

**Economics 570**  
**Applied Econometric Analysis**  
**Summer I 2021**

**Jonathan B. Hill**  
**Dept. of Economics**  
**University of North Carolina -Chapel Hill**

**1. Information**

Prof. Jonathan B. Hill

Office: Gardner 200F

Office Hours: Mon. and Wed. 2:30-3:30, or by appointment. Either way, send me an email to set a time.

[jbhill@email.unc.edu](mailto:jbhill@email.unc.edu)

<http://jbhill.web.unc.edu/>

**2. Virtual Course Information**

This course must be offered virtually due to Covid-19. Class lecture and office hours will be held remotely in Zoom. Zoom information follows:

*Zoom lecture:* <https://unc.zoom.us/j/93787155370>

*Zoom office hours:* <https://unc.zoom.us/j/93324248200>

**Mon/Wed 2:30-3:30, or by appointment. Please email me to set a meeting time on Zoom.**

*Homework, Exams*

Homework and exams will be uploaded in Sakai's "Assignments" interface. Students must upload a single file (e.g. PDF) with pics of your work.

**Exams**

Exams will be downloaded and uploaded in Sakai's. I will not monitor the exams in Zoom. These are take-home exams. I will be available in Zoom, email or cell phone to answer questions, however.

**3. Course Description and Goals**

This course develops statistical and empirical methodologies for analyzing data in order to test economic and financial hypotheses, make policy recommendations, and forecast unknown events. We review statistical theory of estimation and hypothesis testing. We then proceed by studying classical linear regression theory: the theory and practice of building, estimating, and testing econometric models of economic data/information/behavior. The theoretical topics covered in the course prepares the students for more advanced topics associated with the econometrics analysis of economic behavior in, for example, labor economics, macroeconomics and finance. Throughout the course we will pay close attention to the details of conducting empirical work in economics and econometrics with real-world datasets using computational software. With this in mind, assignments will frequently focus on empirical and computational demonstrations of the theory studied in lecture.

Major goals and take-aways from this course are (1) the student's ability to do empirical research, and (2) the student's understanding of why econometric methods work.

#### **4. Prerequisites**

Econ 400 (Statistics), Econ 410 (Intermediate Microeconomics: Econ. 420 is also helpful, but not required), and at least one semester of differential calculus.

#### **5. Questions for Students**

As part of UNC's curricular "Ideas in Action", we pose the following questions:

- a. *How do I establish my point of view, take intellectual risks, and begin producing original scholarship or creative works?*
- b. *How do I narrow my topic, critique current scholarship, and gather evidence in systematic and responsible ways?*
- c. *How do I evaluate my findings and communicate my conclusions?*

#### **6. Learning Outcomes**

As part of UNC's curricular "Ideas in Action", the present course aims to achieve the following goals:

- a. *Frame a topic, develop an original research question or creative goal, and establish a point of view, creative approach, or hypothesis.*
- b. *Obtain a procedural understanding of how conclusions can be reached in a field and gather appropriate evidence.*
- c. *Evaluate the quality of the arguments and/or evidence in support of the emerging product.*
- d. *Communicate findings in a clear and compelling ways.*
- e. *Critique and identify the limits of the conclusions of the project and generate ideas for future work.*

#### **7. Personal Electronic Devices**

Unless explicitly authorized by me (the professor), you are not permitted to use a laptop computer, tablet computer, smart phone, or cell phone during class. Watching movies and videos, playing games, checking the scores on espn.com, shopping, and chatting with your friends are disruptive behavior that will not be tolerated.

#### **8. Course Resources**

Consult the Resources link in the Sakai course site for STATA resources, assignments and answer keys (once they are posted), practice exams, course data sets and online data set links.

#### **9. Required Text Book**

"Introductory Econometrics: A Modern Approach" 5<sup>th</sup>, 6<sup>th</sup> or 7<sup>th</sup> edition, by Jeffrey Wooldridge.

Browse the web for cheap versions (Ebay, etc).

## 10. Software

You may use any software you like, but I will use and teach Stata, including providing resources on Stata.

Stata is a major econometrics software with command prompt (instantaneous commands, one-by-one) and programmable interface (for writing and storing code to run more detailed programs). Students must obtain Stata on their own: 30% of the course grade will be based on econometric software use. See below for options for obtaining Stata.

Students are required to use the Stata econometrics/statistics programming package. In principle you can use any version available to you, but I will only provide documentation for Stata. You need to obtain a copy of, or access to, **Stata IC 16** or a *similar recent version*.

Stata SE 16 handles massive data sets and is therefore expensive. *We do not need such power!!*

**Stata IC** is cheaper and handles less data than Stata SE, but it is perfectly adequate for all that we do. I use it!!! You can purchase **Stata IC** for \$95/year.

Go to [STATA Gradplan](#) to view options for *student purchases*.

**BUY IT SOON:** there will not be any homework extensions if you decide to wait.

If you want to buy it via UNC, go to [UNC Software Acquisition](#). Their links simply sends you to STATA's web-site.

## 11. Stata Write-Up

Before you do any STATA write-up for homework assignments, consult the ***Write-Up Examples*** and the ***Stata: Bad/Good Writeup*** documents to see what clean, compact write-ups look like, and what bad write-ups look like. Since this is a 500-level course, grading on these write-ups will be very strict.

Your STATA grade will be based 50% on the accuracy of what you did, and 50% on the write-up itself.

**NEVER JUST COPY-PASTE STATA OUTPUT:** if all you do is copy-paste Stata output your grade will be 0. The main problem is the output looks terrible, and it always contains far more than was asked for. Also, it will likely always be the case you do not even recognize much of the output. Thus, take what Stata provides and condense and present the material in neat tables, or graphs, as the per the assignment.

**NEVER REPORT OUTPUT YOU DO NOT UNDERSTAND.** This goes with the above: if you do not understand the output, odds are you were not even asked to report it. Only report what you are asked to do. *And report that material very neatly.*

## 12. Course Structure

There will be two exams (midterm, final), a research project, and several (about 4) homework assignments based on econometric theory and based on using Stata. The breakdown follows:

Midterm Exam: 20%

Final Exam: 20%

Homework: 25%

Research Project: 35%

Under no circumstances will late homework assignments be accepted, including legal/medical emergencies and school sanctioned events. Students can, however, turn homework in early.

In case of emergencies or school sanctioned events, with a valid excuse (i.e. written official documented proof) students may have their homework grade re-weighted.

## 13. Late Assignments

Late assignments are never accepted. If you have a documented emergency, once you are able to contact me I will then re-weigh your homework score.

## 14. Research Project

- 14.1** Students may work alone, or in groups of 2 or 3 (not above 3) to write a course paper based on collected data, using econometric methods studied in class (and other methods, too, where applicable). This project will allow students to hone their research skills, and apply econometric skills learned in (and outside of) class.

The paper must be 15-20 pages (double spaced, 12pt font). Figures and tables need to be neat and readable by anyone (*with* or *without* an education in economics or econometrics).

The body of the paper must be 10-15 pages, and the 15-20 limit includes tables/figures.

Table and figure font should be 10pt, with single spacing.

- 14.2** Citations must be of the style used in the academic journals *American Econometric Review* or *Econometrica*. Read articles there to see how journal articles, unpublished scholarly papers and books are entered bibliographically

### 14.3 Time Line

- a. **10<sup>th</sup> lecture (June 1)**: Group names, proposal and data set due.
- b. **15<sup>nd</sup> lecture (June 8)**: Cleaned data set with summary statistics and preliminary regressions done due. This needs to be a skeletal paper with sections and the above information neatly typed: read the STATA write-up documents: NEVER copy-paste raw STATA output.
- c. **23<sup>th</sup> lecture (June 18)**: First draft due. This has most sections completed, most of the econometric analysis done, with results put in tables, and some figures if appropriate.
- d. **Last day (June 24)**: The final project is due on the final day of class, in lecture.

## 15. Tentative Lecture Schedule

Week	Topic	Chapter (text book)
1	Bivariate Regression Model	2.1-2.2
1	Properties of OLS Estimators	2.3-2.6
1	Multiple Regression Analysis	3, 4, 5
2	Model Selection, Transformations	6
2	Dummy Variables	7
3	Heteroscedasticity	8
	<b>MIDTERM EXAMINATION about here</b>	
3-4	Limited Dependent Variables and Sample Selection	17
4-5	Simultaneous Equations and Endogeneity Bias	16 (which uses 15)
5	Serial Correlation	12.1-12.3, 12.5
6	Panel Data: Pooled Panels and Advanced Methods	13-14

## 16. Other Matters

Students who have worked out an arrangement with ARS should contact me so I can make accommodations. If you need extra time for exams, and have a provable “disability”, and have not already done so, please contact ARS (<https://ars.unc.edu>).

It is my goal to create an inclusive environment where anyone can speak out, share ideas, and provide feedback to me and their classmates. In some cases actual issues that arise in econometrics require an effort to maintain diversity and inclusivity (e.g. "gender" variables, and marital status prior to the landmark case allowing for all to marry), and it is my hope that all students will feel welcome in those, and all other, times.

All students implicitly agree to the Honor Code set forth by UNC. See <https://catalog.unc.edu/policies-procedures/honor-code/>.

Occasionally the syllabus may be changed to add clarification, or slightly alter course lecture topics. I will announce such changes when they occur (which is rare).