61334 - Econometrics and Mathematical Instruments

Syllabus Information

Academic Year: 2019/20
Subject: 61334 - Econometrics and Mathematical Instruments
Faculty / School: 109 -

Degree: 525 - Master's in Economics

ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on:
- Lectures and subsequent discussion between professor and students.
- Individual and voluntary assignments about open questions presented in class.

Therefore, the learning process is a mixture of lectures, done by the teacher, and the active participation of students on the different topics of the course. Moreover, students should do small presentations in class, summaries about proposed readings, and exercises suggested by the teacher. Computer resources are used in lectures and presentations.

4.2.Learning tasks

The course includes the following learning tasks:
- Lectures (40 hours): compulsory attendance.
- Autonomous work (90 hours).
- Discussion and presentation of a final report (20 hours): compulsory attendance. The defense of the report will take place at the end of the course.

- Presentation and discussion, at the end of the course, of a significant collection of problems and exercises.
- Assessment: continuous assessment system, or students who wish it have the opportunity to take a global final exam.

4.3.Syllabus

The course will address the following topics:

SECTION I. ECONOMETRICS

Topic 1. PRELIMINARIES

1.1 The Method in Economics. Empirical Testing and Econometrics

1.2 Statistics Review. Estimation and Testing. LR, W and LM tests

1.3 The General Linear Model

1.4 Internal and External Validation

1.5 Threads to Internal Validation

1.6 Information Criteria: the bias-variance trade-off

Topic 2. TIME SERIES MODELS

2.1 Models for Stationary Variables

2.1.1 Univariate Time Series Models.ARIMA

2.1.2 Multivariate Time Series Models. ARD and CRD

2.1.3 The VAR Model

2.2 Models for Non-stationary Variables

2.2.1 Unit Root. Testing

2.2.2 Cointegration. Testing

2.2.3 ECM Model

2.3 Non-linear Models

2.3.1 ARCH and GARCH Models

2.3.2 TAR Models

2.3.3 Bilinear Models

Topic 3. MICROECONOMETRICS

3.1 Panel Data Models

3.1.1 Pooled Model

3.1.2 Fixed Effects Model

3.1.3 Random Effects Model

3.2 Qualitative and Limited Dependent Variable Models

3.2.1 Models with Binary Dependent Variables: Logit and Probit

3.2.2 Multinomial Models

3.2.3 Ordered Choice Models

3.2.4 Models for Count Data

SECTION II. ADVANCED MATHEMATICAL INSTRUMENTS IN ECONOMIC ANALYSIS

Topic 1. DISCRETE ANALYSIS

1.1 Infinite series. Convergence tests.

1.2 Difference equations.

1.3 Discrete systems of equations.

1.4 Economic Analysis Applications.

Topic 2: MATHEMATICAL PROGRAMMING

2.1 Inequality constraints programs.

2.2 Kuhn-Tucker conditions.

2.3 Global optimality conditions.

2.4 Economic Analysis Applications.

Topic 3. OPTIMAL CONTROL THEORY

3.1 Hamiltonian. The Pontryagin maximun principle.

3.2 Dynamic programming.

3.3 Economic Applications.

Topic 4. MILLENNIUM PROBLEMS

    4.1 The input-output framework.

    4.2 Other Economic Analysis Applications.

4.4.Course planning and calendar

The course starts in the second half of October and ends in late January, with an approximate duration of 15 weeks. The contents will be explained according to the syllabus. Each topic will take approximately 2 weeks. There will be presentations of assignments throughout the whole period, but these presentations will take place especially at the end of the course.

4.5.Bibliography and recommended resources

Part 1

- Hill, R. Carter. Principles of econometrics / R. Carter Hill, William E. Griffiths, Guay C. Lim Hoboken, NJ : Wiley, 2012
- Martin, Vance. Econometric modelling with time series : specification, estimation and testing / Vance Martin, Stan Hurn, David Harris. New York, [etc.] : Cambridge University Press, 2013
- Cameron, A. Colin. Microeconometrics : methods and applications / A. Colin Cameron, Pravin K. Trivedi . - 1st ed. Cambridge (etc.) : Cambridge University Press, 2005
- Enders, Walter. Applied econometric time series / Walter Enders New York ; Chichester : Wiley, cop. 1995
- Greene, William H. Análisis econométrico / William H. Greene . - 3ª ed., reimp. Madrid [etc.] : Prentice-Hall, 2001
- Greene, William H. Econometric analysis / William H. Greene . - 3rd ed. Upper Saddle River (New Jersey) : Prentice-Hall International, cop. 1997
- Hayashi, Fumio. Econometrics / Fumio Hayashi Princeton (New Jersey) : Princeton University Press, cop. 2000
- Hamilton, James Douglas. Time series analysis / James D. Hamilton. Princeton, N. J. : Princeton University, 1994
- Juselius, Katarina. The Cointegrated VAR model: methodology and applications / Katarina Juselius. Oxford [etc.] : Oxford University Press, 2006

Part 2

Basic referrences

- Fernández Pérez, C.; Vázquez Hernández, F.J.; Vegas Montaner, J.M. (2003). Ecuaciones diferenciales y en diferencias. Sistemas dinámicos. Thompson.
- Miller, R.E.; Blair, P.D. (1985). Input-output analysis, foundations and extensions. Printice Hall
- Shone, R. (2002): Economic Dynamics. Cambridge University Press, 2nd edition
- Vegara, J. (1979): Economía política y modelos multisectoriales. Tecnos

Additional references

- Kurz, H.D.; Salvador, N. (1995): Theory of Production. A long-Period Analysis. Cambridge University Press
- Takayama A. (1993). Mathematical methods in Economics. Michigan University Press