



Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: <https://catalog.uvu.edu/>

Semester: Spring

Course Prefix: 36402

Course Title: Causal Inference

Year: 2025

Course and Section #: 2700-001

Credits: 3

Course Description

Explores a variety of data generating processes of importance for causal inference with computer simulations. Includes stratified sampling, inverse probability weighting, matching, blocking, propensity, sensitivity, causal graphs, d-separation, identifiability, the causal Markov condition, and the back-door criterion for selecting an admissible set of covariates. Examines causal mechanisms, the Rubin causal model, and both deterministic and stochastic counterfactuals. Develops ethical A/B testing procedures.

Course Attributes

This course has the following attributes:

- General Education Requirements
- Global/Intercultural Graduation Requirements
- Writing Enriched Graduation Requirements
- Discipline Core Requirements in Program
- Elective Core Requirements in Program
- Open Elective

Other: *Click here to enter text.*

Instructor Information

Instructor Name: Brian Knaeble

Student Learning Outcomes

Simulate a variety of data generating processes using a computer program

Quantify uncertainty in causal interpretations from observational studies, experiments, natural experiments, and quasi-experiments

Assess whether causal inference is warranted using a variety of principles such as sensitivity analysis

Apply ethical practices to the design of an A/B test

Course Materials and Texts

We will be using the textbook Causal Inference for Statistics, Social, and Biomedical Sciences
By Imbens and Rubin.

(note that Imbens just won a Nobel prize for work in causal inference)

Course Requirements

Course Assignments, Assessments, and Grading Policy

We will have 12 weeks of homework assignments, starting the second and third week of this course. The topics of those assignments are the topics listed previously. There will be four quizzes, after assignment 3, 6, 9, and 12. There will be one final project---to implement the back door criterion. There will be 1 final comprehensive exam on the day, place, and time specified on the university final exam schedule for Spring of 2025.

Each of the 12 homework assignments will be worth 3 points for 36 homework points. Each of the 4 quizzes will be worth 9 points for a total of 36 quiz points. The final project will be worth 14 points. The final exam will be worth 14 points. Your total points out of 100 will determines your grade according to

93-100 A

90-92 A-

87-89 B+

83-86 B

80-82 B-

77-79 C+

73-76 C

70-72 C-

67-69 D+

63-66 D

60-62 D-

0-59 F

Academic misconduct can result in a failing grade for the course.

Required or Recommended Reading Assignments

The textbook and various articles posted on Canvas

General Description of the Subject Matter of Each Lecture or Discussion

R programming

SUTVA (exclusion, instruments)

SITA (sensitivity analysis)

RDD and DID

Adjustment for covariates (case control, matching, multiple regression, etc.)

Causal Graphs

Causal Discovery

Intervention Policy

Wisdom (causal crossword, z bias, 2nd control, natural experiments, role of time, interactions, mechanisms)

Required Course Syllabus Statements

Generative AI

AI programs are not a replacement for your human creativity, originality, and critical thinking. Writing, thinking, and researching are crafts that you must develop over time to develop your own individual voice. At the same time, you should learn how to use AI and in what instances AI can be helpful to you. However, there may be numerous oral examinations throughout this course. So make sure you are prepared to demonstrate genuine understanding of learned material.

Using Remote Testing Software

This course does not use remote testing software.

This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities

Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU [Accessibility Services](#) at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity

At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their [rights and responsibilities](#). In each course, they are responsible for knowing the requirements and restrictions regarding research and

writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in [UVU Policy 541: Student Code of Conduct](#).

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a [specially dedicated space](#) for meditation, prayer, reflection, or other forms of religious expression.