

Academic Year: ( 2023 / 2024 )

Review date: 08-10-2023

Department assigned to the subject: Economics Department

Coordinating teacher: DELGADO GONZALEZ, MIGUEL ANGEL

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Intermediate course in Statistics (probability and inference) offered in this program.  
Lineal algebra and calculus (B.Sc. level)

**OBJECTIVES**

This is an intermediate-level Econometrics course focused on the application of statistical inference techniques to analyze causal relationships based on models.

The linear regression model is used as a basis to identify these causal relationships in terms of parameters, allowing for inferences to be made using data. However, given the nature of some causal relationships, it is necessary to employ more advanced models than linear regression, adapting the inference techniques to the complexity of these models and the limitations of the data.

In this course, students will learn to model causal relationships between economic variables in various contexts and carry out statistical inferences with the help of specialized software.

**DESCRIPTION OF CONTENTS: PROGRAMME**

Syllabus

1. Correlation, causal effects and randomized trials.  
Reading: AP Ch. 1 & 2, SW Ch. 4 & 5, W Ch. 2, 3.
2. The multiple linear regression model: OLS estimation, causal effects biases.  
Reading: SW Ch. 6, W Ch. 4.
3. Inference in the linear multiple regression model.  
Reading: SW Ch. 7, W Ch. 4, 5.
4. Nonlinear regression models.  
Reading: SW Ch. 8, W Ch. 6,7.
5. Binary regression models: Modeling discrete choice.  
Reading: SW Ch. 11, W Ch. 17-1.
6. The problem of endogeneity: Omitted variables, simultaneity and error in variables.  
Reading: SW Ch. 12., W 15, 16.
7. Inference based on instrumental variables: Identification, two stages least squares and generalized method of moments.  
Reading: SW Ch. 12., W 15,16.

SW: Stock & Watson, W: Wooldridge, AP: Angrist and Pichke.

**LEARNING ACTIVITIES AND METHODOLOGY**

The course consists of 60% lectures and 40% practicals (approximately). Additionally, there is one hour of weekly tutorials. Students can attend departmental seminars of their choice as part of their training.

During the lectures, each of the 8 course topics is discussed, motivated by practical cases using real data. In the practical classes, which are conducted after each topic has been discussed, problem sets are solved. It is expected that students have attempted the exercises before each class, and student participation is desirable to address any unclear aspects during the classes. During the tutorials, students can clarify their doubts or any other topic related to the subject, either individually or in groups.

At the end of some lectures or practical classes, quizzes lasting no longer than 10 minutes will be

conducted to gauge the level of subject comprehension. These quizzes are evaluative and contribute to the ongoing assessment.

Many problems in the practical classes require the use of a personal computer with specialized software. In class, we will be using GRET, which is freely accessible, but students can also use any of the following: Eviews, STATA, or R. Students are required to bring their personal computers to all classes, with GRET loaded, along with any other software they find useful. All mentioned software packages can be found on Aula Virtual (<https://aulavirtual.uc3m.es/uds/page/services>).

## ASSESSMENT SYSTEM

Ongoing assessment 40%, Final Exam 60%

The ongoing assessment comprises a midterm exam (80%) and quizzes that will be conducted at the end of some classes (20%).

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

## BASIC BIBLIOGRAPHY

- Stock, J.H. & M.W. Watson Introduction to Econometrics, 4th Edition, Pearson Education Limited, 2020
- Wooldridge, Jeffrey M. Introductory Econometrics: A Modern Approach, 3rd Edition, Thomson/South-Western, 2006

## ADDITIONAL BIBLIOGRAPHY

- Angrist, J.D. & J-S Pischke Mostly Harmless Econometrics: An Empericist's Companion, Princeton University Press, 2009
- Goldberger, A.S. Introductory Econometrics, Harvard University Press, 1998
- Greene, W.H. Econometrics Analysis, Prentice Hall, 2008
- Hayashi, F. Econometrics, Princeton University Press, 2000
- Imbens, G.W. and D. B. Rubin Causal Inferencia for Statistics, Social and Biomedical Sciences: An Introduction, Cambridge University Press, 2015

## BASIC ELECTRONIC RESOURCES

- César Alonso-Borrego & Jesús Carro . OCW Econometrics UC3M: <http://ocw.uc3m.es/economia/econometrics>
- Ricardo Mora . Econometrics I: Multiple Regression & Inference: <http://www.eco.uc3m.es/~ricmora/mei/>