# Columbia Business School
Modern Econometrics for Business (B8257)
Spring 2024 Course Syllabus

Course Description

Data analysis in economics, or "econometrics" as it is called by practitioners, has moved away from mathematical complexity and towards simpler tools that are accessible to businesses and can be applied easily to big data. This course will provide students with an understanding of three widely used techniques in modern econometrics: randomized control trials, regression discontinuity, and differences-in-differences. After learning how these tools provide superior analytic results than traditional regression techniques in making inferences about the real world, students will gain the practical knowledge to wield them successfully and make better decisions with data.

Course Instructor:
Laura Boudreau (she/her)
Assistant Professor of Economics
Email: l.boudreau@columbia.edu
Office Location: Kravis 584
Office Hours: Available by appointment
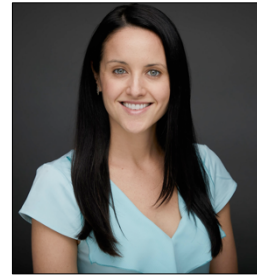
Course Assistant:
TBD

Schedule and Location:
Class Sessions: Thursdays, 9:00 am – 12:15 pm
Location: TBD
Breakout rooms: TBD

Materials
Readings: There is no required textbook, but readings from sources including textbooks will be posted on Canvas and some readings are required. Case studies are available via Canvas.

- For those who would like to have a textbook on hand, excellent books covering much of the course material are: Gerber and Green's "Field Experiments: Design, Analysis, and Interpretation" and Angrist and Pischke's "Mastering 'Metrics." Angrist and Pischke's "Mostly Harmless Econometrics" is also a great book but is more formal/mathematical. These can be relied on for questions about classwork, homework, and your final project.

Handouts: A handout accompanies the presentation slides for each class session. Copies of handouts, presentations, and any other relevant materials from class will be posted on Canvas prior to class. Handouts do not contain all presented material, and students will find it useful to take additional notes.

Software & Computers: We will often use computers in class to do data analysis; you should always bring your laptops to class. We will use R -- a widely used open-source language for data analysis – but do not presume prior knowledge of this software. The course includes a brief introduction to R, although learning to code in R is not part of the course's instructional objectives. Samples and outlines for R code will be provided for in-class exercises as well as assignments, and a number of external supports will be offered for students who need additional help.

Videos: All class sessions will be recorded and available on Echo360 via Canvas. In addition, there are several websites that provide additional explanation of many of the concepts we cover. Some of the best are provided by the Abdul Lateef Jameel Poverty Action Lab (J-PAL) and can be found at https://www.povertyactionlab.org/research-resources/teaching.

Evaluation

Class Participation (20%): In-class discussions are an integral part of the course, and students are expected to contribute to the learning experience of the class by asking relevant questions, offering insights into the topic at hand, and generally behaving in a professional manner. Quality of contribution matters more than quantity.

Class participation scores will also account for attendance, lateness, and completion of pre-class and in-class surveys. Students are expected to attend all classes; excused absences are granted consistent with the standards used in Core courses; see Attendance Policy below.

Problem Sets (40%): There will be four problem sets for the course. Problem sets are Type B2 (see table below). They must be **written up and turned in individually**. Students can discuss concepts related to the problems, but not their own individual submissions or solutions, with members of their learning team and/or other classmates.

Type	Designation	Grade	Preparation of submission	Discussion of Submission	Discussion of Concepts
B2	Individual with discussion of concepts only	Individual grade	Individual preparation	Not permitted to share/discuss solutions or submission	Permitted

Problem sets are submitted via Canvas. **Please name files** using the following convention: "Metrics_PS#_*FIRSTNAME_LASTNAME*" (.pdf, .xls, etc.) where # is the problem set number and *FIRSTNAME/LASTNAME* are filled in with your name.

Submissions are scored and returned via Canvas. Students are encouraged to turn in problem sets prior to the due date. Partial credit for problem sets turned in within 8 hours of the normal deadline: 20% reduction for *any* lateness, plus a reduction of 10% per hour. For example, with a deadline of 11:59pm, an assignment turned in at 2:30AM would be reduced by 20%+25% = 45%. Solutions will be made available on Canvas the following day.

Group Project (40%): Students will work in teams (of 4-5 people) to develop a causal question related to a real business, design a randomized experiment to test their question, and "pitch" a

proposed design and implementation strategy (directed to the key decision maker in the company) during the final exam period. Each student must submit an experimental idea (10% of project grade) which is graded individually. Then each group must meet with course instructors to present an initial design plan and a revised version (10% of the project grade), pitch the idea at a full-class session in the final class session (20% of the project grade) and submit a written version of this pitch (60% of the project grade); these elements are graded at the group level. More details on this project can be found on Canvas.

Attendance Policy

Students are required to attend each class and expected to arrive on time. Students should reach out to the instructor or CA regarding excused absences (for religious observances; personal, medical, and family emergencies; military service; court appearances such as jury duty) or lateness. Unexcused absences and lateness will affect your course grade.

- Students missing more than 33% of classes (unexcused) will receive at most a P grade
- Students missing more than 50% of classes (unexcused) will receive at most an F grade

Columbia Core Culture

The purpose of the Columbia Core Culture is to promote a consistent classroom environment of mutual respect, preparation and engagement. Our expectation of you in class is to be:

Present: Your success depends on being on time and present for the entire class every session. Attendance will be part of your grade for class participation.

Prepared: Bring your nameplate, clicker, and complete any pre-work needed for class discussion. Expect the professor to cold call in class.

Participating: Active participation calls for no electronic devices such as laptops, smartphones, or tablet computers during class, except if you are told to use them as part of in-class work.

Course Schedule and Outline

Session	Date	Time	Topic	Required Readings
Module 1: Experimental Design				
1	**January 25**		Introduction	Is Your Digital Advertising Campaign Working?"; "Why Businesses Don't Experiment"
2	**February 1**		Average Treatment Effects & Selection Bias	"Do We Really Know What Makes Us Healthy?"; MM pp 3-15; RRE pp 57-58
Deliverable	February 7	by 11:59pm	*Problem Set #1 Due*	
3	**February 8**		Precision and Power	"Testing for Statistical Significance (Managerial Stats)"
4	**February 15**		Randomization and Balance	MM pp. 4-5,16,19-22
Module 2: Econometric Analysis of Experiments				
Deliverable	February 21	by 11:59pm	*Experiment Proposals Due*	
5	**February 22**		Estimation of the ATE	Advertising Experiments at RestaurantGrades; FE pp. 102-105; MM pp. 215-217
6	**February 29**		Heterogeneous Effects	FE pp. 296-298; Caselet: Bangladesh SC Experiment
Deliverable	March 20	by 11:59pm	*Problem Set #2 Due*	
7	**March 21**		Multiple Comparisons Problem & Experiments from Firms' Perspectives / Non-compliance	MM pp. 116 - 121; FE pp. 161-163; "Cornell Food Researcher's Downfall Raises Larger Questions For Science"
Milestone	March 27	by 11:59pm	*1st Design Plan Draft Submitted / Discussed*	
8	**March 28**		Sample Attrition / Placebo & Hawthorne Effects	"Does Working From Home Work?" (pp 176 - 183); Caselet: "Virgin Atlantic Tested 3 Ways to Change Employee Behavior"
Deliverable	April 3	by 11:59pm	*Problem Set #3 Due*	
9	**April 4**		Using Experiments to Study Discrimination in Markets & Regression Discontinuity I	MM pp. 150-152
Module 3: Natural Experiments				
10	**April 11**		Regression Discontinuity II	"Using Big Data to Estimate Consumer Surplus: The Case of Uber" pp. 6-10
Milestone	April 17	by 11:59pm	*Revised Design Plan Draft Submitted / Discussed*	
11	**April 18**		Differences in Differences	
Deliverable	April 24	by 11:59pm	*Problem Set #4 Due*	
12	**April 25**		*Experimental Design Presentations*	
Deliverable	May 3	by 11:59pm	*Final Project Write-ups Due*	

Note: In readings, MM = "Mastering Metrics", RRE = "Running Randomized Evaluations", FE = "Field Experiments"

Course Roadmap
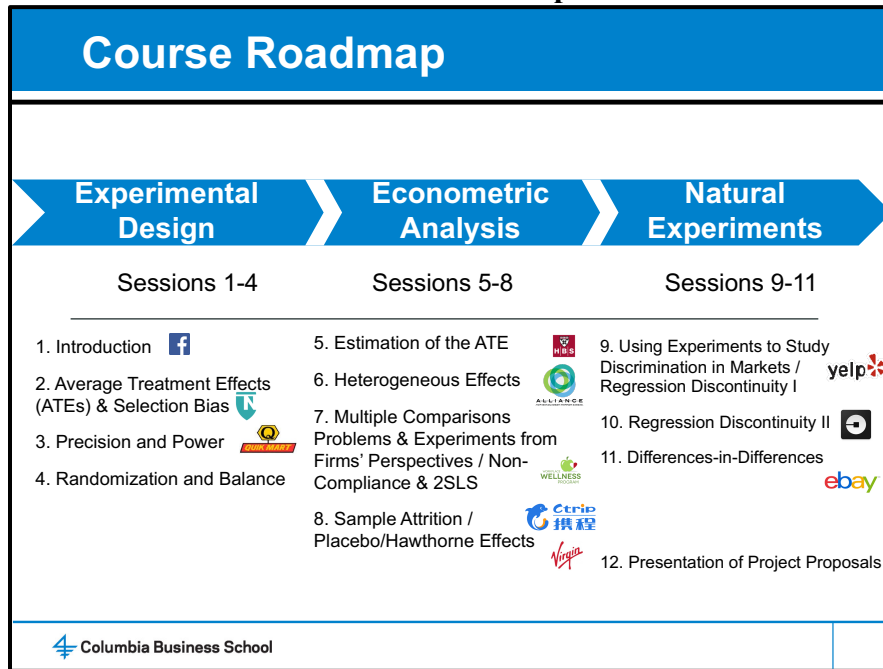
Inclusion, Accommodations, and Support for Students

At Columbia Business School, we believe that diversity strengthens any community or business model and brings it greater success. Columbia Business School is committed to providing all students with the equal opportunity to thrive in the classroom by providing a learning, living, and working environment free from discrimination, harassment, and bias on the basis of gender, sexual orientation, race, ethnicity, socioeconomic status, or ability.

Columbia Business School will make reasonable accommodations for persons with documented disabilities. Students are encouraged to contact the Columbia University's Office of Disability Services for information about registration. Students seeking accommodation in the classroom may obtain information on the services offered by Columbia University's Office of Disability Services online at www.health.columbia.edu/docs/services/ods/index.html or by contacting (212) 854-2388.

Columbia Business School is committed to maintaining a safe environment for students, staff and faculty. Because of this commitment and because of federal and state regulations, we must advise you that if you tell any of your instructors about sexual harassment or gender-based misconduct involving a member of the campus community, your instructor is required to report this information to a Title IX Coordinator. They will treat this information as private, but will need to follow up with you and possibly look into the matter. Counseling and Psychological Services, the Office of the University Chaplain, and the Ombuds Office for Gender-Based Misconduct are confidential resources available for students, staff and faculty. "Gender-based misconduct" includes sexual assault, stalking, sexual harassment, dating violence, domestic violence, sexual exploitation, and gender-based harassment. For more information, see http://sexualrespect.columbia.edu/gender-based-misconduct-policy-students.