EC282SP2022

EC282 Spring 2022

Syllabus

Course description

This course aims to introduce 21st century econometric analysis to business students. It provides tools to infer meaningful information from data using descriptive and regression analyses. Causal inference and study design will be at the center of the econometrics analysis class.

At the end of the semester, I expect you to be familiar with **R** and **RStudio** interface, basic data manipulation, obtaining and interpreting sample statistics, conduct meaningful regression analysis and prediction. Importantly, I expect you to have a clear understanding of the distinction between correlation and causation, and in what conditions the former implies the latter.

Knowledge and Skills

- Compute and interpret the descriptive statistics of a sample.
- Understand the statistical uncertainty, construct and interpret the confidence intervals.
- Conduct hypothesis testing, interpret the test statistic and the results of a statistical test.
- Construct a multivariate regression model, empirically estimate the model and interpret the results.
- In depth understanding of the randomized controlled trials and the causal inference.
- Choose and modify the functional form of a relationship between the output and the input variables.

Perspectives

- Learn how to conduct a regression analysis, understands its limitation in inferring a causal relationship, generalizing its results, and power in prediction an outcome that is unknown to the researcher.
- Understand the causal research design and its basic implementations.
- Understand the regression diagnostics to choose the most appropriate definition of predictors, outcome, and functional form.

Class Information

Contact

- **Instructor**: Onur Altındağ
- **Course materials**:
  - The Effect by Nick Huntington-Klein
  - Introduction to Econometrics by James Stock and Watson
- **Useful Videos for learning R** https://www.nickchk.com/videos.html#rstats
- **Useful Videos of learning Econometrics** https://www.nickchk.com/videos.html#metrics

- **Personal web** : www.onuraltindag.info
- **Office**: AAC 181 - *currently NA due to pandemic*
- **Email**: `oaltindag@bentley.edu`

Office hours

Please go to my calendar and book a virtual office hour to meet me (20 minutes maximum). Email me if you need to talk to me urgently or there is no availability on my calendar.

Important Dates

- Midterm I : **Feb 28, 2022**
- Midterm II: **Mar 31, 2022**
- Final exam: **May 5, 2022**

Homework assignment deadlines

- Assignment 1: **Feb 20, 2022**
- Assignment 2: **Mar 06, 2022**
- Assignment 3: **Mar 20, 2022**
- Assignment 4: **Apr 06, 2022**
- Assignment 5: **Apr 17, 2022**

Evaluation

- First Midterm: 20%
- Second Midterm: 25%
- Final exam: 30%
- Assignments + participation : 25%

Software and Collaborative Work

- **R** and **RStudio**: I assume that you have a basic familiarity with or expect your effort to gain familiarity throughout the semester. The instructions installation, some basic rules and best practices on coding are on this web page. Keep in mind that this course is **not** designed to teach you R and more than anything, the best way to learn programming is to actually work on assigned problems. When learning R, arguably the most important skill that you need to acquire is to be able to **Google** your problem. There is probably not a single R question that you have yet has not been answered on Stack Overflow.
- **Github**: You will only use the very basic tools on GitHub, mainly downloading the course material, homework assignments, and follow the additional material that I post here.

Grading

High-stake assessments

- **2 Midterms + Final**: Constitute 75% of your final grade. All exams are **in-person** with dates indicated on the syllabus. If the classes become online, I will post the exams on **Black Board** and you will have a **24 hours** submission period.
- You **MUST** attend the midterms and the final as there will be no make-up exams. The midterms and the final are not cumulative. If you miss or are likely to miss a **midterm** due to an emergency, please contact me as soon as possible. You will need to provide supporting documentation/verification of your absence. I will re-weight your final exam if you have a valid excuse. If you miss the final exam due to an emergency, you will receive an **incomplete** for this course. **DO NOT** take this class if you know that you will not be able to attend the final exam.

Low-stake assessments

- **Weekly homework assignments:** The homework assignments are posted on the **GitHub** web page with the deadlines. They can be completed in groups of **maximum two** students but each person should post separate answers through **Black Board**. **DO NOT** try to submit the homework assignments on last minute as the system will close after the deadline and I will not accept it. Do the best you can with these assignments, work consistently, do not free ride on your friends, and do not cheat. The data sets that each of you will receive are different so I will not tolerate if I see any copied/pasted answers.

- **Collaborative participation to GitHub and classroom discussions:** You must sign up for a free account on GitHub. Github is an eco-system for web development and version control using Git. You will only need to use it to download the course material, `issues` and `discussions` tabs through either creating an issue to ask or answer a question on your or your peer's empirical analysis, homework assignment, or anything related to econometric analysis. I expect you to actively participate to the discussion on GitHub as it will determine your participation grade. Both asking and answering a question in a meaningful way contributes to your participation grade. To sum, you expect you to actively participate to the online community discussions on GitHub. I will do my best to facilitate the discussion yet I need your active support to make this environment useful for all.

Academic Integrity

Learning is a privilege that demands responsibility. At Bentley, students and faculty are members of an academic community that supports integrity both inside and outside the classroom. The expectation at Bentley is that students will take advantage of the opportunity for intellectual development and, in doing so, will conduct themselves in a manner consistent with the standards of academic integrity. When these standards are violated or compromised, individuals and the entire Bentley community suffer. Students who engage in acts of academic dishonesty not only face university censure but also may harm their future educational and employment opportunities. In other words, don't bring unauthorized materials into exams, don't plagiarize someone else's work, and make sure that your collaborations are conducted in accordance with university and course policy.

All students have access to Bentley's academic integrity policy on Blackboard (via the Academic Integrity course page) and the Undergraduate Student Handbook/Graduate Catalog. The best way to avoid a problem is to consult with your instructor before taking any action that might constitute a violation.

Diversity Inclusion and Support

Statement of Diversity and Inclusion

My goal in this class is to create a teaching environment that is inclusive for all of the members of our community independent of their race, gender, age, disability status, and political or religious views. Our differences strengthen our ability for perspective taking, being critical about our default believes,and enhance learning.

I will try to reach this goal within my best capacity by respect and professionalism in our class-related engagements and I anticipate students to do the same. These standards of appropriate conduct are well summarized by Bentley's Core Values in our institution's mission statement.

If you feel that I or anyone in this class has acted outside these values, please come to me so that we may discuss your experience. If you do not feel comfortable coming to me with your concerns, I encourage you to speak with someone in the Office of Academic Advising: 781.891.2803, academic_services@bentley.edu, Jennison 336.

My class roster has your preferred name, but I will happily address you by an alternate name and/or pronoun. Just let me know your preference early in the semester.

Bias Incident Response

The Bias Incident Response Team (BIRT) provides students affected by bias or bias-related incidents with access to appropriate resources. Where appropriate, BIRT assists the University in its response to situations that may impact the overall campus climate related to diversity and inclusion. Working closely with appropriate students, faculty, committees, organizations, and staff, BIRT plays an educational role in fostering an inclusive campus community and supporting targeted individuals when bias or bias-related incidents occur. More information about BIRT and how to file a bias incident report can be found at: https://www.bentley.edu/offices/student-affairs/birt

Disability Services

Bentley University abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 which stipulate no student shall be denied the benefits of an education solely by reason of a disability. If you have a hidden or visible disability which may require classroom accommodations, please call (if you are a residential student or on online student) Disability Services within the first 4 weeks of the semester to schedule an appointment. Disability Services is located in the Office of Academic Services (JEN 336, 781.891.2004). Disability Services is responsible for managing accommodations and services for all students with disabilities.

The Undergraduate Academic Services (UAS) Peer Tutoring program offers online one-on-one and small group tutoring services for students who have worked with their instructors and made use of the Learning Centers, but still require additional academic support. The program goal is to help those students in true need who are willing to take responsibility for their own learning. Please reach out to me if you need more information.

The Howard A. Winer '58 Lab for Economics, Accounting and Finance (LEAF)

The LEAF will open on Sunday September 19, 2021 for the semester. The LEAF's hours of operation will be Sundays from 5:00–9:00 and Mondays through Thursdays from 12:30–9:00. For the fall 2021 semester, the LEAF tutoring will be done both in person and remotely using Zoom. Please use the instructions below to access additional LEAF information.

1. Access SharePoint site using your Bentley credentials.
2. Click on the Documents at the top of the page, find your tutor by selecting the document for your class (either Accounting, Economics, Finance, or GB).
3. Open the document for LEAF Tutor Schedule and Zoom Information. Find your tutor on the table, note the time he/she tutors, and identify whether he/she is tutoring in the LEAF or using Zoom. If the tutoring is being done via Zoom, identify their LEAF number, and then find their LEAF number on the list of Zoom Links at the top of the page.
4. If the tutoring in being done in the LEAF, the LEAF is in Lindsay 21. If the tutoring is being done via Zoom, log in to the identified Zoom Session at the time, which your tutor is available for your course.

For additional information, visit: https://www.bentley.edu/centers/leaf

Online Attendance

All students must attend the in-person classes. If you join the class online due to an exception, please follow the guidelines indicated below:

Zoom Protocol and Online Attendance

Students **must** join classes through their Bentley Zoom account. Go to bentley.zoom.us and enter the course meeting number to join the session. The zoom link is included on Black Board course page.

I expect you to attend class with a functioning microphone and camera. Cameras should be on to effectively engage in class and participate throughout the course. If you have an impediment to keeping your camera on, please let me know so that we can work to arrive at a mutually agreeable solution.

You are expected to be able to access all electronic course materials. It is your responsibility to review the course syllabus as soon as possible to determine what resources or materials I expect you to use in the course. If you are a student in an international location that may limit access to certain internet resources, please let me know immediately so you can find a solution.

Students are expected to attend classes synchronously despite potential time zone hurdles. Solely watching recorded classes is not deemed to be acceptable course participation or completion. Course recordings are for the benefit of students who miss an occasional class or would like to watch the recording for further edification of materials. Class recordings that are posted to BB are for the sole purpose of this course. Disseminating any portion of this video in any manner is strictly prohibited.

Tentative Schedule

Weeks 1-2
Jan 24-Feb 3

- **Introduction to the course, logistics, syllabus, expectations and pap-talk.**
- **Applied research in economics, Introduction to R.**
- *Videos*: 1. Starting out, 2. Basic R Programming, 3. Manipulating data using dplyr
- **Random variables, sampling variation, sample mean, variance, distribution of random variables**
- *Readings:* Chapter 2 of Stock and Watson: 1. Random sampling and the distribution of the sample average, 2. Large-sample approximations to sampling distributions
- **Econometrics Research Seminar**

Weeks 3-4
Feb 7-Feb 17

- **Central limit theorem**
- **Hypothesis testing concerning the sample mean and confidence intervals**
- **Scatterplots, the sample covariance, and the sample correlation**
- *Readings:*: Chapter 3 of Stock and Watson: 1. Hypothesis Tests Concerning the Population Mean, 2. Confidence Intervals for the Population Mean 3. Comparing Means from Different Populations, 4. Scatter plots, the Sample Covariance, and the Sample Correlation.
- **Bivariate OLS Model**
- *Readings:* Describing Relationships
- *Videos:*The Bivariate OLS

Weeks 5-6
Feb 21-March 3

- **Midterm I**
- **OLS Prediction, Residuals, and Goodness of Fit**
- **Estimate Uncertainty and Hypothesis Testing**
- *Videos:*1. Regression Predictions and Residuals, 2. Hyp. Testing Part 1, 3. Hyp. Testing Part 2, 4. OLS in R, 5. Hyp. Testing in R,

Week 7
March 7-March 10

- **Endogeneity in Ordinary Least Squares**
- **Identification and Control Variables**
- **Causal Diagrams**
- *Videos:*1. Endogeneity in OLS, 2. Controlling for X, 3. Causal Diagrams

Weeks 9-10
March 21-March 31

- **Multivariate Regression**
- **Research Presentation**

- **Midterm II**
- *Videos:* 1. Multivariate regression in R

Weeks 11-12
April 4-14

- **Binary and categorical variables**
- **Polynomials and Logarithms**
- *Videos:* 1. Binary and categorical variables, 2. Polynomials and Logarithms

Weeks 13-14
April 18-28

- **Linear probability model**
- **Probit and Logit**
- *Videos:* LPM, Probit, Logit