

Rose-Hulman Institute of Technology / Department of Humanities, Social Sciences, and the Arts  
Spring 2020: ECONS451: Econometrics  
Section 1: MTRF (9:00 – 9:50)/Olin-205  
Section 2: MTRF (10:00 – 10:50)/Olin-205

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Office Hours: MTRF, 11:00 am to 12:00 pm, 1:00 pm to 2:00 pm, and by appointment

### **Course Description:**

Econometrics is a discipline at the crossroads of mathematics, statistics, and economic theory. This is an introductory course that essentially analyzes a variety of topics regarding both the two variables and the multiple regression models. The course provides an opportunity to understand the elementary theory, which will be essential to appreciate how empirical models are developed and estimated, and results interpreted. At the completion of this course, the successful student will be equipped with lots of essential tools to understand and build models applicable not only to economics, but also to other disciplines of science, and social science.

### **Learning Objectives:**

Specifically, the objectives of this course include:

1. Apply econometric methods to examine correlation and causation among variables
2. Gain hands-on experience in using statistical programs, particularly Stata
3. Understanding the power and limitations of econometric analysis
4. Formulate models that build on existing literature to solve economic problems
5. Conduct and present research by using relevant data and econometric tools

### **Prerequisites/Corequisites:**

ECONS151 (Introduction to Microeconomics) or ECONS152 (Introduction to Macroeconomics) is the prerequisite for this class.

### **Required Text:**

Jeffrey M. Woolridge, *Introductory Econometrics: A Modern Approach*, 7<sup>th</sup> ed. (2020), Cengage.

### **Other Suggested Text:**

Damodar N. Gujarati, *Basic Econometrics*, (2007), McGraw Hill.

James H. Stock and Mark W. Watson, *Introduction to Econometrics*, (2019), Pearson.

### **Assessment:**

- The course assessment will consist of (i) Test-Based Assessment (75%), and (ii) Project-Based Assessment (25%).

(i) Test-Based Assessment (75%): Under this assessment, there will be four homework, four in-class quizzes, one mid-term and one final exam.

- The four homework will be worth a total of 20% of your term grade.
- The four in-class quiz will be worth a total of 20% of your term grade.
- The mid-term exam will be worth 10% of your term grade.
- The final exam will be comprehensive. It will be worth 25% of your term grade.

(ii) Project-Based Assessment (25%): Under this assessment, there will be one final project with presentations (25%)

**Instructions on Final Project and Presentations:**

You will be expected to produce and present an empirical paper by the end of the course. The course project consists of three graded components. First, you will write a literature survey on a topic of your choice. You will be judged on how well you choose the papers, your summary of each paper and how you relate the papers. Second, you will write a research prospectus. This document will serve as the beginnings of a research paper. It should consist of no more than 5 pages, clearly pose a research question, provide motivation, discuss the identification strategy and the data to be (potentially) used, and place the paper in the existing literature. Third, you will submit the first full draft of your empirical paper. You will have several opportunities to get feedback before the final prospectus is turned in. Finally, you will give a 10-minute presentation to the entire class followed by a 3-5minute discussion.

**Project evaluation criteria:**

The paper will be evaluated based on overall performance whose components might be as follows: whether the problem you examine has been clearly stated, the model you formulate has been well described, hypotheses you set are relevant to the topic at hand, results you analyze are helpful to test your hypotheses, and a conclusion summarizes your research and gives possible directions for further research on your question.

**Timeline of course project:**

Project Task 1: 4/3: Brief Literature review with potential research topic (3-4 pages)

Project Task 2: 4/22: Brief project description for instructor and feedback. (3-4 pages)

Project Task 3: 5/8: Draft prospectus due. (10-15 pages)

Final Project: 5/22: Presentations, Final prospectus and presentation slides due.

**Econometrics Software:**

I will use Stata to show estimation of models in class. I strongly encourage you to learn and use Stata to the extent possible. This is one of the most widely used statistical packages among economists. I will take questions about this program although I will accept assignments done using some other programs, such as R or Python. Be prepared to explain things to me if I have a question on how you have implemented that other program to get your results.

**Grading Component, and Grading Scale:**

Grade Component	Weight
Four Homework (4*5)	20%
Four Quizzes (4*5)	20%
Midterm	10%
Final	25%
Final Project and Presentation	25%

Score in Percentage	Grade
90 or better	A
86 to 89	B+
80 to 85	B
76 to 79	C+
70 to 75	C
66 to 69	D+
60 to 65	D
Below 60	F

**Attendance Policy:**

- Click [here](#) to see the Rose-Hulman’s attendance policy.

**Academic Misconduct:**

Students must aware of Rose-Hulman’s rules and procedures toward academic misconduct. These policies may be found on the Rose-Hulman’s web-site at Academic Rules & Procedures at this [link](#).

**Course Schedule:**

The table below lists the order of the material to be covered in the class. This schedule is subject to change by the instructor, if necessary.

Week and Date	Topics and Textbook Reference	Important Due Dates
Week 1: 3/9 – 3/13	Introduction: syllabus review and basic principles Guidelines on final project and sample presentation Chapter 1: The Nature of Econometrics, Economic Questions and Data, Review of Probability & Statistics Supplement: Gujarati ch. 1, Stock & Watson ch. 2 & 3	N/A
Week 2: 3/16 – 3/20	Chapter 2: The Simple Regression Model Supplement: Gujarati ch. 2 & 3, Stock & Watson ch. 4 Stata Tutorial #1	<b>Homework 1</b> (Due:3/20)
Week 3: 3/23 – 3/27	Chapter 3: Multiple Regression Analysis: Estimation Supplement: Gujarati ch. 7, Stock & Watson ch. 6 Stata Tutorial # 2	<b>Quiz 1</b> (Due:3/27)
Week 4: 3/30 – 4/3	Chapter 4: Multiple Regression Analysis: Inference Supplement: Gujarati ch. 5 & 8, Stock & Watson ch. 7 Stata Tutorial # 3	<b>Quiz 2</b> (Due:3/31) <b>Project Task 1</b> (Due:4/3)
Week 5: 4/6 – 4/10	Chapter 5: Multiple Regression Analysis: OLS Asymptotics Chapter 6: Multiple Regression Analysis: Further Issues Review for midterm Others: Comments and Discussion on Project task 1	<b>Homework 2</b> (Due:4/7) <b>Midterm</b> (Due:4/10)
4/13/2020 (M) – 04/17/2020 (F): Spring Break: No Classes		
Week 6: 4/20 – 4/24	Chapter 7: Multiple Regression With Qualitative Information Supplement: Gujarati ch. 9, Stock & Watson ch. 11 Stata Tutorial # 4	<b>Project Task 2</b> (Due:4/22) <b>Homework 3</b> (Due: 4/24)
Week 7: 4/27 – 5/1	Chapter 8: Heteroskedasticity Supplement: Gujarati ch. 11 Stata Tutorial # 5 Others: Comments and Discussion on Project Task 2	<b>Quiz 3</b> (Due:5/1)
Week 8: 5/4 – 5/8	Chapter 9: Specification and Data Issues Stata Tutorial # 6	<b>Project Task 3</b> (Due: 5/8) <b>Homework 4</b> (Due:5/8)
Week 9: 5/11 – 5/15	Advanced Topics: Chapter 15: Instrumental Variables and Two Stage LS Chapter 19: Carrying out an Empirical Project Others: Comments and Discussion on Project Task 3	<b>Quiz 4</b> (Due: 5/15)
Week 10: 5/18 – 5/22	Review for Final Exam Presentation of your final Project	<b>Final Project and Presentation Slides</b> (Due: 5/22)
<b>Week 11</b>	<b>Final Exam</b>	<b>TBA</b>

\*\* In addition, we will go over a few papers on empirical economics that employ the methods discussed in class.