MIS/BUAN 6392 Causal Analytics and A/B Testing

Course Syllabus

Course Information

Course Number/Section	MIS/BUAN 6392
Course Title	Causal Analytics and A/B Testing
Term	Fall 2025

Instructor Contact Information

Instructor	Jose Alvarez, BScEE, MBA
Office Phone	+1 (972) 603 6555 (text ONLY)
Email Address	jose.alvarez4@utdallas.edu **(use this first)**
TA	Julia Park
TA email	Juyeon.Park@UTDallas.edu
Office Location	JSOM Adjunct Lounge JSOM 3.604, available via Teams, email
Class Location	Thursdays 7:00 – 9:45 pm in JSOM 13.501
MS Teams Office Hours	Upon Request – Online or In-Person before class

Course Modality and Expectations The course is officially registered as a traditional, classroom-based course and live, in-person attendance is required. Changes to this schedule may occur and will be communicated via UTD email. Active participation in class on a weekly basis is one of the best predictors of class performance. Students are strongly encouraged to attend class every week and actively participate in class discussions.

About the Instructor Jose Alvarez is an adjunct professor at The University of Texas at Dallas, where he teaches graduate courses on business analytics. He worked as a full-time Digital Transformation Director at Ericsson Inc. He has 15+ years of experience with automation, business analytics and technology program and project management for telecommunications industries. He holds an MBA from The University of Texas at Dallas (class of '99)

Course Description This course focuses on the distinction between correlation and causation in data. This distinction is critical for managers to understand the effect of proposed managerial interventions. For example, an advertiser may want to know whether referral marketing interventions will be effective for its customers, and, if so, what types of messages may be used to implement a referral marketing program with a high degree of success. Similarly, a music service like Spotify may want to know what kinds of promotions will help increase the number of subscribers in the most effective way. The course will focus on the design and analysis of A/B tests to tease out the difference between correlation and causation. It will also focus on statistical techniques that can be used with observational data to achieve reliable causal inferences in the absence of experimental data. The course employs a combination of lectures, cases, and in-class exercises to introduce the course material. It takes a hands-on approach, exposing students to simulated and real-world datasets, and equipping them with tools they can leverage immediately on the job.

Student Learning Objectives/Outcomes

- Appreciate the difference between correlation and causation and understand the limitations of observational data in teasing out causation.
- Understand why experiments and A-B testing are the gold standards in teasing out causation.
- Understand how to design, implement, and analyze A-B tests.
- Be able to formulate hypotheses statement, perform hypotheses tests and analysis the results.
- Be able to perform causal analysis using observational data.
- Understand the difference between traditional machine learning/predictive analytics and causal analytics.

Recommended Textbooks and Materials

- Causal Inference: The Mixtape (https://mixtape.scunning.com/) by Scott Cunningham
- Other materials (papers, case-studies) will be unloaded in the e-learning course page.
- There is also **a simulation that is a required part of the class**. A link to purchase the simulation will be made available and all students must buy access to the simulation.

Required Software

- R (http://cran.us.r-project.org/)
- R / R-Studio (Free-version) (https://www.rstudio.com/products/rstudio/download/)
- Jupyter/Jupyterlab/VSCode

Course Policies

Make-up exams, Extra Credit and Late Work There will be **two exams** during the semester. For each exam, students will be responsible for making themselves familiar with the materials discussed in the lectures, the lecture slides, all assigned readings, and any additional content discussed and/or posted on the E-learning site. The exam is specified in the academic calendar below. **The exams will either be conducted at the testing center**. The exam must be **completed in a single attempt in the length of time specified** for that exam. **A make-up exam can only be given for medical reasons certified by a doctor**. **However, such an exam may have different questions/format than the original quiz.**

Check file:///C:/Users/japph/Downloads/Academic_Calendar_Fall_2025.pdf for all important University related dates.

There will be **NO extra-credit** in this course.

Late assignment submissions will be accepted for 3 days after the due date, but each day will be penalized by 25% reduction in score.

Class Participation You are expected to actively participate in the discussion of readings, contribute to the learning experience of the class, and meaningfully contribute to all group work, if any. You can miss a maximum of two classes without incurring any penalties.

WEEKLY SCHEDULE

Week	Date	Topics/Lecture	Assignments
1	8/28	Introduction, Brief introduction to some commonly used distributions	**Assignment 1 (due 9/01)**
2	9/04	Overview view of some statistical concepts in R	
3	9/11	Hypothesis testing, p-values, confidence intervals, Power analysis	**Assignment 2**
4	9/18	Introduction to A/B tests	
5	9/25	A/B tests continued	**Assignment 1 due,** **Assignment 3**
6	10/02	Case Study – Advertising email A/B testing	
7	10/9	Case Study – TBD	**Assignment 3 due**
8	**10/16**	**Exam 1**	
9	10/23	Causal Analytics using observational data	**Assignment 4**
10	10/30	Matching and Propensity score	
11	11/06	Case Study – Matching and Propensity score	**Assignment 4 due,** **Assignment 5**
12	11/13	Additional techniques for causal analytics	
13	11/20	A/B testing experimental platform and introduction to simulation	**Assignment 5 due**
14	**11/27**	**Thanksgiving week off**	
15	12/04	Live simulation tournament and debrief	
16	**12/11**	**Exam 2**	

NOTE(s):
(1) There will be no classes during exam weeks.
(2) The schedule provided is tentative and subject to minor changes at the discretion of the instructor.

Student Assessments

Grading Information

2 Exams (20% each)	40%
Assignments (6% each)	30%
Attendance	5%
Participation	10%
Group Simulation exercise and report	15%
Total	**100%**

Grading Scale

Scaled Score	Letter Equivalent
>= 93	A
>= 89 and < 93	A-
>= 86 and <89	B+
>= 83 and < 86	B
>= 79 and < 83	B-
>= 76 and < 79	C+
>= 69 and < 76	C
Less than 69	F

Accessing Grades Students can check their grades by clicking “My Grades” under Course Tools after the grade for each assessment task is released.

Assignment submission instructions You will submit your assignments (in the required file format with a simple file name and a file extension) by using the Assignments tool on the course site. Please see the Assignments link on the course menu or see the icon on the designated page. You can click each assignment name link and follow the on-screen instructions to upload and submit your file(s). Please refer to the Help menu for more information on using this tool. **Please note**: each assignment link will be deactivated after the assignment due time. After your submission is graded, you may click each assignment’s “Graded” tab to check the results and feedback.

Scholastic Honesty

The University has policies and discipline procedures regarding scholastic dishonesty. Detailed information is available on the UTD Judicial Affairs web page. All students are expected to maintain a high level of responsibility with respect to academic honesty. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced.

Course Evaluation

As required by UTD academic regulations, every student must complete an evaluation for each enrolled course at the end of the semester. An online instructional assessment form will be made available for your confidential use. A link to an online instructional assessment form will be emailed to you for your confidential use.

University Policies

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to http://go.utdallas.edu/syllabus-policies for these policies. *These descriptions and timelines are subject to change at the discretion of the Professor.*