

ECON 8300: Topics in Advanced Econometrics, Fall 2023

University of Pennsylvania

Syllabus

(Tentative: August 25, 2023)

Instructor: Wayne Gao

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- Office: PCPSE 630
- Office Hours: by appointment

Lectures:

- Time: Monday & Wednesday, 10:15-11:45am
- Location: PCPSE 510

Course Description:

The course covers a selected range of topics in advanced econometrics, with a focus on **semi/non-parametric methods** and **double/debiased machine learning**. The course will:

- (i) Introduce you to common statistical/econometric methods for *nonparametric regressions*, such as kernel, sieve, penalization/regularization, and “machine learning” methods.
- (ii) Cover the theory of *semiparametric estimation and inference*, which is mainly about how you can use the nonparametric estimator in (i) to study a “structural/causal/interpretable” parameter of interest.
- (iii) Walk you through the (relatively) recent development in econometrics on the topic of *double/debiased machine learning*, which is a systematic way to obtain locally robust semiparametric estimators for the purpose of (ii) under “relatively fewer” restrictions on how you exactly do (i).

- (iv) Discuss ongoing research and open questions related to (iii), as well as applications in specific structural/causal settings.

Course Requirements:

In terms of course requirements, students can choose between:

- (1) A final project by “critically and creatively” replicating an empirical paper, using (some of) the methods covered in this course;
- (2) An original research proposal on a related topic (which can be preliminary).

Each student will be asked to make a final presentation about (1) or (2) towards the end of the semester. The exact format and length of the presentations will be determined based on enrollment in the course.