



## Dillard College of Business Administration

### ECON 5633: Applied Analysis of Business Processes

Tuesday and Thursday at 5:30 pm to 6:50 pm

Room DB 129

Fall 2023

### Contact Information

Instructor: Dr. Andrew Holt

Email: [Andrew.holt@msutexas.edu](mailto:Andrew.holt@msutexas.edu)

Office: Dillard Building 217

Office Hours: Tuesday: 11:00-12:30

Wednesday: 10:00-12:00

Thursday: 11:00-12:30

The subject line of any email you send to me must be “**CausInf: First Name, Last Name**”. If the subject line is wrong, then I will ignore your email or maybe I will ask you to resend your email with the correct subject line.

### Course Materials

Mastering 'Metrics: The Path from Cause to Effect by Angrist and Pischke

Using R for Introductory Econometrics by Florian

Download R for free here: <https://cran.r-project.org/bin/windows/base/>

Download RStudio for free here: <https://posit.co/products/open-source/rstudio/>

### Course Description

Often, businesses want to know the effect their policies and decisions have on revenue, suppliers, customers; however, their policies cannot be implemented randomly. This poses a problem for a data scientist because most of the time non-random policies or decisions cannot be used to infer the effects of said policies or decisions.

This class is designed to teach students commonly used methods of causal inference that take advantage of quasi-natural experiments that allow for the analysis of business policies and decisions.

### Objectives:

General Learning Goals: Students will be asked to demonstrate their critical thinking and problem-solving skills by applying statistical learning techniques in their homework assignments and exams. This course aims to contribute to developing students' ability to communicate their analyses in a professional manner. Student's will have to integrate the statistical knowledge they acquire from this course with multiple business disciplines.

Course Specific Learning Goals: Students should learn how to perform data analysis in R. Students are expected to learn the following statistical techniques: Linear Regression, Conditional RCT, Difference-in-Differences, Regression Discontinuity.

## Assessments:

1. Homework Assignments: There will be 5 homework assignments that will be due at the beginning of class on Tuesdays. The types of questions on the homework will be similar to the types of questions on the exams.
2. Exams: There will be one midterm exam and one final exam. Each exam is worth 25 points. All exams must be taken in-class.
3. Case Study: Students will be assigned to teams later in the semester and be asked to analyze and present on a real-world case study. **Missed Exam Policy:**

If you miss the midterm exam, then 90% of your grade on the final will replace the missing grade. So, if you miss the first exam and make a 100% on the final, then you get 25 points for your final exam grade and only 22.5 points for the midterm that you missed.

## Grading:

Assignment	Points
Homework Assignment #1	10
Homework Assignment #2	10
Homework Assignment #3	10
Homework Assignment #4	10
Homework Assignment #5	10
Case Study Presentation	25
Midterm Exam	25
Final Exam	25

A= 89.5-100%      C =69.5-79.5%  
B= 79.5-89.5%      D= 59.5-69.5%      F= <59.5%

## Class Participation:

Students are expected to participate in all class discussions. Sleeping in class, using electronic devices, tardiness, and any class disruption will result in a lower grade. The instructor reserves the right to lower any student's final grade by a letter grade if the student failed to actively participate in class discussions. Because it is impossible to participate in class while not attending class, you must attend class to not receive a lower grade.

## Cheating:

Cheating on an assignment will result in a 0 on the assignment and I will also report you to the Chair of the department.

## Plagiarism Statement:

“By enrolling in this course, the student expressly grants MSU a “limited right” in all intellectual property created by the student for the purpose of this course. The “limited right” shall include by not be limited to the right to reproduce the student's work product in order to verify the originality and authenticity.”

## Tape Recordings:

Students are not allowed to record lectures.

## Americans with Disabilities Act

This course follows the university policies and guidelines suggested by the Disability Support Services Office for qualified students. Students are referred to the Midwestern State University Undergraduate Catalog for details.

## **Campus Carry Policy**

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at [link to MSU campus carry rules and policies](#).

## **Syllabus Change Policy**

This syllabus is a guide for this course and is subject to change with advanced notice.

### References

Midwestern State University Student Handbook

Midwestern State University Undergraduate Catalog

## Course Content

Tuesday	Thursday
August 29 <ul style="list-style-type: none"> <li>Syllabus Day</li> </ul>	August 31 <ul style="list-style-type: none"> <li>Causality vs Correlation</li> </ul>
September 5 <ul style="list-style-type: none"> <li>Introduction to R</li> </ul>	September 7 <ul style="list-style-type: none"> <li>Descriptive Statistics in R</li> </ul>
September 12 <ul style="list-style-type: none"> <li>Programming in R (Loops, Generating Random Draws)</li> </ul>	September 14 <ul style="list-style-type: none"> <li>Advanced Data Management (Merging Datasets, Collapse Datasets)</li> </ul>
September 19 <ul style="list-style-type: none"> <li>Simple Linear Regression</li> <li>Homework 1 Due</li> </ul>	September 21 <ul style="list-style-type: none"> <li>Multiple Regression</li> </ul>
September 26 <ul style="list-style-type: none"> <li>Further Issues with Regressions (Measurement Error, Misspecification, Leverage)</li> </ul>	September 28 <ul style="list-style-type: none"> <li>Interpreting Regression Results (Logs, Dummy Variables, Polynomials)</li> </ul>
October 3 <ul style="list-style-type: none"> <li>Regressions in R</li> </ul>	October 5 <ul style="list-style-type: none"> <li>Regressions in R</li> </ul>
October 10 <ul style="list-style-type: none"> <li>Review</li> <li>Homework 2 Due</li> </ul>	October 12 <ul style="list-style-type: none"> <li>Exam 1</li> </ul>
October 17 <ul style="list-style-type: none"> <li>Potential Outcomes Framework</li> </ul>	October 19 <ul style="list-style-type: none"> <li>RCT testing</li> </ul>
October 24 <ul style="list-style-type: none"> <li>Panel Data and Fixed Effects (Year and ID Fixed Effects)</li> </ul>	October 26 <ul style="list-style-type: none"> <li>FE and RCTs in R</li> </ul>
October 31 <ul style="list-style-type: none"> <li>Differences in Differences (Time Series Average, Two Period Model)</li> <li>Homework 3 Due</li> </ul>	November 2 <ul style="list-style-type: none"> <li>DiD Event Study</li> </ul>
November 7 <ul style="list-style-type: none"> <li>DiD Treatment Timing</li> </ul>	November 9 <ul style="list-style-type: none"> <li>DiDs in R</li> </ul>
November 14 <ul style="list-style-type: none"> <li>Regression Discontinuity</li> <li>Homework 4 Due</li> </ul>	November 16 <ul style="list-style-type: none"> <li>Regression Discontinuity in R</li> </ul>
November 21 <ul style="list-style-type: none"> <li>Thanksgiving</li> <li></li> </ul>	November 23 <ul style="list-style-type: none"> <li>Thanksgiving</li> </ul>
November 28 <ul style="list-style-type: none"> <li>Case Studies</li> <li>Homework 5 Due</li> </ul>	November 30 <ul style="list-style-type: none"> <li>Case Studies</li> <li></li> </ul>
December 5 <ul style="list-style-type: none"> <li>Presentations</li> <li></li> </ul>	December 7 <ul style="list-style-type: none"> <li>Presentations</li> </ul>
December 12 <ul style="list-style-type: none"> <li>Final Exam Sometime This Week</li> </ul>	December 14