# Econometric Techniques

**Academic Year: ( 2024 / 2025 )** **Review date: 23-04-2024**

**Department assigned to the subject: Economics Department**

**Coordinating teacher: GONZALO MUÑOZ, JESUS**

**Type: Compulsory ECTS Credits : 6.0**

**Year : 3 Semester : 1**

## OBJECTIVES

The goal of this course is understand the time evolution of the most relevant economic time series (GNP, Unemployment, inflation, interest rates, exchange rates, financial asset prices, etc.) and the analysis of the dynamic causal relationships existing among those variables in order to perform forecasts and economic policy analysis.
To achieve this goal, the student must acquire knowledge, abilities (specific and general) and attitudes.
Knowledge: At the end of the course the student will be able to:

- Construct adequate models to obtain forecasts
- Construct adequate models to analyze causal relationships between economic variables
- To analyze the growth of economic variables and their long-term relationship.

In term of concrete questions, the student will learn to answer in a quantitative and synthetic way, via an empirical project, to questions of this type:

- How interest rates affect economic growth, employment level, prices, etc.?
- How economic growth affects C02 levels, and those affect temperature?
- Is it possible to forecast the returns of financial assets?

Specific abilities:
- Isolate and analyze the main characteristics of the evolution of economic data.
- Distinguish different types of data and the components of a time series.
- Build appropriate models for testing economic hypotheses and forecasting.
- Evaluate and criticize different approaches for dealing with an applied problem.

General skills
- Solve complex problems.
- Discrimination of relevant information contained in economic data on a problem.
- Relate different description measures of data and diagnostics on the validity of a model.
- Flexibility on the use of a model for different goals.
- Use of computer packages of econometric modeling.
- Analysis and synthesis.
- Group work.
- Oral, written and graphical communication skills.

Attitudes:
- Critic attitude on solutions and models provided by alternative analysts.
- Constructive attitude based on partial information and approaches.

## DESCRIPTION OF CONTENTS: PROGRAMME

The basic contents of the course are:
- Characteristics of time series data.
- Univariate statitionary models.
- Forecasting and model selection.
- The linear regression model with autocorrelated error: robust inference.
- Dynamic single-equation econometric models: endogeneity problems. Instrumental variables solution

(Two Step Least Squares) and via model transformations. Endogeneity tests.
- Dynamic multi-equation models (VAR) and causality analysis. Shocks identification. Impulse response functions.
- Non stationary processes: trend-cycle decomposition.
- Regression with nonstationary variables: testing different economic theories.

## LEARNING ACTIVITIES AND METHODOLOGY

THIS YEAR WE WILL FOLLOW THE FLIPPING TEACHING APPROACH.
The teaching methodology minimizes the formal aspects, focusing on the intuitive discussion of concepts and intensive work with real data sets, aiming that the student reaches a practical mastering of econometrics with time series economic data.

The course comprises lectures, and problem and practical classes:
Lectures and problem classes:
- It will be used blackboard, computer and slides.
- Each section contains a typical empirical application.
- The applied data analysis is performed with the packagae E-Views (or alternatively with the free software GRETL, R, etc.) and different databases: IFS, FRED, etc.
Computer practical classes:
- Every week there will be a session in the computer room to solve applied empirical problems related to the empirical course project.

## ASSESSMENT SYSTEM

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|---|---|
| **% end-of-term-examination:** | 0 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 100 |

This course will be 100% evaluated via continuous evaluation based on three blocks with different parts: Empirical Project ( 3 parts with a total of 20% final grade) + First midterm (40%) + Second Midterm (40%).

The first midterm will take place during the first two weeks of November.
The second midterm will take place during the last week of the course.

The practical classes include problem sets related to the theoretical concepts developed during the course. There could be some quizzes.

The empirical project is chosen by the student among the choices offered by the lecturer at the beginning of the course. It contains a maximum of five pages (3+2) where the student has to show her/his capacity for synthesis and analysis, critical reasoning, and a good command of quantitative tools. This empirical project could have up to an extra point if it is completely done in R, Matlab, Python, etc.

80% (big and small group) attendance is required for empirical projects and quizzes to be graded.
In the case of online lectures, the camera must be ON in order to count as an attended lecture. In both cases (face-to-face and online) you CAN NOT USE the mobile phone. Tablet and/or laptop only can be used to follow the material of the lecture (conditioned to a previous announcement by the professor).

## BASIC BIBLIOGRAPHY


- Brockwell, P. & R. Davis Introduction to Time Series and Forecasting (segunda edición), Springer-Verlag.

- Enders, W Applied Econometric Times Series (segunda edición), John Wiley.

- Lectures Notes http://www.eco.uc3m.es/~jgonzalo/teaching/TecnicasEconometricas.html, -, -

- Notes de Clase http://www.eco.uc3m.es/~jgonzalo/teaching/TecnicasEconometricas.html, -, -

- Stock, J. & M. Watson Introduction to Econometrics, Addison-Wesley.

- Thomas Nechyba, Intermediate Microeconomics an intuitive approach with calculus,, CENGAGE,, 2018

- Wooldridge, J. Econometrics: A Modern Approach (segunda edición) [Versión en español: Introducción a la Econometría: un enfoque Moderno], South-Western.

## ADDITIONAL BIBLIOGRAPHY

- Aznar, A. y F.J. Trivez Métodos de Predicción en Economía (vols 1 y 2), Ariel.

- Diebold, F. Elements of Forecasting (segunda edición), South-Western.

- Koop, G. Analysis of Economic Data, John Wiley.

- Lecture Notes http://www.eco.uc3m.es/~jgonzalo/teaching/TecnicasEconometricas.html, ,,.

- Mills, T.C. The Econometric Modelling of Financial Time Series, Cambridge UP.

- Otero, J.M. Econometría (Series Temporales y Predicción), AC.

- Perez, C Econometría de las Series Temporales, Pearson Prentice.

- Perez, C Problemas Resueltos de Econometría, Thompson.

- Peña, D Análisis de Series Temporales, Alianza Editorial.

## BASIC ELECTRONIC RESOURCES

- enlace . web: http://www.eco.uc3m.es/~jgonzalo/teaching/TecnicasEconometricas.html