COURSE DATA

DATA SUBJECT

Code: 44947
Name: Macroeconometrics
Cycle: Master's Degree
ECTS Credits: 5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2242 - Master's Degree in Economics	Facultat d'Economia	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2242 - Master's Degree in Economics	Macroeconometrics	ELECTIVES

COORDINATION

ROCHINA BARRACHINA MARIA ENGRACIA

SERRANO DOMINGO GUADALUPE

SUMMARY

The purpose of this course is to introduce the students to the basics of contemporary time series analysis. The approach of the course is mostly applied, although the theoretical fundamentals will also be part of the teaching material and the classes. The students are expected to learn the main tools currently used by practitioners in Macroeconomics, as well as to interpret the results of research articles as they are published in scientific journals.

The program consists of four lessons that correspond to approximately 10 hours of theoretical and applied classes each. The course starts with a revision of the univariate analysis of stationary data, followed by the main concepts of nonstationary data and the most frequently applied tests for the determination of the order of integration of the variables. The third lesson will start with the definition of cointegration and single equation methods for testing and estimation, whereas the fourth topic will extend it to the multivariate context, in an introduction to the Johansen methodology.

In the laboratory sessions the students will use econometrics software to apply to real data the concepts and methods already studied in class. We will choose mostly open-source software in our sessions, such as R and Gretl, although we cannot discard using other programs if they are more suitable for a particular topic or test.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

There are no specified enrollment restrictions with other subjects of the curriculum.

COMPETENCES / LEARNING OUTCOMES

2242 - Master's Degree in Economics

Acquire linguistic and technological skills: ability to use English in the scientific field of economics and to use ICT in the field of economic study and research.

Desarrollar la capacidad crítica, impulsar la inquietud y el interés investigador en el ámbito de la economía, especializarse en el manejo de material bibliográfico, en la utilización de bases de datos económicas y programas matemáticos y estadísticoeconómetricos, así como aprender a transmitir de forma adecuada los resultados de investigadora a través de artículos científicos y
ponencias en congresos.

Know how to manage and process databases using the most appropriate and current techniques and software packages.

Know how to properly use econometric techniques applied to the analysis of the functioning of the economy.

Know the databases and bibliography necessary to carry out economic research work.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should demonstrate self-directed learning skills for continued academic growth.

Students should possess and understand foundational knowledge that enables original thinking and research in the field.

DESCRIPTION OF CONTENTS

1. UNIVARIATE ANALYSIS OF STATIONARY TIME SERIES (ARIMA).

a. Introduction:

1. Macroeconometrics

1. UNIVARIATE ANALYSIS OF STATIONARY TIME SERIES (ARIMA).

i. Time series: definitions
ii. Estimated autocorrelation function

b. Models: AR, MA and ARMA
i. Autoregressive AR(p) models
ii. Moving average MA(q) models
iii. ARMA(p,q) models.

c. Non-stationary processes: ARIMA(p,d,q)

d. Application of the methodology

2. NON-STATIONARY TIME SERIES AND TESTING FOR THE ORDER OF INTEGRATION.

a. Concepts and definitions

b. Unit root tests
i. Dickey-Fuller test
ii. Phillips-Perron unit root tests
iii. Elliot-Rothenberg-Stock Tests
iv. Schmidt-Phillips Test

c. Stationarity KPSS test

d. Unit root tests with structural breaks
i. Perrons exogenous break tests in trended variables
ii. Zivot and Andrews (1992) unit root test

3. LONG-RUN RELATIONSHIPS AND COINTEGRATION.

a. Introduction: definition of cointegration

b. Tests for no cointegration based on the residuals of the static regression
i. DW test applied to the cointegration residuals (CRDW)
ii. ADF test by Engle and Granger (CRADF)
iii. Phillips-Ouliaris (1990) tests
iv. Cointegration test by Shin (1994)

c. Tests based on the Error Correction representation

d. The LSE approach to dynamic modelining

4. JOHANSENS METHODOLOGY.

a. Definitions, examples and representations

b. The I(1) model
i. Definitions
ii. Estimation
iii. Tests for the cointegration rank
iv. The role of the deterministic components
v. Hypothesis testing about the long-run vectors
vi. Testing for exogeneity

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	40,00
Classroom practices	10,00
Total hours	**50,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	75,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**75,00**

TEACHING METHODOLOGY

The classes will consist on the presentation of the theoretical aspects of the topic, with examples and simulations in R. Each topic has a set of exercises to be made in class, also including scripts written in R. Then, the students should do one complete exercise on the application of the methodology used. In this way, each of them will find the type of problems that researchers find when working with data.

EVALUATION

The grade of the first call will consist on the result of the presentation of individual assignments (50% of the grade) and a final written exam for 50% of the grade. The student must pass the exam to pass the course.

The grade of the second call will correspond to 100% with the grade obtained from the completion of a written exam. The exam will cover the contents of the theoretical and practical classes, and the type of

questions will be selected so that the total score of different questions correspond to the volume of work devoted to the theory classes and classroom to the theory classes and classroom practices.

REFERENCES

- B. Pfaff (2011): Analysis of Integrated and Cointegrated Time Series with R, second edition. Springer. - Harris, R.I.D. (1995): Using Cointegration Analysis in Economic Modelling, Prentice Hall. - Juselius, K. (2007). The cointegrated VAR model: methodology and applications, Advanced texts in econometrics. Oxford University Press - Econometric software: RStudio (http: //www.rstudio.com); Gretl (http://www.LearnEconometrics.com/gretl.htlm)

- Dickey, D. A. and Fuller, W. A. [1979], Distributions of the estimators for autoregressive time series with a unit root, Journal of the American Statistical Association 74, 42743. - Dickey, D. A. and Fuller, W. A. [1981], Likelihood ratio statistics for autoregressive time series with a unit root, Econometrica 49, 10571072. - Engle, R. F. and Granger, C. W. J. [1987], Co-integration and error correction: Representation, estimation, and testing, Econometrica 55(2), 251276. - Granger, C. W. J. [1981], Some properties of time series data and their use in econometric model specification, Journal of Econometrics 16, 150161. - Hamilton, J. D. [1994], Time Series Analysis, Princeton University Press, Princeton, NJ. - Hendry, D. F. [1986], Econometric modelling with cointegrated variables: An overview, Oxford Bulletin of Economics and Statistics 48(3), 201212. - Johansen, S. [1991], Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models, Econometrica 59(6), 15511580. - MacKinnon, J. [1991], Critical values for cointegration tests, in R. F. Engle and C. W. J. Granger, eds, Long-Run Economic Relationships: Readings in Cointegration, Advanced Texts in Econometrics, Oxford University Press, Oxford, UK, chapter 13. - Perron, P. [1988], Trends and random walks in macroeconomic time series, Journal of Economic Dynamics and Control 12, 297332.