Syllabus, Eco B2000, Colin Powell School at CCNY, Fall 2022

Statistics and Introduction to Econometrics

Thursday 5-7pm, in NAC 1-302 ie STC-1 (NAC library lower level)

Course Description

This MA course is designed to teach you to use the statistical tools that form an economist's basic toolbox in a hands-on environment working with a lot of real data. Students will get a better understanding of statistics, of how numerical evidence is used and abused, and of how people can torture the numbers to make them appear to support their point of view. In our modern world statistics are the first choice for how someone is going to lie to you. If you know some of the secrets then you will be able to see through other people's lies (and perhaps create some of your own – if you choose to embrace the dark side!).

Course Mode

The course is *in person*. It's important to meet people in person to establish relationships, since your fellow students are vital in your education. You might, from time to time, be unable to get to campus. I will usually have a zoom link for class so you can get some exposure to what's going on but note that is substantially inferior. No zoom for exams.

Textbook

There will be a diagnostic test at the beginning of term; students will use the online module on Statistics from Hawkes Learning http://www.hawkeslearning.com/.
We will learn the R statistical language. You should get *R for Data Science* by Hadley Wickham (you can read it online for free https://r4ds.had.co.nz/ or pay for a download).
This course uses the textbook by James H Stock and Mark W Watson, *Introduction to Econometrics*, Pearson. Earlier editions are very close substitutes. The accompanying study guide is not necessary.

Professor

Kevin R. Foster, Department of Economics and Business, The Colin Powell School for Civic and Global Leadership, The City College of New York, kfoster@ccny.cuny.edu, m: (860) 593-7674, sign up for office hours via link https://calendly.com/kevinrfoster/15min.

Course Requirements/Prerequisites

This course assumes that you have prerequisites of a basic undergraduate course in statistics, a course in Calculus, and enough familiarity with computers to quickly learn new programs. I will use math freely and often. Matrix algebra is not a prerequisite although I will occasionally use it to help more advanced students get a fuller understanding. Stats requires a willingness to work through the algebra and plow through the applicable formulas. However, that said, the point of doing it on a computer is so that the

machine can do the donkey work while you worry about bigger questions – so what? why? what does it mean? what else do I need to know? what other hypotheses could present the same pattern?

Some course material will be presented in online videos. All assignments will be submitted online. All exams will be online. We will have a Slack channel for regular communication.

Computer Use

We'll do a lot of work with (free) computer programs such as R and RStudio. You don't need your own computer although it would be helpful. If you don't have that, you will spend time in the campus computer labs. You are not required to have previous experience with programming although that would be useful.

Educational Outcomes

Students will be able to apply mathematically rigorous analysis to topics such as hypothesis testing, common probability density functions, and regression analysis. More details in the document, "Skills Learned in This Course," available from the course webpage.

Grading

Course grades are determined by four factors: your diagnostic test result, your scores on the exams, your demonstrated skill at using statistical analysis in a final project, and your scores on the homework assignments. The exams have a 45% weight, the project has a 30% weight, homework gets 15%, and the diagnostic test is 10%. Homework assignments and diagnostic test are graded as check, check-plus or – minus, or fail. There is no BS factor of effort or any other unobservable will-o-wisps – the weightings sum to 100. Your grade is determined entirely on observed performance.

Grades will be posted on the course page, so that you can check your progress and determine what grade you can expect to receive. In this public grade posting, you will be identified only by the last 4 digits of your CUNYfirst ID number (if you wish to choose some other 4-digit identifier, email me).

Time Requirements

You should expect to spend 10-12 hours per week on this class. My simple calculation is that a student who is going to school "full time" takes 4 or 5 classes and someone who works fulltime at a job works 40-50 hours per week. So about 10 hours per week is a good estimate. If you don't put in that much work then you can't expect to get a good grade. (This is confirmed by research)

Exam

The syllabus shows the weeks when the two exams are scheduled.

Final Project

You will work with a small group of fellow students to write a project to analyze a question using one of the datasets that we'll be working with. You will make a presentation about this project in class; the

presentation counts as homework and then the written project has a separate grade. This will require you to use statistical analysis software with a large dataset. More details will be given later in the course.

Course Material

Homework and basic course documents will be on the class page, publicly accessible from my web page (http://kfoster.ccny.cuny.edu/classes/fall2021/). Little of the material will be available on the Blackboard course page (login required). More on the class Slack channel. I will periodically send emails to the class so you must regularly check your CCNY email.

Additional Reading

If you end up engulfed in a love affair with stats, you might be interested in these books too:

- Cathy O'Neil & Rachel Schutt, *Doing Data Science*.
- Cosma Rohilla Shalizi, *Advanced Data Analysis from an Elementary Point of View*.
- John W. Tukey, *Exploratory Data Analysis* (in library)
- Edward R. Tufte *The Visual Display of Quantitative Information*, *Visual Explanations: Images and Quantities, Evidence and Narrative* (in library);
- Howard Wainer, *Graphic Discovery: A Trout in the Milk and Other Visual Adventures*
- David Salsburg, *Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century*
- Stephen Stigler, *Statistics on the Table* (in library) and *The History of Statistics: The Measurement of Uncertainty before 1900* (in library).
- Dierdre McCloskey, *Economical Writing* and *The Rhetoric of Economics* (in library).
- Peter Kennedy, *A Guide to Econometrics*.
- Joshua Angrist & Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*.
- Andrew Gelman and Jennifer Hill, *Data Analysis Using Regression and Multilevel/Hierarchical Models*.
- John Hopcroft and Ravindran Kannan, *Foundations of Data Science*.
- DJ Patil and Hilary Mason, *Data Driven: Creating a Data Culture*.
- Cathy O'Neil, *Weapons of Math Destruction*. https://www.youtube.com/watch?v=yK_zyq9l_HY
- Annie Duke, *Thinking in Bets*. https://www.youtube.com/watch?v=uYNsSeYjkp4
- Allison Schrager, *An Economist Walks into a Brothel, and other unexpected places to understand risk*. https://www.allisonschrager.com/why
- Leonard Mlodinow, *The Drunkard's Walk: How Randomness Rules Our Lives*.
- Judea Pearl, *Book of Why*.
- Hadley Wickham, *R for Data Science* https://r4ds.had.co.nz/.
- Scott Cunningham, *Causal Inference: the Mixtape*.
- Maria Konnikova, *The Biggest Bluff*.

Weekly Topics

Eco B2000, Fall 2021

Kevin R Foster, CCNY

Date	Chapter(s)	Topic
Aug 25	1, *online notes*	Introduction to Econometrics, R
Sept 1	2, 3; Hawkes	Basic Statistics & Random Variables
Sept 8	*online notes*	Estimating Parameters
Sept 15	*online notes*	Hypothesis Testing
Sept 22	4, 5	Linear Regression
Friday Sept 23		**Diagnostic Test must be completed before 11:59pm (local time)**
Sept 29		**no class, CCNY has Monday class schedule**
Oct 6	6, 7	More Regression
Oct 13	*1-7 and online*	**Exam 1**
Oct 20	*online notes*	Nonlinear Regression, Panel Data
Oct 27	8, 9	Binary Dependent, Instruments, Quantile, Propensity Score
Nov 3	10, 11, 12	Further Topics: Trees, Random Forest
Nov 10	*online notes*	Further Topics: LASSO, Spike & Slab, Factor Analysis, (Time Series)
Nov 17	*comprehensive*	**Exam 2**
Nov 24		**no class**
Dec 1		*Class Presentations of Research Projects – attendance is graded*
Dec 8		*Class Presentations of Research Projects – attendance is graded*
Sunday Dec 18		**Final Project Due** before midnight

Chapters refer to **Introduction to Econometrics**, Stock and Watson.

There will be lecture notes online – these are most important. Exams will cover material in both textbook and lecture.

Deviations from the schedule will be announced in class.

The exam dates are given above. You must take the exams at the scheduled times. No excuses.

CUNY Policy on Academic Integrity

"Plagiarism is the act of presenting another person's ideas, research or writings as your own. The following are some examples of plagiarism:

- "Copying another person's actual words without the use of quotation marks and footnotes attributing the words to their source;
- "Presenting another person's ideas or theories in your own words without acknowledging the source;
- "Using information that is not common knowledge without acknowledging the source;
- "Failing to acknowledge collaborators on homework and laboratory assignments.
- "Internet plagiarism includes submitting downloaded term papers or parts of term papers, paraphrasing or copying information from the internet without citing the source, and "cutting & pasting" from various sources without proper attribution."
- A student who plagiarizes may incur academic and disciplinary penalties, including failing grades, suspensions, and expulsion.
- A complete copy of the CUNY Policy on Academic Integrity may be downloaded from the College's home page.

Accommodations for Students with Disabilities

Your success in this class is important to me! We all learn differently. The Office of Student Disability Services (SDS) is dedicated to providing students with disabilities equal access to the College curriculum. The Office ensures that, upon request, qualified students with disabilities are provided reasonable and effective accommodations, as mandated by law, as well as appropriate support services.

Students who contact SDS and indicate that they have a disability or believe that they might qualify for services will be asked to make an appointment for an intake interview with SDS staff. To qualify for services, students must register with SDS by providing appropriate documentation from a qualified professional describing the nature of their disability and functional limitations. Although academic adjustments are mandated by law, the College is not required to alter demonstrably essential academic requirements of a course of study nor is the College mandated to lower or effect substantial modifications of reasonable academic standards.

Service animals are welcome in class.

Early planning is essential for many of the resources, adjustments and accommodations; students are asked to contact SDS at the earliest possible date (NA 1/218; 212-650-5913 or 212-650-6910 for TTY/TTD).

Mental Health

CCNY has free anonymous programs available to community members who need help, https://www.ccny.cuny.edu/counseling for details or call (212)650-8222. Daytime/Walk-in Crisis Services are available to students whose crisis affects their own or others' safety. If the crisis is urgent but the Counseling Center is closed, please contact Public Safety at (212)650-7777 or call the Crisis line at (800)273-8255. If you are in a life-threatening situation while off-campus, call 911 or go to the nearest Emergency Room. There is a Psychological Counselor: Confidential Advocate for confidential clinical services to students and employees who have experienced gender-based violence.

Student Basic Needs

Any student who has difficulty affording groceries or accessing sufficient food to eat, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact either Ms Darbassie in the Colin Powell School (NAC 6-141) or Student Affairs https://www.ccny.cuny.edu/studentaffairs. There is a Food Pantry open to the community here in NAC ground floor.

Policies on Non-Discrimination and Sexual Harassment

The City College prohibits discrimination on the basis of age, gender, sexual orientation, transgender, gender identity, gender expression, disability, genetic predisposition or carrier status, alienage or citizenship, religion, race, color, nationality or ethnic origin, or veteran, military or marital status in its student admissions, employment, access to programs, and administration of educational policies. Questions, concerns, or complaints based on any of the above may be directed to the Office of Diversity and Compliance, Wille Administration Building, Room 212 (212-650-6310). In addition, the specific form of gender discrimination, "sexual harassment," is prohibited by the policies of the Board of Trustees of The City University of New York.

Student complaints alleging sexual harassment should be directed to the Sexual Harassment Awareness and Intake Coordinator (see Appendix B.15 of the Bulletin, and the Sexual Harassment brochure for the name of the current Coordinator and a list of Committee members who may be contacted). Brochures are available in the Office of Diversity and Compliance, the Office of Human Resources, the Office of the Vice President for Student Affairs and at the NAC Welcome Center. Information is also available on the City College website under Office of Diversity.

Every student has their own identity and can choose what name to use and what pronoun. Gender Resources info https://www.ccny.cuny.edu/health-wellness/gender-resources

Policy on Children in Class

All students should assist in welcoming their peers who are parents. Breastfeeding babies and newborns welcome always. For older children, I understand that unforeseen disruptions in childcare can be an issue so you are welcome to bring your child to class – although this is not a longterm solution. Students with children should sit close to the door to step outside if the child needs attention. Please contact me if you have trouble balancing school and parenting.

Veterans

We welcome students who have served our country as members of the armed forces https://www.ccny.cuny.edu/veterans

Immigrants

CUNY Citizenship Now offers free immigration services to all CCNY students and their families https://www.ccny.cuny.edu/we-are-one-ccny/city-college-immigration-center