

Advanced Quantitative Methods II: Econometric Methods (API-210)

Harvard Kennedy School

Course Syllabus—Spring 2020

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Key people:

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Course Description:

Intended as a continuation of API-209, Advanced Quantitative Methods I, this course focuses on developing the theoretical basis and practical application of the most common tools of empirical analysis. In particular, we will study how and when empirical research can make causal claims. Foundations of empirical analysis will be coupled with hands-on examples and assignments involving the analysis of data sets. Since the course is targeted to first-year students in the MPA-ID program, we will not shy away from using mathematical tools, but the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools. So, for example, when studying a given model, we will place a heavier emphasis on what the model is doing, when to use it, and how to interpret its results, as opposed to the mathematical proofs underpinning the model.

The ultimate goal is that by the end of the course you will be able to:

1. Conceptually understand the statistical methods studied in the course and be able to apply them to a wide range of public policy issues.
2. Interpret the results of statistical analyses and think critically about the potential issues that arise when trying to draw conclusions from such results.
3. Conduct statistical analyses using R.
4. Develop a basic understanding of the mathematics underlying the most common econometric models used in policy analysis and program evaluation.

Class Meetings:

Classes: Tuesdays and Thursdays, 10:15 am – 11:30 am, Belfer 200, Starr Auditorium
Review Sessions: Session #1: F 8:45am – 10:00am Belfer 200, Starr Auditorium
Session #2: F 10:15am – 11:30am Belfer 200, Starr Auditorium
[You only need to attend one review session]

Office Hours:

Professor Dobbie: Thursdays, 11:30 – 1:30, R405. Sign-up sheet to be posted on office door.

Shiro Kuriwaki: By appointment and the week before problem sets, to be posted.

Shannon Parker: Wednesdays, 3:30 – 5:30.

Luciana de la Flor: Mondays, 11:30--1:30.

Jack Sullivan: Tuesdays, 4:00 – 6:00.

Rosemary Ulfe: Tuesdays, 8:00 – 10:00.

Prerequisites:

API-209 or permission of the instructor. The main prerequisite for this course is an understanding of calculus at the level of a typical undergraduate calculus course. However, as far as mathematics goes, the most important prerequisite is a certain level of “mathematical sophistication,” i.e. comfort in dealing with mathematical constructs and arguments. Experience with computer programming is helpful but not required.

Target Students:

This course is required for first-year students in the MPA/ID program. Students not in the MPA/ID program will be admitted only with permission of the instructor. In general, I strive to welcome to the class non-MPA/ID students for whom API-210 is the best option. But unfortunately, I can only accept a limited number of students. Hence, unless you have compelling reasons to take this particular course, I suggest you consider taking another course.

Texts and Other Course Materials:

There is no required textbook for this course.

Recommended Background Textbooks:

Angrist, J.D. and Pischke, J.S., 2008. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press.

Other Background Textbooks:

Angrist, J.D. and Pischke, J.S., 2014. *Mastering 'metrics: The Path from Cause to Effect*. Princeton University Press.

Duflo, E. and Banerjee, A., 2011. *Poor Economics*. PublicAffairs.

R:

We will be using R as the statistical software for the course. The expected level of familiarity with R and project management skills is at the level covered in the MPA-ID math camp and the API-209 problem sets. API-210 assignments will build up from that foundation to cover additional techniques (R Markdown, functions, and package workarounds).

[R for Data Science](#) will be the main reference text and the cheatsheet (<http://bit.ly/HKS-R>) will be updated with the key R functions for the API-209 -210 sequence. The R fellow is also available for individual consultation in addition to office hours.

Course Website:

Course materials will be posted on the Canvas course website for API-210 (<https://canvas.harvard.edu/courses/71679>).

Grading:

The class grade will be based on the following criteria:

- 10% - Class participation
- 30% - Problem sets
- 30% - Midterm exam
- 30% - Final exam

Problem Sets (30%)

There will be four major problem sets. They will give you hands-on experience with the analytic techniques introduced in class. These are meant to be long assignments and you should not leave them to the last minute. Problem sets will be posted on the course website.

Problem sets not received by the deadline will be considered late. There will be no credit for late assignments.

Under the Harvard Kennedy School Academic Code, the problem sets for this course are “Type II” assignments unless indicated otherwise. You are encouraged to work in a study group but must write and submit your own solutions and programming scripts. Examples of assignments that are not in accordance with the HKS academic code include reprints of substantially identical assignments, printouts of substantially identical Excel tables or R scripts. Violations of the Academic Code are a serious violation of academic and professional standards and can lead to a failing grade in the course, failure to graduate, and even expulsion from the University. I take this issue seriously. If you have questions about the degree of collaboration allowed or about any other aspect of the Academic Code, please come to see me. The Kennedy School Academic Code is available [here](#).

Instructions for submitting problem sets:

- Turn them in electronically via the Canvas course page.
- Submit them by 10:10 am on the day they are due. Assignments submitted after class begins will be considered late.
- Indicate on the cover page the names of the classmates you worked with.

Midterm exam (30%)

Please note that midterm exam will be held on March 12th at 10:15am. More details will be provided later in the course.

Final exam (30%)

Please note that final exam will be held on May 6, from 9:00am-12:00pm. More details will be provided later in the course.

Regrade Policy

Requests for reconsideration of grades on exams are not encouraged, and will be accepted only in writing, with a clear statement of what has been incorrectly graded, and within one week of receiving your graded exam. Please submit your full exam so grading on all questions can be reconsidered.

All course activities, including class meetings, problem sets, and exams are subject to the HKS Academic Code and Code of Conduct.

Other Items:

Use of Data

Data may be collected in various forms in this course. Some forms of data collection will be obvious to you (such as when responding to a question on a survey) but others might not be (such as someone from our teaching team records class participation or the Canvas course website system recording activity while you are logged in). Whatever the form of data collection, I pledge to use the data to help improve my teaching and ultimately your learning. This includes using your responses to online quizzes to tailor a class better to the backgrounds and learning needs of students in the class, conducting research about the effectiveness of a particular teaching approach, etc. I also pledge to keep your data confidential so that it can only be used for the purposes of improving teaching and learning or to help you and other students connect with future professional opportunities. The university-wide policy on use of Canvas data can be found [here](#).