

# ECON 417-002: INTRO TO ECONOMETRICS

**Spring 2021**

## **INSTRUCTOR**

Daniel Tannenbaum

**Email:** dtannenbaum@unl.edu

### **Class Lecture:**

**Location:** HLH 032 and Zoom (both live and recorded)

**Meeting Time:** 2:00PM-3:15PM

### **Zoom Lectures:**

**Meeting ID:** 951 0287 4295

**Passcode:** 4321

**Course Webpage:** <https://canvas.unl.edu>

### **Office Hours:**

**Meeting Time:** Wednesdays, 4:00-5:30PM

**Location:** Zoom

**Meeting ID:** 920 1719 6473

**Passcode:** 4321

These office hours are open and do not require an appointment. Students should feel free to join and leave the Zoom meeting as desired. I am also available by appointment, and students should feel free to email me to set up a time to meet outside the scheduled office hours.

## **TEACHING ASSISTANT**

Anupam Ghosh

**Email:** aghosh4@huskers.unl.edu

**Office Hours:** Tuesdays, 4-5:30PM

**Location:** Zoom

**Meeting ID:** 965 9608 4078

**Passcode:** 199

## **COURSE DESCRIPTION AND GOALS**

This course presents an introduction to univariate and multivariate regression and its uses in economics. These methods lay the foundation for empirical work in economics and public policy. Students will be introduced to Stata, an econometric software package, which we will use to apply the tools we develop in class and to answer empirical questions using data from the real world.

By the end of the course students will be able to read empirical economics papers and answer two questions: (1) What are the needed statistical assumptions to interpret the results in the way the author is advocating? (2) What would pose a threat to these assumptions, in the context of the

problem the author is studying, and how would the potential threats change the interpretation of the results? These two questions will be a recurring theme throughout the course.

An additional theme of the course is for students to learn how to take a public policy question and to develop a precise econometric framework for answering the question, which can then be implemented with data.

I will be assuming the mathematical background provided in the prerequisites for the class. The class will make use of calculus and basic probability and statistics. Some of this material will be reviewed during the course, but this review will be done very quickly. If you have any questions about your own level of preparedness, come to office hours.

## TEXTBOOK

The main textbook will be *Introduction to Econometrics, 3rd Edition*, by James H. Stock and Mark W. Watson. Other good undergraduate econometrics texts are *Introductory Econometrics*, by Jeffrey M. Wooldridge and *Basic Econometrics*, by Domodar N. Gujarati and Dawn C. Porter.

You are strongly advised to supplement class lectures with your own personal study of an econometrics text. My lectures will not follow Stock and Watson exactly but I will adopt their notation. I will often provide more mathematical details than found in the texts, so you are also strongly advised to attend each of the lectures and try to follow them closely. If you need to miss a class, contact one of your classmates and arrange to get a copy of their notes.

A class schedule will be uploaded to Canvas, containing a rough outline of the lectures and exact dates for the exams. Each lecture topic is referenced with chapter numbers from each of the three books above. **Anything covered in lecture is testable material.**

## PROBLEM SETS

Problem sets will be assigned semi-weekly and are to be turned in at the beginning of the lecture during which it is due.

**Computational Problems:** Some of the problem sets will involve applied empirical problems with data using the econometric software package Stata. This software is widely used by applied researchers, both academic and professional. You will not be tested on Stata commands or syntax. However, there may be Stata-related exam questions – for example, asking you to interpret Stata regression output. You should be familiar with this aspect of the software and be able to interpret it. We have a license for Stata available for students. I will provide a class roster with names and NUID numbers to the CoB IT department to obtain permissions for each student to access Stata.

Problem set policies:

- Late problem sets will be penalized.

- You may work in groups of up to 4 students, but each student must submit their own set of solutions. On each problem set, you must write the names of the other students with whom you worked. **No two students' answers should be identical on any question.**
- Code for computational problems should be turned in via Canvas. We will create a folder for each assignment to which you can upload your code. Non-computational problems can be written by hand or typed but please print out a copy and bring to class. (The few students who have exemptions from attending in-person classes may upload a pdf of their problem sets to Canvas.)

Please keep in mind that it is in your interest to work through the problem sets on your own, as the majority of your grade will be determined by tests, for which collaboration is not possible.

## **GRADING**

There will be 8-10 problem sets, two in-class midterm exams, and one in-class final exam. The midterms are tentatively scheduled for Week 5 (Thursday, February 25) and Week 10 (Thursday, April 1st). The final exam is scheduled by the Registrar. Final grades will be calculated by applying the following weights:

**Problem Sets:** 15%

**Midterm Exams:** 40%

**Final Exam:** 35%

**Attendance and Participation:** 10%

Grading policies:

- The lowest two problem set grades will be dropped.
- All grades are final except for obvious clerical errors. This rule applies equally to problem sets and exams. We award partial credit systematically, so we cannot revise up one student's grade without implicitly penalizing their classmates. If you would like guidance on missed points, feel free to discuss questions first with the TA and then with me during office hours.
- We will be happy to go through your exam or homework and help explain how you can improve your performance going forward.

The final course grades will be curved. Below is the grading scale that will serve as the starting point for final grades. I reserve the right to be more generous with the assignment of letter grades to percentages.

93-100: A

90-92: A-

87-89: B+

83-86: B

80-82: B-

77-79: C+

73-76: C

70-72: C-  
65-69: D+  
50-64: D  
<50: F

## **ACADEMIC HONESTY**

Students are expected to create and submit original research and written work. Plagiarism is taken very seriously and students will be held to UNL's Student Code of Conduct, section B.1.1c, which defines plagiarism as: "Presenting the work of another as one's own (i.e., without proper acknowledgment of the source) and submitting examinations, theses, reports, speeches, drawings, laboratory notes or other academic work in whole or in part as one's own when such work has been prepared by another person or copied from another person." Both undergraduate and graduate students will be held to the University's "zero tolerance" policy with respect to all aspects of the Student Code of Conduct, including plagiarism. Anyone caught violating the code of academic honesty on any written assignments will fail the course and be referred to the Dean's office for further disciplinary action.

## **UNL RESOURCES FOR STUDENTS WITH DISABILITIES**

The University of Nebraska-Lincoln is committed to ensuring equal access to curricular and co-curricular opportunities for students with disabilities. Providing a range of services, SSD implements reasonable accommodations for students with disabilities and offers students the opportunity to contribute and participate in the diverse campus experience at the University of Nebraska-Lincoln.

### **Services for Students with Disabilities (SSD)**

Office Location: 232 Canfield Administration  
Building Phone: (402) 472-3787

## **UNL NON-DISCRIMINATION POLICY**

The University of Nebraska does not discriminate based on race, color, ethnicity, national origin, sex, pregnancy, sexual orientation, gender identity, religion, disability, age, genetic information, veteran status, marital status, and/or political affiliation in its programs, activities, or employment. The following office has been designated to handle inquiries regarding non-discrimination policies:

**Title IX or Discrimination Inquiries**  
Institutional Equity and Compliance  
128 Canfield Administration Building  
(402) 472-3417  
[equity2@unl.edu](mailto:equity2@unl.edu)

## **COVID-19 POLICY**

### Face Covering Policy

All University of Nebraska–Lincoln (UNL) faculty, staff, students, and visitors (including contractors, service providers, and others) are required to use a facial covering at all times when indoors on the UNL campus, with the following exceptions:

- When eating; however, social distancing practices must be observed.
- When alone in a room.
- When alone in a motor vehicle.
- When an alternative is necessary as indicated by a medical professional during patient care.\*
- When exercising either in a campus recreation facility or during a university-sponsored activity when use of a campus recreation facility is not practicable.
- When in one's assigned apartment or residence hall room.
- When the task requires the use of a NIOSH-approved respirator.
- When pertaining to children under the age of 2 years.

Facial coverings are also required in outdoor settings on the UNL campus if safe social distancing and gathering practices are not possible unless subject to an exception. This policy shall remain in effect until further guidance is provided from the Office of the Chancellor.

### Rationale

An overarching principle to which the University of Nebraska–Lincoln ascribes is that Every Person and Every Interaction Matters. This facial covering policy has been established because we respect and care for ourselves and every person that we encounter on campus.

The Centers for Disease Control and Prevention (CDC) has acknowledged that use of facial coverings can help to slow the spread of COVID-19 in our communities. A facial covering can reduce the trajectory of expelled respiratory droplets, which pose risk to those around you. When you wear a face covering, you demonstrate care about the health and safety of those in our campus community.

### What constitutes a face covering?

There are no universal design standards for facial coverings. However, the covering must extend from the bridge of the nose to below the chin.

- Reusable cloth facial coverings are acceptable, as are disposable paper masks.
- A face shield is an acceptable alternative.
- Regardless of the type used, a mask should not be designed with an exhalation valve.

### \*Requesting Alternatives

Individuals whose unique and individual circumstances require an alternative face covering, as indicated by a medical professional during patient care, may request one. To request an alternative,

students should contact the Office of Services for Students with Disabilities. Faculty and staff should contact Faculty/Staff Disability Services.

#### Wearing and Caring for Your Facial Covering

Each individual is responsible to care for their own facial covering. Disposable facial coverings are to be discarded as ordinary refuse after a single day's use. Reusable cloth facial coverings should be washed regularly. Reusable face shields should be cleaned thoroughly with soap and hot water after each day's use. Facial coverings that are visibly soiled or in poor condition should not be used.

Instruction for properly caring for and donning (putting on) and doffing (taking off) a face mask is provided at the Environmental Health & Safety website.

#### Additional Protective Measures

This policy on facial coverings complements other important community and self-protection measures which are to be consistently practiced by all faculty, staff, students, and visitors. These measures include:

- Self-monitoring for symptoms and staying home when ill or after having been exposed to someone known or suspected of having COVID-19.
- Washing hands often and thoroughly.
- Refraining from touching the face, eyes, nose, and mouth.
- Practicing social distancing, by maintaining 6 feet of distance from others.
- Regularly cleaning and disinfecting surfaces.

#### Compliance

Any employee, student or visitor who fails to abide by these guidelines may be asked or directed to leave the campus space. Employees and students who are directed to leave a campus space for failure to comply with these guidelines may be taken off duty and/or subject to disciplinary action.

Procedures for ensuring compliance in classrooms and similar places are described in the required syllabus statement, "Required Use of Face Coverings for On-Campus Shared Learning Environments."

#### Counteracting Existing Marginalization

In implementing this policy, we must ensure protocols to optimize safety and provide a sense of well-being for all members of our community. We recognize that a policy to wear facial coverings may exacerbate implicit biases and existing racial stereotypes. Thus, we will provide training and professional development for members of campus units regarding face coverings in order to prevent racial profiling and targeting.

WEEK	TOPIC	READINGS		
		Stock & Watson	Gujarati & Porter	Wooldridge
1	Introduction to Empirical Methods in Economics STATA PRIMER			
2	Probability & Statistics: Bivariate and multivariate distributions	Ch 1-3	Appendix A	Appendix B
3	Estimators, small sample properties	Ch 1-5	Appendix A	Appendix C
3	Estimators, large sample properties	Ch 1-6	Appendix A	Appendix C
4	Central limit theorem (asymptotic distribution of the sample mean), convergence. MLE and analogy principle			
5	Simple linear regression: Intro and interpretations	Ch 4	Ch 1-3	Ch 2
MIDTERM I				
6	Simple linear regression, ordinary least squares			
6	Simple linear regression: $R^2$ , properties of OLS	Ch 4	Ch 3, 4	Ch 2
7	Simple linear regression: Inference	Ch 5	Ch 5	Ch 2
7	Simple linear regression: Inference,	Ch 5	Ch 6	Ch 2, 8
8	Intro to Multivariate Linear Regression		Appendix B,	Appendix D,
8	Multivariate Linear Regression: Estimation	Ch 6	Ch 7.4, 7A.1	Ch 3
9	Multivariate Linear Regression: $R^2$ , adjusted $R^2$ , properties of OLS	Ch 6	Ch 7.8	Ch 3, 5, 6
MIDTERM II				
11	Multivariate Regression: Inference	Ch 7	Ch 8	Ch 4
12	Dummy Variables and Non-Linear (In) Variables Models	Ch 8, 9, 11	Ch 9, 6.4-6.8, 7.10	Ch 6, 7
13	Differences-in-Differences			
14	Instrumental Variables (IV) I: Using IV to solve omitted variables	Ch 12		Ch 15, 16
14	Instrumental Variables II	Ch 12		Ch 15, 17
15	Instrumental Variables IV (time permitting) Heterogeneity and LATE			
IN-CLASS REVIEW: Examples and Applications FINAL EXAM (Time and Location Scheduled by the University)				