EC508—Econometrics
Spring 2022

LOGISTICS

Lecture meetings
Lecture time: Tuesday and Thursday 9:30 am–10:45 am
Lecture location: Morse Auditorium MOR-101

Instructor
Linh Tô (linhto@bu.edu)
Sign-up office hours: rotating one-on-one slots which can be signed up on https://linh.to/teaching (you can cancel or reschedule if your plan changes)
Open office hours: Monday 11:30 am to 12:15 pm, Zoom https://bostonu.zoom.us/j/94316605791?pwd=VXJQK0tlbG1MVHY0ZkR0L0kvaFVqZz09 Thursday 11:30 am to 12:15 pm, SSW 307
Office hours location: SSW 307 or Zoom

Discussion section (required)
A1 Section time: Friday 2:30 pm–3:45 pm
A1 Section location: CAS 216
B1 Section time: Friday 11:15 am–12:05 pm
B1 Section location: KCB 106
C1 Section time: Friday 5:45 pm–7:00 pm
C1 Section location: CAS B20

Teaching fellows
Zhanyuan Tian (zhanyuan@bu.edu)
Office hours: Wednesday 5 pm–6 pm and Friday 1:15 pm–2:15 pm SSW basement area or Zoom
Marshall Drake (mhdrake@bu.edu)
Office hours: Monday 3:15 pm–4 pm (Zoom) and Friday 10:15am–11 am (SSW B04 or Zoom)
Patrick Power (ppower1@bu.edu)
Office hours: Wednesday 10 am—11 am (SSW B18 or Zoom) and Thursday 6:30 pm—7:30 pm (Zoom)

COURSE OBJECTIVES

Standard econometric methods for empirical economic research in academic or business settings. Basic concepts: quantification of uncertainty using confidence intervals, inference of causal relationships in regressions, and prediction based on regression estimates. Working with data and use of statistical software.

PREREQUISITES

The prerequisite is EC 507 (Statistics for Economists). Familiarity with elementary notions of calculus and probability is assumed.

All materials in this course are copyrighted and are only for students in the class, not to be distributed outside the class under any circumstances.
READING AND COURSE MATERIALS

Some of the required readings for this course consist of papers published by economists in academic journals, and some of the required readings come from the following textbook (abbreviated IEP).


Textbook chapters from the following textbook (abbreviated SW) may also be useful:


Course website
The lecture slides, problem sets, and other materials will be posted in the Blackboard learn web site of the course at [http://learn.bu.edu](http://learn.bu.edu). Check also this website for class announcements.

Stata
Students will use Stata in this course. Your teaching fellow can answer your Stata questions both during office hours and discussions as well as on Piazza Discussion Forum.

Options to obtain and use Stata are posted on Blackboard under *Content/Stata materials/CAS Instructions on Obtaining Stata*.

OTHER RESOURCES

Online resources
Stata: [https://stats.oarc.ucla.edu/stata/modules](https://stats.oarc.ucla.edu/stata/modules) (by UCLA)
Companion Website for Stock and Watson:

GRADING

The class grade will be determined based on the following components:

- 10% Professionalism
- 15% Problem sets
- 15% Exam 1 [February 17]
- 15% Exam 2 [March 24]
- 15% Exam 3 [April 19]
- 30% Final [date to be announced by BU on January 31]

Professionalism (10%)
Professionalism entails on-time class attendance, preparation, participation in class discussions, facilitating a respectful learning environment, putting high-quality effort into group assignments, respectful communication, and honesty.

Effective class participation requires that you attend lectures and discussions prepared to make comments and ask questions. Your contributions to the class discussion will be evaluated based not solely on quantity but on quality as well. Questions and comments during class and on the Blackboard Piazza Discussion Forum are highly encouraged, including asking clarifying questions and addressing points of confusion. You are not expected to be perfect; you are expected to try. It is incumbent upon you to let us know if you have areas of confusion. Ideally, you will raise these in class—but you can also let me know if you are struggling with concepts or have questions outside of class. Letting us know that you have a question or area of confusion will not negatively affect your grade. The best comments and questions are those that enrich the learning experience of your fellow classmates, and this can be achieved by asking clarification questions as well.

**Problem sets (10%)**
Problem sets are always due by 08:00 of the due date. The problem sets are designed to give you practice with concepts and the various methods covered in the course. Students are encouraged to work together in small groups to discuss the problem sets, but each student must write up their own answers independently and list the names of the other students with whom they worked.

Problem sets are graded based on effort (completeness and timeliness). Full credit is obtained by handing in a completed “good faith effort” homework that is turned in on time. Assignments received within 24 hours of the deadline will receive half credit. Assignments submitted beyond that time will receive no credit. Effort is demonstrated in explaining the solutions and how to obtain them, and not simply whether the answers are ‘correct’ or ‘incorrect’.

**Exams**
All exams are cumulative, and each exam emphasizes the most recent materials. Exams will take place in class. You may use notes from class, but you may not consult materials outside of class. Under no circumstances are students permitted to discuss the exam with anyone else. This includes collaborating or sharing answers to questions, or disseminating exam questions or exam materials in any form.

All exams will be graded based on the thought process and demonstrated effort in obtaining and explaining the solutions, and not simply whether the answers are ‘correct’ or ‘incorrect.’

- The length of exams will be strictly enforced. If you have a disability that necessitates extra time for exams, or any other accommodations, you will need to give me a note from the BU office of Disabilities Services within the first two weeks of the semester.
- Exams must be taken when scheduled. With a note from a Dean, the final exam will count for any missed prior exam that is granted by the Dean.

**CORRESPONDENCE AND OFFICE HOURS**

I look forward to interacting with you all during office hours this term.

For questions related to the problem sets, you will be asked to post on the course’s Piazza Discussion forum rather than send emails since your questions will likely be helpful to others.
in the class as well. If we receive questions via email, we will remind you to post your question on Piazza. You can be completely anonymous on Piazza, or you can choose to not be anonymous to the instructor in order to receive participation credit.

You should sign up for the course Piazza at https://piazza.com/bu/spring2022/22sprgcasec508. The Blackboard course website also links to Piazza. If you have any problems or feedback for the developers, email team@piazza.com.

Many questions—especially conceptual questions—are generally answered better in-person rather than over Piazza. In such cases, you are encouraged to sign up for office hours.

**DIVERSITY, INCLUSION, AND SUPPORT**

It is my goal that all students in this course feel they are working in an environment in which they can comfortably and productively learn. To that end, I want to be explicit that diversity of background (including, but not limited to: race, gender, ethnicity, sexual orientation, age, socioeconomic status, religion, ability) is an asset to all of us. Diversity of voices, of minds, makes our ability to do science and answer questions about the world we all inhabit stronger. In fact, research has shown that papers authored by more diverse teams of scientists generate papers that are more highly cited than work from more homogeneous groups (e.g., see https://www.scientificamerican.com/article/how-diversity-makes-us-smarter/). Accordingly, I will seek to provide primary literature from diverse voices of scientists presently working in our field, but I also acknowledge that many of the foundational articles we will read have been authored by a small subset of privileged voices. I welcome any feedback or suggestions on how to improve the quality of the course materials. Finally, you should all feel comfortable to let me know (in person, over email, or anonymously) if you feel that your learning is being adversely affected by experiences in or outside of class.

**ADDITIONAL POLICIES**

**COVID-19 health protocol compliance:** All students are expected to comply with all of the commitments they have made with regard to COVID-19 health protocols, such as wearing an appropriate mask, and, on request, producing the badge that indicates the student is up-to-date with testing and attestation.

**Absences:** Please notify the instructor of any requests for missing classes for valid reasons before the absence. View the religious observance policy: www.bu.edu/academics/policies/absence-for-religious-reasons

In the case the absence is due to isolating because of being COVID-positive, a student should email the instructor in advance with their badge to request that the class is livestreamed and the livestream link will then be provided to the requesting student.

**In-class mobile communications policy:** Mobile telephone devices should have the ringer turned off and be placed in pockets or backpacks. Students may not make or receive phone calls, surf the web, or send or receive text messages during the class. No laptops, no cellphones should be visible on your desks and they should not be used during class.
Grade appeals policy: Problem sets are graded on a “good faith effort” basis and there is no grade appeal.

Exams are eligible for grade appeals. Grade appeal requests must be submitted at the earliest 2 days after the exam is returned, and at the latest 7 days after the exam is returned. There are two types of grade appeals.
- The first is an “arithmetic error” appeal. If a student feels that there was an arithmetic error in the construction of their total score, they can return it to me to have the score recalculated after writing “arithmetic appeal” and signing the first page. I will recalculate the entire score. Note that it is possible for the score of an exam to fall after an arithmetic appeal.
- The second type of appeal is a “full exam appeal.” If a student feels any part of the exam was incorrectly graded on any particular part, they can type up and print out a written appeal specifying the detailed reasons for the request. They can return it to me after writing “full exam appeal” and signing the first page. I will then regrade the entire exam. Note that it is possible for the score of an exam to fall after a “full exam appeal.” Students cannot appeal an appeal: the grade given after a “full exam appeal” is final. A “full exam appeal” can only be made prior to discussing the exam with me. For fairness to the rest of the students, there will be no exceptions to this policy.

Academic dishonesty: I take academic dishonesty very seriously, as it is unfair to other students and undermines the principles of academia. Do not cheat. If you are wondering whether something constitutes cheating, ask before you do it. Suspected cases of cheating, plagiarism, and other forms of academic misconduct will be investigated, and if there is sufficient case for action, will be reported to the administration for possible disciplinary action. Penalties for academic misconduct can range from failing the course to suspension or expulsion from the university.

It is your responsibility to be familiar with the Academic Conduct Code as can be found here: https://www.bu.edu/academics/policies/academic-conduct-code/

LIST OF MAJOR TOPICS

- Regression analysis
  - Ordinary least squares (OLS)
  - Omitted variable bias (OVB)
- Advanced regression analysis
  - Fixed effects (FE)
  - Probit/logit
- Randomized experiments
  - Randomized controlled trials (RCT)
  - Instrumental variables (IV)
- Quasi-experimental methods
  - Differences in differences (DD)
  - Regression discontinuity (RD)
### Reading List and Schedule
(subject to change)
*Papers should be read before the corresponding lecture

#### January 20 (Thurs): Introduction

#### Part I—Regression analysis

**January 24**: Problem set 1 assigned

**January 25/27 (Tues/Thurs): OLS 1**
- SW Chapter 4.1–4.4

**January 28: Lab 1 (Introduction to Stata)**

**January 31**: Problem set 2 assigned

**February 1 (Tues): OLS 2**
- SW Chapter 4.1–4.4

**February 3 (Tues): Hypothesis Testing**
- SW Chapter 5.1–5.3

**February 4: Lab 2 (OLS)**

**February 7**: Problem set 3 assigned

**February 8 (Tues): Omitted Variable Bias**
- SW Chapter 6.1

**February 10 (Thurs): Multiple Regression**
- SW Chapter 6.2–6.3

**February 11: Lab 3 (OVB)**

**February 15 (Tues): Validity 1**
- SW Chapter 9.1–9.2

**February 17 (Thurs): Exam 1 (15%)**

**February 18: No lab this week**

#### Part II—Advanced regression analysis
February 21: Problem set 4 assigned

**February 22 (Tues): No class (Monday schedule)**

**February 24 (Thurs): Validity 2**  
- SW Chapter 9.1–9.2

*February 25: Lab 4 (Exam 1 solutions)*

February 28: Problem set 5 assigned

**March 1 (Tues): Nonlinear**  
- SW Chapter 8.1–8.3

**March 3 (Thurs): Fixed Effects 1**  
- SW Chapter 10.1–10.4, 10.7

*March 4: Lab 5 (FE)*

March 14: Problem set 6 assigned

**March 15 (Tues): Fixed Effects 2**  
- SW Chapter 10.1–10.4, 10.7

**March 17 (Thurs): Binary Dependent 1**  
- SW Chapter 11.2

*March 18: Lab 6 (Probit/logit)*

**March 22 (Tues): Binary Dependent 2**  
- SW Chapter 11.2

**March 24 (Thurs): Exam 2 (15%)**

*March 25: No lab this week*

### Part III — Randomized experiments

March 28: Problem set 7 assigned

**March 29 (Tues): Potential outcomes and treatment effects**  
- IEP Chapter 3  
- SW Chapter 13.1

**March 31 (Thurs): Randomization**  
- IEP Chapter 4
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<th>April 1: Lab 7 (Exam 2 solutions)</th>
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April 4: Problem set 8 assigned

**April 5 (Tues): Threats to validity 1**  
- IEP Chapter 9  
- SW Chapter 13.2

**April 7 (Thurs): Threats to validity 2**  
- Miguel and Kremer 2004 ECMA

**April 8: Lab 8 (RCT)**

April 11: Problem set 9 assigned

**April 12 (Tues): Local Average Treatment Effects**  
- IEP Chapter 5

**April 14 (Thurs): Instrumental Variables**  
- SW Chapter 12.1–12.5

**April 15: Lab 9 (IV)**

**April 19 (Tues): Exam 3 (15%)**

April 20: Problem set 10 assigned

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<th>Part IV — Quasi-experimental methods</th>
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**April 21 (Thurs): Matching**  
- IEP Chapter 8

**April 22: Lab 10 (Exam 3 solutions)**

April 25: Problem set 11 assigned

**April 26 (Tues): Differences in Differences 1**  
- IEP Chapter 7  
- SW Chapter 13.4

**April 28 (Thurs): Differences in Differences 2**  
- IEP Chapter 7  
- SW Chapter 13.4

**April 29: Lab 11 (DD)**
May 2: Problem set 12 assigned

**May 3 (Tues): Regression Discontinuity**
- IEP Chapter 6
- SW Chapter 13.4

**May 5 (Thurs): Make-up class and Review**