DATA/STAT 4600   Causal Inference for Data Science
Section 1   **Fall 2025**

Lectures	M/W/F 8:30–9:20am, 218 MacLean Hall (MLH)
Instructor	Dr. Nathan Wikle, nathan-wikle@uiowa.edu
Office Hours	W 1:30–2:20pm, 3:30–4:30pm; Th 2:00–3:00 p.m., 207 Schaeffer Hall (SH)
	Students are welcome to stop by my office during these hours to discuss questions about the course material or other concerns. I am also available by appointment.
Grader	Shuyuan Wang, shuyuan-wang@uiowa.edu
Course Website	https://icon.uiowa.edu
	Announcements, course materials (e.g., homework problems, lecture notes, etc.), and other information will be regularly posted in ICON.

Course Description and Objectives. This course introduces methods for reasoning about causes, effects, and bias when analyzing experimental and observational data. Topics include the potential outcomes framework, counterfactuals, confounding, and missing data; the identification and estimation of causal effects via propensity score methods, marginal structural models, and instrumental variables; directed acyclic graphs and causal learning; as well as applications of machine learning and Bayesian methods to causal inference.

Upon completion of this course, students will understand when causal claims can be justified (or not), they will have experience implementing fundamental estimation strategies from the causal inference literature, and they will be prepared to read and engage with cutting-edge methods in the statistics, data science, and machine learning literature which utilize causal inference methods.

Textbooks. Students are encouraged to download Peng Ding's *A First Course in Causal Inference* (note: if you prefer a physical copy, it has recently been published by Chapman & Hall). However, additional readings may be assigned from Gerber and Green's *Field Experiments*, Gelman, Hill, and Vehtari's *Regression and Other Stories*, Peters, Janzing, and Schölkopf's *Elements of Causal Inference*, and Hernán and Robins' *Causal Inference: What If*.

Prerequisites. DATA/STAT:3120 and DATA/STAT:3200, or equivalents (i.e., basics of statistical inference and regression), are required prerequisites for this course. If you are unsure you satisfy these requirements, please talk with the instructor.

Course Home. The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, the "second-grade only" option (SGO), academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies.

- The Course Home Department is Statistics and Actuarial Science, 241 SH.

- DEO: Dr. Kung-Sik Chan, 241 SH, kung-sik-chan@uiowa.edu

Grading. Your semester grade will consist of the following components:

Homework	50%
Participation	20%
Final Project	30%
Total	100%

A "plus-minus" grading scale will be used for this class. As a rough guide, the scale is as follows:

- A, A- $\to$ [90%, 100%]

- B+, B, B- $\to$ [80%, 90%)

- C+, C, C- $\to$ [70%, 80%)

- D+, D, D- $\to$ [60%, 70%)

- F $\to$ [0%, 60%)

Homework. Homework assignments are a core component of the course and will be assigned approximately every 10-14 days. Assignments may include analytical as well as numerical components, often centered around a real data analysis. Unless stated otherwise, to **receive full credit, show your work** when solving homework problems and (when applicable) include reproducible code as an appendix to your solution. You are encouraged to discuss and study with others, but **the submitted work must reflect your own effort**. If you do **discuss with others** on homework assignments, please: **(a) write up your own assignment** and make sure you completely understand all solutions that you submit, and **(b) write the names of the others in your study group** on your assignment.

Homework submission will be online (via ICON) and students are expected to upload a scanned (or typed) copy of their homework. Your work and its scanned (or typed) copy must be legible and include your name at the top to receive credit. Any exceptions will be announced in class or via ICON. Due to time constraints, the grader may grade only some of the assigned questions, but you are responsible for understanding all questions.

Unless prior arrangements are made with me well in advance (for reasons judged to be acceptable by me), **late homework will receive zero credit**.

Participation and Attendance. Class participation will be assessed via attendance and participation at lecture — everyone is expected to participate in group discussion and to volunteer answers during lecture. Attendance is required; relevant attendance and absence policies can be found here.

Final Project. A student project will be due at the end of the semester in which you are expected to learn about and implement a causal inference method (that was not previously discussed in class) on a data set of your choosing. The project will include a written report and an oral presentation.

Artificial Intelligence (AI) Policy. Students may use AI for help with their homework and project, however, all final solutions and code must be written by the student; any sections of the homework or project which were aided by AI should be clearly indicated as such in your submission.

Academic Honesty and Misconduct. All students in CLAS courses are expected to abide by the CLAS Code of Academic Honesty. Undergraduate academic misconduct must be reported by instructors to CLAS according to these procedures. Graduate academic misconduct must be reported to the Graduate College according to Section F of the Graduate College Manual.

Student Complaints. Students with a complaint about a grade or a related matter should first discuss the situation with the instructor, and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact CLAS Undergraduate Programs for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS Associate Dean for Graduate Education and Outreach and Engagement when additional support is needed.

Drop Deadline for this Course. You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course here. When you drop a course, a "W" will appear on your transcript. The mark of "W" is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the Registrar's website. Undergraduate students can find policies on dropping CLAS courses here. Graduate students should adhere to the academic deadlines and policies set by the Graduate College.

Accommodations for Students with Disabilities. UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as mental health, attention, learning, vision, and physical or health-related conditions) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is available here.

Additional University Resources and Policies.

- Basic Needs and Support for Students

- Classroom Expectations

- Exam Make-up Owing to Absence

- Free Speech and Expression

- Mental Health

- Military Service Obligations

- Non-discrimination

- Religious Holy Days

- Sexual Harassment/Misconduct and Supportive Measures

- Sharing of Class Recordings