SIADS 630 Syllabus, Winter 2024

Course Overview and Prerequisites

This course will introduce basic concepts of causal inference. The experimental ideal, that is, random assignment of the treatment, is often impossible or impractical. Thus, we must look for alternative strategies that allow for causal identification when we do not have control over treatment assignment. In this course, we will explore the five most common methods to identify causal effects in observational data. This includes controlled regression, matching, instrumental variables, regression discontinuity, and differences-in-differences. The aim is to help you to understand modern applied econometric methods and to foster the skills needed to plan and conduct your own data science projects. Course prerequisites: Students should have completed at least one undergraduate statistics class at the level of Stats 250. Please note by completing the Statistics Entrance assessment, you have waived this prerequisite. This course was initially developed by Dr. Alain Cohn. The syllabus and course design are thanks to his hard work and expertise.

Instructor and Course Assistants

- Instructor: Alain Cohn - adcohn@umich.edu Opens in a new tab
- Lecturers:
    - Linfeng Li - llinfeng@umich.edu Opens in a new tab
    - Hanna Hoover - hooverha@umich.edu Opens in a new tab
    - Mohamed Abbadi - meabbadi@umich.edu Opens in a new tab

Communication Expectations

Contacting instructor and course assistants:

- Course channel in Slack (preferred) - siads630_WI24_002 (response time: 12 - 24 hours)
- Email - see above (response time: 24 - 48 hours)

Office hours:

Schedule of Weekly Office Hours via Zoom (time zone = Ann Arbor, Michigan = Eastern Time):

For questions about the lecture materials:

- Thursdays, 3:30-4:30pm (Alain Cohn)
- Link to submit questions: https://forms.gle/DpKK4FbGQkHo6PYQ8 Opens in a new tab

For questions about quizzes/assignments:

- Fridays, 5:00-6:00pm (Hanna Hoover)
- Sundays, 11:00am-12:00pm (Mohamed Abbadi or Linfeng Li)
- Link to submit questions: https://forms.gle/DpKK4FbGQkHo6PYQ8 Opens in a new tab

Required Textbook

- *Mastering' Metrics: The Path From Cause to Effect*. Princeton University Press, 2014. Joshua D. Angrist and Jörn-Steffen Pischke. You can purchase the book on Amazon Opens in a new tab (about $24). See the book's website Opens in a new tab for additional resources. HathiTrust Digital Library Opens in a new tab has an online version of this book available to UM students. Please note: This online title only allows for 5-10 concurrent users.
- We have also put together a Manual for Data Assignments and a series of tutorial videos to aid you in your data assignments. These can be found under "Resources" in the course on Coursera.

Technology Requirements (unique to this course)

None

If you encounter a technical issue with Coursera or admin issues with slack, please submit a report to the ticketing system at umsimadshelp@umich.edu Opens in a new tab and also cc meabbadi@umich.edu Opens in a new tab, llinfeng@umich.edu Opens in a new tab, sshiv@umich.edu Opens in a new tab and jakehart@umich.edu Opens in a new tab

Accessibility

Screen reader configuration for Jupyter Notebook Content Opens in a new tab

Learning Outcomes

1. Develop awareness of causal thinking.
2. Understand the problem of selection bias.
3. Understand the basic concepts of ordinary least squares (OLS) regression.
4. Formulate key ideas and assumptions of causal inference methods.
5. Develop awareness of when to apply which method of causal inference.
6. Know how to apply methods of causal inference to simple data analysis problems.

Course Schedule

This course begins on **Tuesday, February 6, 2024,** and ends on **Monday, March 4, 2024**.

Weekly Concept Quizzes and Data Analysis Assignments will be due on **Mondays at 11:59 pm** (time zone = Ann Arbor, Michigan = Eastern Time).

Grading

Course Assignment	Percentage of Final Grade
Week 1 Concept Quiz	10%
Week 1 Data Assignment (Randomized Experiments)	15%
Week 2 Concept Quiz	10%

Course Assignment	Percentage of Final Grade
Week 2 Data Assignment (Matching and Controlled Regression)	15%
Week 3 Concept Quiz	10%
Week 3 Data Assignment (Instrumental Variables)	15%
Week 4 Concept Quiz	10%
Week 4 Data Assignment (Regression Discontinuity and Differences-in-Differences)	15%
Total	**100%**

Note: All assignments are required to earn credit for this course.

Letter Grades, Course Grades, and Late Submission Policy

Refer to the MADS Assignment Submission and Grading Policies Opens in a new tab section of the UMSI Student Handbook (access to Student Orientation course required)

Letter Grade	Percentage
A+	98 and up
A	[95 - 98)
A-	[90-95)
B+	[85-90)
B	[80-85)
B-	[75-80)
C+	[70-75)
C	[65-70)
C-	[60-65)
D+	[55-60)
D	[50-55)
D-	[45-50)
E	Below 45

Late policy

For this course, the late-submission policy is 15% daily-recurring reduction in grade for the first three days after the submission deadline. You will receive a zero (0) if your assignment is turned in four or more days late.

Students have one free pass to submit all of one week's assessments late (up to three days). Students don't need to explain their circumstances but need to report their late submission by DMing Instructional team. Instructional team will adjust the late grade for one week's assessments.

Academic Integrity / Code of Conduct

Refer to the Academic and Professional Integrity Opens in a new tab section of the UMSI Student Handbook (access to Student Orientation course required).

While we offer a number of discussion channels to support your work, if you are stuck you may not share or receive complete solutions to the assignments. We also encourage you to support your classmates, but again, without sharing completed code (pointing to resources, describing ideas in pseudo-code, etc. is fine).

Accommodations

Refer to the Accommodations for Students with Disabilities Opens in a new tab section of the UMSI Student Handbook.

Use the Student Application Form in Accommodate Opens in a new tab to begin the process of working with the University's Office of Services for Students with Disabilities.

How to get Help

If you have questions concerning the degree program, encounter a technical issue with Coursera, or issues using Slack, please submit a report to the ticketing system at **umsimadshelp@umich.edu**.

If you have an issue specific to the Coursera environment, you can also begin a live chat session with Coursera Technical Support (24/7) or view Coursera troubleshooting guides through their Help Center Opens in a new tab (you may be asked to log in to your Coursera account).

For questions regarding course content, refer to the Communications Expectations section.

Library Access

Refer to the U-M Library's information sheet Opens in a new tab on accessing library resources from off-campus. For more information regarding library support services, please refer to the U-M Library Resources Opens in a new tab section of the UMSI Student Handbook (access to the Student Orientation course required).

Student Mental Health

Refer to the University's Resources for Stress and Mental Health website Opens in a new tab for a listing of resources for students.

Student Services

Refer to the Introduction to UMSI Student Life Opens in a new tab section of the UMSI Student Handbook (access to the Student Orientation course required).

Acknowledgements

This course was initially developed by Dr. Alain Cohn. The syllabus and course design are thanks to his hard work and expertise:

In developing this course, I have used many resources from various people. I want to express my deep gratitude to those individuals and thank them for sharing their materials with me (or making them publicly available):

- Joshua Angrist and Jörn-Steffen Pischke for their book "Mastering' Metrics and for providing me with high-resolution tables and graphs.
- Tim Maudlin for allowing me to use his examples.
- Pamela Jakiela and Owen Ozier for allowing me to use their slides.
- Timothy Lin (www.timlrx.com) for sharing data with me.
- Emily Glassberg Sands for allowing me to use her examples.
- Alex Butler for his valuable feedback and paper on "Making Decisions with Data: An Introduction to Causal Inference."
- Scott Cunningham for his book "Causal Inference: The Mixtape."
- Matthew Blackwell for his course materials from "Causal Inference (GOV 2002)."
- Pierce Donovan for sharing his homework assignments.
- Matt Masten for inspiring me with his "Causal Inference Bootcamp" videos (https://mattmasten.github.io/bootcamp/ Opens in a new tab).
- Anyone who I have forgotten to mention.