

Department of Economics

# ECON 305: Economics, Causality, and Analytics

Class/Exam Location: SGMH 2113, Tuesday and Thursday 2:30-3:45PM

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Technical support: (657) 278-8888

## Response TIME

I tend to respond to email inquiries very quickly, and will not take more than 48 hours to respond to an email.

## Course Communication

All course announcements and individual emails are sent through TITANium, which only uses CSUF email accounts. Therefore, you MUST check your CSUF email on a regular basis (several times a week) for the duration of the course.

## Course Description

### University Catalog Description (40 words or less)

* Students will learn modern economic analysis, which centers around causal inference – how X causes Y. Students will learn how economists and social scientists identify causal effects without experiments, how to diagram causality, and how to implement casual methods using R.

### Detailed Course Description

In order to make sense of the modern world and learn new things about it, it is necessary to be able to understand data, how to use it, how it is used, and what conclusions can be drawn from it. In this class we will learn how to use the R statistical programming language so that we can work with data. We will also learn the fundamental problems of causal inference (using data to understand how X *causes* Y to happen), and how researchers can conceptually solve these problems.

## Course Objectives + LEARNING GOALS

* Understand the problems of causal inference and how economists try to come to causal conclusions using observational (non-experimental) data.
* Learn how to diagram an economic model in order to be able to be able to determine how effects can be identified.
* Learn the standard statistical approaches (causal inference methods) for identifying causal effects.
* Learn how to use the R statistical programming language to interact with economic data and apply causal inference methods.

## Pre/co-requisites

The prerequisite for this class is ECON 201 or ECON 202 or ECON 100. Economics majors should note that ECON 100 does not count towards their major and are strongly encouraged not to take that route.

## Required Texts

There is no textbook for this course. Readings and videos will be available on TITANium from the beginning of the term.

## Other Required Materials

You will be required to have access to a computer that can run R and RStudio. These can be installed at [R-Project](r-project.org) and [RStudio](rstudio.com). These programs are free, can run on every major operating system, and are installed on many campus computers for use. You can alternately use R on any web browser by making an [RStudio Cloud](rstudio.cloud) account (also free).

## Recommended Materials

* Programming resources: [Guide to R for SCU Economics Students](https://rpubs.com/wsundstrom/home), [Using R for Introductory Economics](http://urfie.net/read/mobile/index.html#p=1), [Introduction to Econometrics with R](https://scpoecon.github.io/ScPoEconometrics), [R-Bloggers](https://www.r-bloggers.com/), [StatMethods](https://www.statmethods.net/), and more available on [my site](http://www.nickchk.com/econometrics.html), all free.
* *Counterfactuals and Causal Inference* by Morgan & Winship, and[*Causal Inference: The Mixtape*](http://scunning.com/mixtape.html) (free), give a more advanced and in-depth look at many of the causal inference methods we’ll be covering.
* I also suggest the *More or Less* podcast by the BBC and [*The Upshot*](https://www.nytimes.com/section/upshot) by the New York Times

### Attendance Policy

Attendance is required, including the class period right after a midterm. Attendance will be recorded using the iFullerton app, or by roll call if the app does not work for you. **After the first two absences, each unexcused absence will lower your course grade by 1.5%, to a maximum 9%. Attendance makes up 9% of your course grade.**

### Late Assignments

All late homework will be marked down a total of 10%, and will not be accepted more than one week after the due date.

### Extra Credit Policy

You may independently learn the R package ggplot2 (Advanced 7-10 and [The R Graphs Cookbook](http://www.cookbook-r.com/Graphs/)), or both the R and econometrics necessary to use advanced regression formulas (Moderate 1), IV (Moderate 4), time series regression (Moderate 5), probit and logit (Moderate 6), Heckman (Moderate 7), or fixed effects (Moderate 9). For learning the econometrics I recommend “Using R for Introductory Economics” or “Introduction to Econometrics with R”, listed above. Except for the ggplot2 option, these all require you to learn about methods considerably beyond what is covered in class, and are more about getting you to explore and acquire new concepts on your own. Once you have completed one of these, check in with me; I’ll ask you to demonstrate your ability to use the appropriate R code by completing a task, and for the econometrics options, answer three basic questions about the method (oral exam). Doing so will increase your course grade by **2%** (maximum one per student, although I certainly encourage you to do more learning on your own), and also your employability.

## Grading Standards, and Criteria

In this course the plus/minus system will be used.

The grade breakdown is as follows:

94 or above = A (outstanding performance)

90 – 93.99% = A-

87 – 89.99% = B+

83 – 86.99% = B (good performance)

80 – 82.99% = B-

77 – 79.99% = C+

73 – 76.99% = C (acceptable performance)

70 – 72.99% = C-

67—69.99% = D+

63 – 66.99% = D (poor performance)

60 – 62.99% = D-

0 –- 59.99% = F

Keep all assignments and exams returned to you so that any discrepancies can be easily and fairly straightened out.

## Examinations

If you are going to miss an exam, you must make it up or you will receive a 0 score on it. To make up an exam, you must contact me no more than two days after the exam, and you must have documentation of exceptional circumstances such as a doctor’s note.

## Assignment Descriptions

**HOMEWORK**

All homework assignments are available on TITANium. There is a homework assignment due **Sunday** at **11:55PM** on most weeks, even though this is not a class day. All late homework will be marked down a total of 10%, and will not be accepted more than one week after the due date. **Homework is worth 27% of your course grade.**

**PROJECTS**

There are two projects: First, a **Research Design** writing assignment (**10%** of your course grade) in which you will come up with a causal question, draw the appropriate causal diagram, and discuss how the question could be identified. Second, a **Causal Inference in the News** writing assignment (**10%** of your course grade) in which you will find a news article that contains a causal statement, draw the appropriate causal diagram, determine what must be done to identify the causal statement of interest, and judge whether the article did a good job of identifying its statement. More details for both projects are available on TITANium.

**EXAMS**

There will be two midterms, the first of which will focus on programming, which is worth **12%** of your course grade and covers material from the first six weeks of class, and the second on causal inference, which is worth **12%** of your course grade, and covers material from the 7th through 13th weeks of class (although there will also be a minor programming component on this midterm as well).There will also be a comprehensive final exam worth **20% of your course grade.** *All exam grades may be adjusted upward based on the class average. This adjustment will never lower your grade.* I will describe the type and amount of notes you may bring into the exam.

**GRADING COMPONENTS**

| **Assignment** | **Number** | **Points Each** | **Total Points** | **Percent** |
| --- | --- | --- | --- | --- |
| Homework | 12 | 22.5 | 270 | 27% |
| Programming Midterm | 1 | 120 | 120 | 12% |
| Causal Inference Midterm | 1 | 120 | 120 | 12% |
| Final Exam | 1 | 200 | 200 | 20% |
| Research Design | 1 | 100 | 100 | 10% |
| Causal Inference in the News | 1 | 100 | 100 | 10% |
| Attendance | n/a | n/a | 90 | 9% |

## Policy on Retention of Student Work

Work is submitted through the TITANium course site and shall be retained on the course website for a year after the semester is completed.

## Technical Requirements

Students are expected to:

1. Have basic computer competency which includes:
   1. the ability to use a personal computer to locate, create, move, copy, delete, name, rename, and save files and folders on hard drives, secondary storage devices such as USB drives, and cloud such as Google Drive (Titan Apps) and Dropbox;
   2. the ability to use a word processing program to create, edit, format, store, retrieve, and print documents;
   3. the ability to use their CSUF email accounts to receive, create, edit, print, save, and send an e-mail message with and without an attached file;
   4. the ability to use an Internet browser such as Chrome, Safari, Firefox, or Internet Explorer to search and access web sites in the World Wide Web.
2. Have ongoing reliable access to a computer with Internet connectivity and both R and Rstudio installed for regular course assignments
3. Maintain and access three times weekly their CSUF student email account
4. Use Internet search and retrieval skills to complete assignments
5. Apply his/her educational technology skills to complete expected competencies
6. Utilize other software applications as course requirements dictate
7. Utilize TITANium to access course materials and complete assignments

### Software for Students

Students can get FREE and low-cost software. Software downloads and request forms can be found on the [CSUF Student Software website](http://www.fullerton.edu/it/students/software/). Class specific software will be provided. R can be downloaded at R-project.org, and Rstudio can be downloaded at Rstudio.com.

## MCBE Assessment Statement

The programs offered in Mihaylo College of Business and Economics (MCBE) at Cal State Fullerton are designed to provide every student with the knowledge and skills essential for a successful career in business. Since assessment plays a vital role in Mihaylo College’s drive to offer the best, several assessment tools are implemented to constantly evaluate our program as well as our students’ progress. Students, faculty, and staff should expect to participate in MCBE assessment activities. In doing so, Mihaylo College is able to measure its strengths and weaknesses, and continue to cultivate a climate of excellence in its students and programs.

Assurance of Learning (AoL) is an integral part of both our AACSB and WASC accreditation. For more information on our College-based assurance of learning efforts, please visit the [Assessment and Instructional Support website](http://business.fullerton.edu/Main/CollegeAssessment/).

## University ResourceS

### TITANium

As a registered student you are enrolled in TITANium. You may access TITANium for all your classes by clicking on your student portal, found on the CSUF website. There is a [short video explaining TITANium access](http://www.fullerton.edu/IT/students/digitaleducation/AccessTitanium.php). Problems? Contact the student help desk at (657) 278-8888 or email [StudentITHelpDesk@fullerton.edu](mailto:StudentITHelpDesk@fullerton.edu).

### University Learning Center

The goal of the University Learning Center is to provide all CSUF students with academic support in an inviting and contemporary environment.  The staff of the University Learning Center will assist students with their academic assignments, general study skills, and computer user needs. The ULC staff work with all students from diverse backgrounds in most undergraduate general education courses including those in science and math; humanities and social sciences; as well as other subjects. They offer one-to-one peer tutoring, online writing review, and many more services. More information can be found on the[University Learning Center website](http://www.fullerton.edu/ulc/)**.**

### Writing Center

The Writing Center offers 30-minute, one-on-one peer tutoring sessions and workshops, aimed at providing assistance for all written assignments and student writing concerns. Writing Center services are available to students from all disciplines. Registration and appointment schedules are available a**t the**[Writing Center Appointment Scheduling System](http://fullerton.mywconline.com/)**.** Walk-in appointments are also available on a first come, first served basis, to students who have registered online. More information can be found at the  [Writing Center webpage](http://www.fullerton.edu/learningassistance/tutoring_centers/writing.asp).TheWriting Center is located on the first floor of the [Pollak Library](http://www.library.fullerton.edu/) their phone number is (657) 278-3650.

## [Important University Information and Student Policy Website](http://fdc.fullerton.edu/teaching/syllabus.php)

Topics on the website above include:

Students with Special Needs

Academic Dishonesty Policy

Library Support

Final Exams Schedule

University Learning Goals

Degree Program Learning Outcomes

Emergency Preparedness

## Classroom Emergency Preparedness Guide

### Emergency Preparedness for: ECON 305

#### On the first day of every semester:

* Know the emergency exits and evacuation areas for every classroom.
* Devise "buddy systems" so that everyone is accounted for in an evacuation.
* Evaluate the challenges that you might face during an evacuation and speak with your instructor.
* Add the CSUF Emergency Information number – **877-278-1712** –to your cell phone to hear recorded information regarding campus conditions or closure.
* [Personal Preparation website](https://prepare.fullerton.edu/personalpreparedness/)

#### Emergency Communication

Campus emergency communication is done via a voice message, text and/or an email. Go to your Portal to review your contact information. [A guide to update your personal information](http://prepare.fullerton.edu/emergencynotification/default.asp)

#### Evacuations – Drills or real

* You may not know if this is a drill or not, so take every call to evacuate seriously.
* Take your personal belongings and immediately leave the building.
* Know where the evacuation area is for every building. [A map of all campus evacuation areas](http://prepare.fullerton.edu/evacuationprocedure/)
* Re-enter buildings only when directed by Building Marshals or other campus authority.
* Leave the campus only if instructed.

#### For this class, the closest 2 exits are: at the front of the room.

#### We will meet at: note class meeting place

### Earthquake

As soon as you feel shaking, **DROP, COVER and HOLD ON**: Immediately seek shelter (under a desk or table) cover your head and hold on. Evacuate if directed, or you feel it is safe to do so.

### Fire

* When you see smoke or fire, immediately evacuate the building.
* If not already activated, pull the fire alarm switch to alert others of the situation.
* Use a fire extinguisher only if you know how to use it and the fire is small.

### Shelter in Place or Dangerous Situation

* If directed, or you feel it is best to do so, seek shelter in a room with a lock.
* Turn off the lights and silence all cell phones.
* Hide as best as possible until the all clear signal has been given by authorities.
* If possible, move away from the dangerous situation as fast as you can.
* If you cannot safely hide or escape, be prepared to take action to protect yourself.
* See [some helpful videos on sheltering in place](http://prepare.fullerton.edu/shelterinplace.asp)

#### When you need help ****Immediately or to report a dangerous situation, CALL 911.****

University Police non-emergency line: (657) 278-2515

#### For more information

Ask your instructor, or go to [Campus Preparedness website](http://prepare.fullerton.edu/campuspreparedness/)

## TENTATIVE SCHEDULE

| Schedule | Topic | Reading, Assignment |
| --- | --- | --- |
| Aug 27, 29 | **Understanding Data**  *What we can do with data*  *Where data comes from*  *What we get out of looking at data*  *Difficulties of working with data* | **Reading**: Pick any article currently on the front page of The Upshot (New York Times) or FiveThirtyEight.com.  **Assignment**: Homework 1, due Sep 1 |
| Sep 3, 5 | **Getting Started in R**  *Getting used to RStudio*  *Basic commands in R*  *Working with objects*  *Variable types* | **Reading**: [Basics of R Chapter 2](http://r-marketing.r-forge.r-project.org/Instructor/Chapter2/Chapter2-ChapmanFeit.html#/), [R Studio IDE Cheat Sheet](https://github.com/rstudio/cheatsheets/raw/master/rstudio-ide.pdf)  **Videos**: R for Economists Basics 1, 2, and 3  **Assignment**: Homework 2, due Sep 8 |
| Sep 10, 12 | **Working with Data in R**  *Data frames*  *Loading in data*  *Manipulating variables* | **Reading**: [Base R Cheat Sheet](http://github.com/rstudio/cheatsheets/raw/master/base-r.pdf), [dplyr Cheat Sheet](https://github.com/rstudio/cheatsheets/raw/master/data-transformation.pdf) (You can skip a lot on the dplyr cheat sheet)  **Videos**: R for Economists Basics 4, 5, and 6 (7 optional) R for Economists Advanced 4 and 5.  **Assignment**: Homework 3, due Sep 15 |
| Sep 17, 19 | **Summarizing Data**  *Exploring different kinds of variables*  *Summarizing and graphing variables* | **Reading**: [Basics of R Chapter 3](http://r-marketing.r-forge.r-project.org/Instructor/Chapter3/Chapter3-ChapmanFeit.html#/)  **Videos**: R for Economists Basics 8, 10 (not 9 – yet!)  **Assignment**: Homework 4, due Sep 22 |
| Sep 24, 26 | **Relationships Between Variables**  *Scatterplots and grouped bar graphs*  *Correlations*  *Summaries by Group* | **Reading**: Relationships Cheat Sheet (on TITANium)  **Videos**: R for Economists Basics 9, 10 again R for Economists Advanced 6  **Assignment**: Homework 5, due Sep 29 |
| Oct 1, 3 | **Simulating Data**  *Creating random data*  *Constructing true relationships*  *Uncovering true relationships*  *Midterm 1 review* | **Reading**: Simulation Cheat Sheet (on TITANium)  **Video**: R for Economists Advanced 1  **Assignment**: Homework 6, due Oct 6 |
| **Oct 8** | **Midterm 1 – Programming Midterm** |  |
| Oct 10 | **Causal Inference**  *What is causality?*  *The problem of causal inference*  *Models and causality* | **Reading**: Causal Diagrams Cheat Sheet |
| Oct 15, 17, 22, 24 | **Causal Diagrams**  *Controlling for a variable*  *Drawing causal diagrams*  *Dagitty.net*  *Backdoor paths*  *Identification*  *Causal Inference in the News assignment, due [Day]* | **Reading**: Oct 15 Causal Inference: The Mixtape p. 67-73, Dagitty cheat sheet (on TITANium)  **Assignment**: Homework 7, due Oct 20.  **Assignment**: Homework:8, due Oct 27. |
| Oct 29, 31 | **Closing Back Doors: Controlling**  *Controlling for variables*  *Collider variables*  *Fixed effects* | **Reading**: Causal Inference: The Mixtape p. 74-80 (skip all code)  **Assignment**: Homework 9, due Nov 3. |
| Nov 5, 7, 12, 14 | **Closing Back Doors: Untreated Groups**  *Matching*  *Difference-in-Differences*  *Regression Discontinuity* | **Assignment**: Homework 10, due Nov 10  **Due**: Causal Inference in the News Assignment, due Nov 16  **Assignment**: Homework 11, due Nov 17 |
| Nov 19, 21 | **Ignoring Back Doors: IV**  *Instrumental variables*  *Research Design assignment* | **Assignment:** Homework 12, due Dec 1. |
| Dec 3 | Midterm 2 Review |  |
| **Dec 5** | **Midterm 2 – Causal Inference Midterm** |  |
| Dec 10, 12 | **Explaining Better**  *Other methods of using one variable to explain another*  *Final exam review* | **Due**: Research Design Assignment, due Dec 14 |
| Finals Week | Final Exam (Comprehensive) |  |