

Statistics 9210: Observational Studies

Syllabus

Professor: Dylan Small

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Office: Academic Research Building 417

Office Hours: Thursday, 9:30am-10:30am by zoom (link from class Canvas web site); by appointment.

Teaching Assistant: Abhinandan Dalal, abdalal@wharton.upenn.edu . Office hours: Thursday, 11am-noon, 302 Academic Research Building 302

Class Website: <https://canvas.upenn.edu/courses/1878042>

Recommended Texts: The notes and handouts will aim to be self-sufficient. The notes are based on a book I am working on with Ruoyi Yu. Recommended texts for additional reading are

P. Rosenbaum (2002), *Observational Studies*, Springer

P. Rosenbaum (2010), *Design of Observational Studies*, Springer.

Course description: This course will cover statistical methods for the design and analysis of observational studies. Topics for the course will include the potential outcomes framework for causal inference; randomization inference for randomized experiments; matching, propensity score and regression methods for controlling confounding in observational studies; tests of hidden bias; sensitivity analysis; and instrumental variables.

Course Requirements: Grades will be based on group study questions to be handed in at the end of each class (20%), homework (40%) and a final project (40%). If an assignment is handed in late, 1% of the grade for the assignment will be deducted for each day late. For the final project, you could choose to (1) read about a statistical method related to observational studies that was not covered in class, and carry out a simulation study or data analysis to illustrate the method; (2) develop a new statistical method or theoretical result that could be an extension of an existing method or theoretical result; or (3) conduct a thorough data analysis using some of the methods covered in class. You can work alone or in a group of 2-3 for your final project. Your final project report will be due December 18th.

Computing software: We will make use of the freeware statistical computing software R. R can be downloaded from <http://www.r-project.org/> .

Course Prerequisites: Stat 5200, Stat 9610 or Stat 9700, or permission of instructor.

Use of Generative AI: You may use generative AI programs (e.g., tools like ChatGPT) to help generate ideas and brainstorm. However, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. Beware that use may also stifle your own independent thinking and creativity. You may not submit any work generated by an AI program as your own. If you include material generated by an AI program, it should be cited like any other reference material (with due consideration for the quality of the reference, which may be poor).