom do nothing to facilitate our pursuit of truth, undermine the nature of our Christian community, and will not be tolerated.

ECONOMETRICS REFEREE REPORT GUIDELINES

Each student will complete a 1,200-1,500-word written analysis of a peer-reviewed econometrics paper. **When you turn in your assignment, include the name of the article, the author(s), and the name of the journal in which the article is published.** Your analysis should clearly summarize the article, but most importantly should offer at least one economic critique. This assignment will enable you to interact critically with the best of what the broader economics profession has to offer.

The only requirements are 1. that the article contain econometrics and 2. that you understand it. **Any citations (you're not required to cite anything other than the article in question) should adhere to the Chicago Style Author-Date format.** You may find examples here: <https://owl.english.purdue.edu/owl/>

When a scholar submits a paper for publication in a professional journal, it is subjected to rigorous scrutiny by the author's professional peers who offer feedback by way of a referee report. Superior analyses for this class will adhere to the best practices in writing a professional referee report. Because the purpose of a referee report is to offer your own original thoughts on a paper, there is no requirement that you consult outside sources (though you are free to do so). A grading rubric is available on myGCC. Your written assignment should:

- Begin with a brief overview of the paper to provide someone who's never read the paper with a working knowledge of it.
- Succinctly describe the paper's primary contribution. What question did the paper ask and what answer did it provide?
- Describe the author's methodology. How do they attempt to answer the question?
- Describe the author's data source and how the data is generated.
- Offer a significant critique or a suggestion about how the author could improve his work. For example: Does the model suffer from omitted variable bias? Is the author's model appropriate for the question? Is there likely to be measurement error? Does the model suffer from endogeneity?

Additionally, each student will present their referee report in class for a presentation grade. More details on this in class.

POTENTIAL REFEREE REPORT PAPERS

1. How have pre-nuptial agreements impacted [divorce rates](#)?
2. Did no-fault laws increase [divorce](#)?
3. Is government a "helping hand" or a "[grabbing hand](#)"?
4. Who owns the [media](#)?
5. Is entrepreneurship always [productive](#)?
6. Does immigration destroy [institutions](#)?

7. What determines [corruption](#)?
8. Does your country's [legal origin matter](#)?
9. Did abortion really reduce [crime](#)?
10. Does the death penalty [deter](#)?

COLLEGE REGULATIONS

This course complies with the Attendance Expectations and Academic Integrity policies of the College as described in the Grove City College Bulletin. Attendance at all classes for which a student is registered is essential to the satisfactory completion of the course. If an absence is incurred for any reason, it is the obligation of the student to ascertain from the instructor what is to be done to maintain his/her standing in the course.

A student may have unexcused absences which total less than or equal to the number of times the class meets per week. In other words, classes meeting four times per week allow four unexcused absences; three times per week allow three unexcused absences, etc. Absences are excused for authorized GCC activities, loss of immediate family member, and Zerbe-certified illness or injury. Please consult the College Bulletin (pgs. 53-54) for more details on college attendance policy.

Academic Integrity:

Preamble

Grove City College is deeply invested in upholding academic integrity and honesty. Three of the college's five core values, faithfulness, excellence, and community, directly relate to academic integrity because any violation of academic integrity is a form of theft and deceit that affects the one stolen from, as well as the community of students and faculty at the college. In addition, cheating is a violation of three of the Ten Commandments: the prohibitions against stealing, lying, and coveting. However, as the Ten Commandments and the totality of Scripture demonstrate to us, we are fallen creatures who at times do what we ought not do.

Accordingly, the college has created a policy both to define what cheating is and to describe our process for dealing with allegations of cheating in order to discourage cheating and provide an opportunity for meaningful repentance and restoration when students do cheat.

Pledge

As a student of Grove City College, I pledge to do my work faithfully with honesty in accordance with my calling as a student working for Christ's glory.

Cheating and Plagiarism may be present in many areas, including (but not limited to) the following:

1. Doing Papers, Outside Work. Work done out of class, which a student submits as his/her own work to a professor, should be his/her own and should not contain that which has

been obtained from another, other than properly credited references, sources, and citations.

2. Taking Exams, Tests, Quizzes. Work done on a test, exam, or quiz, which a student submits to a professor, should be his/her own and should not contain that which has been knowingly obtained from another. By default, no resources are permitted unless explicitly allowed by the instructor.

3. Preparing for Exams. A student should not seek to gain an advantage on an exam he/she is about to take by obtaining advanced access to particular questions or advance copies of a professor's exam, or by giving access to other students. This includes access to exams from prior semesters.

4. Group Work. In courses where group work or teamwork is allowed, the members of the group may collaborate and share resources among themselves, but not with other groups or prior and subsequent classes.

5. A student should not cooperate with, aid, or encourage another student's violation of the above rules, even though he or she receives no direct benefit. Any student who does so is also guilty of cheating, and can have their grade from current or past semesters (if relevant) reduced.

6. Instructor-Imposed Limitations. Faculty may add (via syllabus, assignment instructions, or verbal instructions) additional rules and limitations pertaining to cheating in their particular discipline, class, and assignment.

Special Note: Plagiarism includes

1. Any direct quotation of another's words, from simple phrasing to longer passages, without using quotation marks and properly citing the source of those words.

2. Any summary or paraphrase of another's ideas without properly citing the source of those ideas.

3. Any information that is not common knowledge—including facts, statistics, graphics, drawings—without proper citation of sources.

4. Any cutting and pasting of verbal or graphic materials from another source and representing as one's own work—including books, databases, web sites, journals, newspapers, etc.—without the proper citation for each of the sources of those materials; this includes any copyrighted artwork, graphics, or photography downloaded from the Internet without proper citation.

5. Any wholesale "borrowing," theft, or purchasing of another's work and presenting it as one's own, whether from the Internet or from another source.

6. Any presentation of "ghost-written" work including—whether paid for or not—as one's own original work, including papers, computer code, visual artwork, and other forms of written and non-written work.

7. Making one's work available for copying by others, as well as copying work posted on the Internet or otherwise made available by another.

8. Self-citation: you cannot submit the same work for two different classes. If you use part of an earlier work, or ideas from an earlier work, you should reference it, as with any other source.

Accessibility & Accommodations: If you anticipate physical or academic barriers based on a disability, please let me know immediately so that we may discuss options. You may also contact the disability services office to establish accommodations. The Disability Services Coordinator may be reached at (724)-264-4673 or disabilityservices@gcc.edu.

COVID Policies: Grove City College is continuing to monitor the COVID-19 outbreak, and we are committed to maintaining a safe and healthy campus community. In order to care for each other, you are required to wear a face mask in all academic buildings including in all classrooms, labs, studios, hallways, and restrooms. Additionally:

- a. Students and faculty should maintain social distancing (minimum 6' distance) to the extent possible during class.
- b. Students should arrive no earlier than 5 minutes before class to reduce contact between students during class change periods.
- c. Students showing any symptoms related to COVID-19 (outlined in the Campus Health and Safety Plan) must not attend class. Instead, they should report their condition through the College's COVID-19 portal, work closely with the College's medical staff, and not return to class in person until approved by the Zerbe Health Center. During this time, every effort will be made to provide remote learning opportunities.
- d. Office hours may be held virtually, and if faculty voluntarily elect to hold face-to-face office hours, both students and faculty should wear a face mask.
- e. If you feel ill, please report your health status in the portal so that the lectures can be provided to you via Teams.