VNIVERSITAT DE VALÈNCIA

Course Guide
44333 Quantitative methods

COURSE DATA

Data Subject	
Code	44333
Name	Quantitative methods
Cycle	Master's degree
ECTS Credits	5.0
Academic year	2017 - 2018

Study (s)

Degree	Center	Acad. year	Period
2202 - M.U. en Economía	FACULTY OF ECONOMICS	1	First term

Subject-matter

Degree	Subject-matter	Character
2202 - M.U. en Economía	1 - Instrumental subject areas	Obligatory

Coordination

Name	Department
CALVO LOPEZ, CLARA	257 - MATEMATICAS PARA LA ECONOMIA Y LA EMPRESA

SUMMARY

The subject Quantitative Methods in Economics is organized in two parts. The purpose of the first one, Methods and Models of the Economic Dynamics, is to qualify the student to deal with Ordinary Differential Equations and Difference Equations as indispensable tools to analyze the behavior, over time, of any economic situation. Specific methods for analyzing the stability of the solutions in continuous and discrete time will be shown. Moreover, the study of systems of equations will lead to the analysis of simultaneous dynamical systems.

The second part introduces some of the concepts, ideas and basic concepts of the analysis of hierarchical data using multilevel models and describes the statistical tools necessary to properly explore the information when the observations are nested in more than one level of aggregation. The topic also describes the specification of specific multilevel models, and explains the consequences of choosing different specifications for the analysis of the phenomenon of interest in terms of its determinants observed and examined on at least two levels of analysis.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Basic knowledge of Mathematics and Statistics for Social Sciences.

OUTCOMES

2202 - M.U. en Economía

- Students can apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
- Students are able to integrate knowledge and handle the complexity of formulating judgments based on information that, while being incomplete or limited, includes reflection on social and ethical responsibilities linked to the application of their knowledge and judgments.
- Students can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences, clearly and unambiguously.
- Students have the learning skills that will allow them to continue studying in a way that will be largely self-directed or autonomous.
- Students have the knowledge and understanding that provide a basis or an opportunity for originality in developing and/or applying ideas, often within a research context.

LEARNING OUTCOMES

After completing the course Quantitative Methods in Economics students must be familiar with the dynamic analysis of economic conditions in both discrete and continuous time as well as with the study of the stability of the systems analyzed. In order to avoid the difficulties inherent to these techniques, computer programs will be used to facilitate the task, and graphical and qualitative solutions of economic models will be emphasized. Moreover, economic interpretations of the quantitative results and their formal expression will also be highlighted.

The student will also learn to identify the hierarchical nature of the data and appreciate the wealth of information, to ask hypotheses or research questions in more than one level, to anticipate the consequences of using different strategies of multilevel modeling, to specify the most appropriate multilevel models for each problem, to estimate and interpret the parameters of multilevel models and to make quality statistical inference with hierarchical data structure.

DESCRIPTION OF CONTENTS

1. Introduction to Dynamical Analysis

Continuous and Discrete Dynamics.
Introduction to Stochastic Dynamics.
Examples: Discrete and Continuous Compounding.
Introduction to Mathematica®.

2. Discrete Dynamical Analysis

Finite Difference Equations.
Stability and Equilibrium Points.
Economic Models: Supply&Demand, Dynamics of the Market Price, Market Models with Inventory.
Solving Practical Cases with Mathematica®.

3. Continuous Dynamical Analysis

Ordinary Differential Equations.
Economic Models: Inflation and Unemployment, Market Models with Price Expectations, Domar and Solow Growth Models, Domar Debt Model.
Solving Practical Cases with Mathematica®.

4. Basic elements of multilevel analysis

The empty random intercept model.
Random disturbance and residual variance.
Application and interpretation.

5. Models with fixed effects independent predictors

Model a predictor of aggregate.
Model a predictor of individual fixed slope.
Models with an aggregate predictor and a single predictor of fixed slope.

6. Models predicting independent random effects

Model with random intercept and slope.
Application and interpretation.
Extensions of multilevel analysis.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	40.00	100
Classroom practices	10.00	100
Development of individual work	5.00	0
Study and independent work	10.00	0
Readings supplementary material	7.50	0
Preparation of evaluation activities	7.50	0
Preparing lectures	15.00	0
Preparation of practical classes and problem	15.00	0
Resolution of case studies	15.00	0
TOTAL	**125.00**	

TEACHING METHODOLOGY

The teaching method used to transmit the theoretical content of the course will be the participatory master class. This methodology will take advantage of the features of the master class while favouring the participation of students and the teacher-student interaction. Empowering participation and discussion during the class is necessary for the student to be directly involved in the learning process.

When the content of the class is practical, the teacher will propose to the students case studies (real –based on the reading and discussion of scientific papers– or fictitious) that should be solved by applying the theoretical concepts learned. The practices will be developed following different teaching strategies according to the theoretical contents discussed, although they will be primarily based problem solving and simulation scenarios.

Morever, in the practical sessions the teacher will pose one or more activities to be solved by the students covering different topics of the subject, with the aim that students acquire the academic skills listed in this guide. These activities will be a part of the assessment of the subject.

EVALUATION

In order to pass the course the two parts (units 1-3 and units 4-6) must be passed separately. The final mark is the average of the marks of each of the two parts.

The mark of the first part comprises two parts:

- **Continual assessment (50%)**. This evaluation is based on solving and discussing exercises and/or on the result of individual tests taken in class.
- **Final exam (50%)** at the end of the term.

The mark of the second part comprises two parts:

- **Continual assessment (30%)**. This evaluation is based on solving and discussing exercises and/or on the result of individual tests taken in class.
- **Research report (70%)** . It must be handed in at the end of the term.

Please be aware that, by their very nature, continual assessment activities will be non-recoverable.

REFERENCES

Basic

- (Units 1-3)
  Shone, R. (2002) Economic Dynamics: phase Diagrams and their Economic Application. Cambridge University Press.
- (Units 1-3)
  Gandolfo, G (1997) Economic Dynamics. Springer.
- (Units 4-6)
  Goldstein, H. (2010) Multilevel Statistical Models. Arnold.
- (Units 4-6)
  Gelman, A. & Hill, J. (2007) Data analysis Using Regression and Multilevel/Hierarchical Models. Cambridge University Press.

Additional

- (Units 1-3)
  Chiang, A.C. (1984, third edition) Fundamental Methods of Mathematical Economics. McGraw Hill.
- (Units 4-6)
  Snijders, T.A.B. & Bosker, R. (1999) Multilevel analysis: An introduction to Basic and applied Multilevel Analysis. Sage.