University of California San Diego
Department of Economics

Econ 120B: Econometrics (FA25)
Alisher Batmanov

Course Instructor
Alisher Batmanov
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Office hours: Fri 2-3 pm
Location: Atkinson Hall 6004 or on Zoom

Teaching Assistant
Georgy Kalashnov
Email: gkalashnov@ucsd.edu
Office hours: Tue 12-1 pm
Location: SD Supercomputer Center E129

Lectures
Tue & Thur at 5:00 pm - 6:20 pm
Location: CSB 004

Discussions
Mon at 5:00 - 5:50 pm
Location: PCYNH 121

Problem Sets
PS #1 due on Sat, Oct 11 at 11:59 pm
PS #2 due on Sat, Oct 25 at 11:59 pm
PS #3 due on Sat, Nov 22 at 11:59 pm

Exam Dates
Midterm - Tue, Nov 4 at 5-6 pm in YORK 2622
Final - Fri, Dec 12 at 7-9 pm in TBD
No classes on Oct 9, Nov 11 and Nov 27

Course Description

This course has three main goals:

(1) The first goal is to **equip you with a thorough understanding of causal inference**. This course will cover key concepts such as selection and random assignment, natural experiments, and the potential outcomes framework. You will learn how to distinguish correlation from causation and apply these techniques to real-world problems.

(2) The second goal is to **enhance your proficiency in statistical and econometric methods**. After we review core probability concepts, you will learn the basics of linear regression, explore the properties of regression estimators, and learn how to conduct statistical inference.

(3) The third goal is to **develop your skills in data analysis and interpretation**. Throughout the course, you will work with datasets to apply the concepts learned in class using the statistical software called Stata. By the end of the course, you will be able to use it to run linear regressions, interpret their results, and make informed conclusions based on your analysis.

ECON 120B is the second course in the core econometrics sequence. The focus will be on identifying causal relationship between variables of interest using linear regression.

Prerequisites: ECON-120A | ECE-109 | MAE-108 | MATH-180A or 183 or 186

Textbook

There is no official or required textbook for this course. All necessary materials, including lecture slides and handwritten notes, will be posted on Canvas. These resources are designed to be comprehensive and self-sufficient, containing everything you will need to succeed in this course.

For those interested in additional reading, the lecture material will be based on the following textbooks: *Introduction to Econometrics* by James Stock and Mark Watson (primary), *Causal Inference: Mixtape* by Scott Cunningham, *Introductory Econometrics: A Modern Approach* by Jeffrey Wooldridge, and *Mostly Harmless Econometrics* by Joshua Angrist and Jörn-Steffen Pischke. Additionally, some lecture content will draw from teaching materials by Peter Hull, Jon Roth, and Paul Goldsmith-Pinkham.

Lectures and Discussions

This is an **in-person class**, and as such, attendance and participation will be expected and essential for your learning.

As an encouragement for you to attend lectures, there will be an opportunity for you to earn up to 10% as a **bonus** to the course grade. Five times during the quarter we will have pop quizzes and you will be guaranteed at least 60% if you are present on the day of the quiz regardless of your performance.

As an encouragement for you to attend discussions, your TA will cover at least one problem from the upcoming problem set during the discussion in a given week.

Note that lectures and discussions will not be podcasted because of technical reasons. We will be posting all class notes on Canvas. There will be regular **office hours** held by the instructor and the TA for you to ask any course-related or general questions – we strongly encourage you to come to office hours!

There will also be a class **Discord server** which is the easiest way for you to ask questions – we will try our best to address them as fast as we can. You can also use Discord to make groups to work on problem sets together. Join link: discord.gg/6errPdWkXN

Stata

You will use the statistical software called *Stata* for questions on problem sets that ask you to work with data. The first discussion session will partially be dedicated to learning how to implement the basic commands in Stata - do not hesitate to reach out to your TAs if you have any questions about Stata. Download and license information is available under Modules on Canvas. Both the installation file and the license are meant for students enrolled in this class only. Please do not share these information with anyone outside of this class.

Your course grade will be determined based on the following components:

Problem Sets (x3)	30%	Due on **Saturdays, Oct 11, Oct 25 and Nov 22 at 11:59pm**. Work in groups of 3. Submit one solution per group on Gradescope.	Weeks 2, 4, 8
Midterm Exam	30%	Held on **Tuesday, Nov 4 during class time**. Duration – 75 minutes. Covers Lectures 1-6.	Week 6
Final Exam	40%	Held on **Friday, Dec 12 at 7:00 pm in CSB 004**. Duration - 2 hours. Covers Lectures 1-10.	Finals Week
Pop-Quizzes (x7)	10%	Unannounced in-class bonus quizzes. Guaranteed 60% if present on a quiz day. Two scores dropped.	Weeks 1-10
Total:	100+10%		

Problem Sets: In Weeks 2, 4 and 8 you will be assigned three problem sets to be completed in groups of up to 3 students. Each problem set carries the weight of 10% of your course grade. Please upload your solutions directly on **Gradescope**. Problem sets are designed to test your conceptual understanding of course topics, ability to carry out analytical derivations, and ability to apply concepts from lectures when working with data.

Late submissions of up to 12 hours after the deadline will be penalized by 20% subtracted from the final score. No submissions will be accepted after 12 pm on the following day – email me if you find yourself in such situation. If you cannot submit your solutions by the deadline due to a verifiable medical/legal/sports reason, you must notify me at least 12 hours before the deadline and the weight will be shifted to the other problem set (or midterm/final exam).

Midterm and Final Exams: Both exams are held in person, so please plan your commute accordingly. The exam format is a mix of multiple-choice questions and essay-type problems. Exams are closed book but you can bring one cheat sheet to the exam, which should be no larger than a standard letter-sized paper (8.5 x 11 inches). Both sides of the paper may be used. Electronic devices (e.g., phones, tablets, laptops) are not permitted. Please bring a calculator and photo ID.

There will be no make-up midterm. If you must miss the midterm for a verifiable medical, legal, or athletic reason, the weight of the final exam will be increased to 70%. You must notify me at least 12 hours before the exam; failure to do so will result in a zero on the midterm. A make-up final exam may be given only for a verifiable medical, legal, or athletic reason. Failure to notify me at least 12 hours before the exam will result in a zero on the final. Unexcused absences will result in a zero grade. If you miss an exam without prior notification, please email me as soon as possible so we can discuss potential arrangements.

Bonus Quizzes: There will be seven **in-class** pop quizzes, which will be unannounced. Each quiz will consist of 5 straightforward multiple choice questions based on the material recently covered in class. If you are present on the day of the quiz but score less than 3 correct answers, you will still receive a minimum of 3 out of 5 points (1.2 out of 2% per quiz). This means if you are present all five times the quiz is administered, you are guaranteed 6% towards the overall course grade. Two lowest scores will be dropped.

Letter Grades Policy: This course does <u>not</u> use a fixed percentage-based scale (e.g., 93% = A). Instead, I will determine letter grade cutoffs based on the overall difficulty of the problem sets and exams. After the midterm, I will provide a rough estimate of your expected letter grade based on your performance up to that point. To give you a general idea, about one-third of students should expect at least an A (A+, A, or A−), and about two-thirds should expect at least a B (B+, B, or B−). These proportions are not set in stone and may shift depending on overall class performance.

Finally, while your score relative to the class average provides helpful context, it does not solely determine your grade. If the whole class performs well, everyone can receive a strong grade.

I will informally track class attendance and participation for all students. At the end of the quarter, if a student's letter grade is near a cutoff (e.g., between an A- and a B+), strong participation may result in an upward grade adjustment.

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ADMINISTRATIVE ISSUES

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(1) If you have a documented disability, please bring your AFA documentation to me as soon as possible so that I can make suitable accommodations for you. If you believe that you have a disability and desire accommodation, please register with the Office for Students with Disabilities.

(2) Midterm and Final Exam Proctoring
   (a) Late show-up: If you arrive to take the exam after the first 30 minutes, you will not be allowed to take the exam.
   (b) Restroom policy: You may not use the restroom during the last 30 minutes of the exam.

(3) Grading concerns: If you believe there is a grading mistake, you must let us know within one week of the exam scores being posted. We are using Gradescope to grade exams and Gradescope makes it very easy to ask for a regrade.

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ADDITIONAL COURSE POLICIES

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Academic Honesty and Plagiarism. All graded work must be done by you. Familiarize yourself with the University's policy on academic integrity: UCSD Academic Integrity Policy. Zero-tolerance policy for violations applies. Students who violate UCSD's academic integrity policy will earn a failing grade for the course. In addition, the Council of Deans of Student Affairs will impose a disciplinary penalty.

Harassment and Discrimination. The University Policy on Discrimination and Harassment applies to all students, staff, and faculty. Any student, staff member, or faculty member who believes that they have been the subject of discrimination or harassment based on race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation,

or political philosophy, should contact the Office for the Prevention of Harassment and Discrimination (OPHD) at (858) 534-8298, ophd@ucsd.edu, or visit reportbias.ucsd.edu.

Well-being and Counseling. Managing the many challenges of being a college student can be very stressful. Always remember that talking to staff who are professionally trained to help is available: caps.ucsd.edu

Tentative Course Schedule

	Date	Activity	Course Topic
Week 0	Thu, Sep 25	Lecture 1	Intro to causal inference
Week 1	Tue, Sep 30	Lecture 2	Review of probability theory
	Thu, Oct 2	Lecture 3a	Potential outcomes framework
Week 2	Tue, Oct 7	Lecture 3b	Potential outcomes framework
	Thu, Oct 9	*No Class*	*Instructor conference travel*
	Sat, Oct 11	**Problem Set #1 (10%)**	
Week 3	Tue, Oct 14	Lecture 4a	Linear regression
	Thu, Oct 16	Lecture 4b	Linear regression
Week 4	Tue, Oct 21	Lecture 5a	Properties of estimators
	Thu, Oct 23	Lecture 5b	Properties of estimators
	Sat, Oct 25	**Problem Set #2 (10%)**	
Week 5	Tue, Oct 28	Lecture 6a	Statistical inference
	Thu, Oct 30	Lecture 6b	Statistical inference
Week 6	Tue, Nov 4	**Midterm Exam (30%)**	Lectures 1–6
	Thu, Nov 6	Lecture 7a	Multiple linear regression
Week 7	Tue, Nov 11	*No Class*	*Veterans Day Holiday*
	Thu, Nov 13	Lecture 7b	Multiple linear regression
Week 8	Tue, Nov 18	Lecture 8a	Nonlinearity and interactions
	Thu, Nov 20	Lecture 8b	Nonlinearity and interactions
	Sat, Nov 22	**Problem Set #3 (10%)**	
Week 9	Tue, Nov 25	Lecture 9a	Instrumental variables
	Thu, Nov 27	*No Class*	*Thanksgiving Holiday*
Week 10	Tue, Dec 2	Lecture 9b	Instrumental variables
	Thu, Dec 4	Lecture 10	Natural experiments
Finals Week	Fri, Dec 12	**Final Exam (40%)**	Lectures 1–10