Economics, Applied
Course Number: 22:223:764
Course Title: Introduction to Econometrics

COURSE DESCRIPTION

Econometrics, literally "economic measurement," is a branch of economics that attempts to quantify theoretical relationships. Econometrics is application of statistical and mathematical models using data to quantify theories or test existing hypotheses and to make predictions. This course discusses econometric models and their estimation using real empirical data. Emphasis will be on understanding how econometrics can be used in testing business theories, estimating statistical significant relationships between business variables and business predictions.

This course will cover cross sectional Classical Model (two variable and multiple regression), properties of the Ordinary Least Square estimators, violations of classical assumptions, specification and functional form issues, hypothesis testing and prediction. Maximum Likelihood Estimation and simple Limited Dependent Variable Models will be discussed. simple Time Series Models (Trends, MA and ARMA) as well as Introductory Panel Models will also be covered. There will be a focus on using econometrics software in estimating econometrics models learned during the semester and interpreting the results. .

All econometrics estimation and model building will be demonstrated using case studies and empirical data using STATA and/or R.

COURSE MATERIALS

Required Text
Wooldridge, Jeffrey M., *Introductory Econometrics: A Modern Approach*, 7th Edition (or higher), South-Western College Publishing, 2020

Software
R (cran.r-project.org/ and www.rstudio.com)
OR
STATA – www.STATA.com (https://it.rutgers.edu/software-portal/)

LEARNING OBJECTIVES

This course is designed to help students develop knowledge and skills of econometric models and their applications to empirical data; master the statistical properties of the econometric models, estimation methods and diagnostics on the model; learn to interpret the estimated results, test hypothesis and do predictions for different business scenarios; learn and better understand how econometrics and business data can be used to test theories, quantify relationships between different business variables and make predictions.

Students develop and strengthen these skills and knowledge through the following course activities and assignments:

▪**Lectures**. All econometric models will be covered in the lectures, along with their estimation and discussions on their practical applications.

▪**Case studies**. Each student is required to individually complete two case studies. Students will be asked to practice in class using the realistic business data in the cases while learning the knowledge, methods and skills in the lectures. This will help them better understand the econometric models and conduct estimation of econometric models, testing and interpretation of their findings to tackle realistic business problems. Each case will be discussed to help students better and systematically understand the relevant work before the submission of the case study.

▪**Quizzes**. Theoretical concepts and various econometric methods will be tested in quizzes. Two open-book quizzes are arranged.

▪**Project**. Students will be grouped into teams. Each team shall identify a realistic business/economic issue and appropriate data to apply the knowledge and skills covered in this course to perform econometric modelling. Each project will be discussed in class with peers and the instructor before the project report submission so that everyone can have a better understanding about the different econometric models, their estimation, and analysis of the findings for different business issues.

PREREQUISITES

Pre-requisites: Undergraduate or master's level course in Statistics.

ACADEMIC INTEGRITY

I do NOT *tolerate cheating*. Students are responsible for understanding the RU Academic Integrity Policy (http://academicintegrity.rutgers.edu/)

I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, "On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment." I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large

database of past work. Don't let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.

DEADLINE EXTENSION AND EXAM MAKE-UP POLICIES

Deadlines will not be extended (late submissions will not be graded) unless you have a serious reason, and, in such cases, you **must** notify the instructor **(3 days)** before the deadline.

GRADING

Quiz 1	15%
Quiz 2	10%
Case Study 1	15%
Case Study 2	10%
Term Project	50%

COURSE SCHEDULE

Topic	Assignment
Syllabus Overview and Course Introduction Two variable Ordinary Least Square Models -Cross Sectional Framework (Properties, Estimation, Gauss Markov Theorem) Chs 1-2	
Two variable Ordinary Least Square Models -Cross Sectional Framework (Hypothesis Testing, Diagnostics)	Case Study 1 Assigned
Multiple Variable Regression Analysis (Assumptions, Properties of the Estimator, Testing, Diagnostics, Dummy Variable) Chs 3-5	

Multiple Regression Analysis Continued (Violations of Gauss Markov Assumptions – Heteroscedasticity, Specification and Functional Form) Chs 6-8	Project Team Set up
Quiz 1 Case Study 1 Discussion	Case Study 1 due one week after class
Introductory Time Series Model (Time trend, AR, MA, ARMA models) Chs 10-11	
Maximum Likelihood Estimation and Introductory Limited Dependent Variable Models Ch 17	Project Topic and Data Finalized Case Study 2 Assigned
Introductory Panel Models Ch 13-14	
Quiz 2 Case Study 2 Discussion	Case Study 2 due one week after class
Project Discussions	Project Slides due before the class Project report due one week after the class

* Topics may roll over to the next class but will be clearly announced on the class website on Canvas

SUPPORT SERVICES

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. More information can be found at ods.rutgers.edu.

[Rutgers University-New Brunswick ODS phone (848)445-6800 or email dsoffice@echo.rutgers.edu]

[Rutgers University-Newark ODS phone (973)353-5375 or email ods@newark.rutgers.edu]

If you are *pregnant*, the Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy.

[Rutgers University-New Brunswick Title IX Coordinator phone (848)932-8200 or email jackie.moran@rutgers.edu]

[Rutgers University-Newark Office of Title IX and ADA Compliance phone (973)353-1906 or email TitleIX@newark.rutgers.edu]

If you seek *religious accommodations*, the Office of the Dean of Students is available to verify absences for religious observance, as needed.

[Rutgers University-New Brunswick Dean of Students phone (848)932-2300 or email deanofstudents@echo.rutgers.edu]

[Rutgers University-Newark Dean of Students phone (973)353-5063 or email DeanofStudents@newark.rutgers.edu]

If you have experienced any form of *gender or sex-based discrimination or harassment*, including sexual assault, sexual harassment, relationship violence, or stalking, the Office for Violence Prevention and Victim Assistance provides help and support. More information can be found at http://vpva.rutgers.edu/.

[Rutgers University-New Brunswick incident report link: http://studentconduct.rutgers.edu/concern/. You may contact the Office for Violence Prevention and Victim Assistance at (848)932-1181]

[Rutgers University-Newark incident report link: https://cm.maxient.com/reportingform.php?RutgersUniv&layout_id=7 . You may also contact the Office of Title IX and ADA Compliance at (973)353-1906 or email at TitleIX@newark.rutgers.edu. If you wish to speak with a staff member who is confidential and does **not** have a reporting responsibility, you may contact the Office for Violence Prevention and Victim Assistance at (973)353-1918 or email run.vpva@rutgers.edu]

If students who have experienced a temporary condition or injury that is adversely affecting their ability to fully participate, you should submit a request via https://temporaryconditions.rutgers.edu .

If you are a military *veteran* or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. http://veterans.rutgers.edu/

If you are in need of *mental health* services, please use our readily available services.

[Rutgers University-Newark Counseling Center: http://counseling.newark.rutgers.edu/]

[Rutgers Counseling and Psychological Services–New Brunswick: http://rhscaps.rutgers.edu/]

If you are in need of *physical health* services, please use our readily available services.

[Rutgers Health Services – Newark: http://health.newark.rutgers.edu/]

[Rutgers Health Services – New Brunswick: http://health.rutgers.edu/]

If you are in need of *legal* services, please use our readily available services: http://rusls.rutgers.edu/

Students experiencing difficulty in courses due to *English as a second language (ESL)* should contact the Program in American Language Studies for supports.

[Rutgers–Newark: PALS@newark.rutgers.edu]

[Rutgers–New Brunswick: eslpals@english.rutgers.edu]

If you are in need of additional *academic assistance*, please use our readily available services.

[Rutgers University-Newark Learning Center: http://www.ncas.rutgers.edu/rlc

[Rutgers University-Newark Writing Center: http://www.ncas.rutgers.edu/writingcenter]

[Rutgers University-New Brunswick Learning Center: https://rlc.rutgers.edu/]

[Optional items that many faculty include:

  - Students must sign, date, and return a statement declaring that they understand the RU Academic Integrity Policy.

  - Students must sign, date, and return a statement declaring that they understand this syllabus.]