Instructor: Wayne Gao

• Email: waynegao@upenn.edu
• 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.