FACULTAD DE CIENCIAS
ECONÓMICAS Y EMPRESARIALES

SYLLABUS OF THE SUBJECT

Course Information	
Name	Quantitative Models for Business and Economics
Code	
Degree	Degree in Business Administration (ADE)
Year	2º (E-2, E-4) 3º E-6 3º E-3
Semester	2º
Credits ECTS	6
Type	Mandatory
Department	Quantitative Methods
Area	Statistics and Econometrics
Coordinator	Carlos Martínez de Ibarreta Zorita

Information – Faculty members	
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DETAILED INFORMATION ABOUT THE COURSE

Context of the course

Contribution to the professional profile of the degree

Within the area of economics and business, in the empirical research; conclusions about the effect of a variable in other one can be obtained throughout the realization of experiment, if data allows the experimental control, or throughout econometrics model if we have observational data and are given to the researcher.

For the first case, the subject studies the basis of the design and analysis of experiments, and also the basic associated statistical techniques (hypothesis tests in order to compare means or proportions among groups)

For the observational data, the subject carries out an introduction to econometric techniques. Econometrics, understood as the art of building models, allows the exploration, the quantification and the empirically contrast, using real data of micro and macro type, of the existing relationship between economic and business variables and of the theories established about them.

Results gotten out of the models allow the estimations of the effect that a change in a variable would have in the other one, and also the realization of predictions.

The practical character of the subject allows to put in practice many concepts and theories that have already been introduced in other subjects, being of economic type (production or demand models, gravitational models of international commerce), of marketing, or finance (CAPM models).

The obligation of having to carry out a project of empirical application allows the student to introduce his or her-self in the steps to applied scientific research, emphasizing the transcendental fact of following a clear and objective methodology.

Prerequisites

- Basis of economic analysis (micro and macro)
- Basis of matrix algebra
- Basis of inference and descriptive statistics
- Intermediate management of spreadsheet

Skills- Objectives
Generic skills of degree program
Instrumental skills
CGI 1 Analysis and synthesis ability
CGI 2 Decision-making process and solving of problems
CGI 4 Ability to manage information proceeding of different sources
CGI 6 Oral and written communication
CGI 8 Technological knowledge related to the study context
Interpersonal skills
Systematic skills
CG 14 Ability to work autonomously
Specific skills of the area-subject
Conceptual
Knowing the elements and types of econometric models
Understanding the role of basic hypothesis in a model
Understanding the basis of estimation, contrast and prediction processes in a model of multiple linear regression and in Logit models
Interpret the results gotten out of the estimation of an econometric model
Knowing how to contrast economic hypothesis in an econometric model
Analyze the compliance of the basic hypothesis in a multiple regression model
Procedural
Knowing how to specify an econometric model out of a question of economic or business research
Knowing how to obtain and treat data out of primary and secondary sources for its use in the estimation of models
Knowing how to manage any econometric software to estimate and contrast models with real data
Empirically developing and redacting a brief project of empirical application in an academic paper
Attitudinal
Valuing the utility of econometric techniques as tools for improving companies management, making predictions and knowing better the economic context at a micro or macro
Valuing the role of empirical research in economic and social science

COURSE CONTENT

COURSE CONTENT
BLOCK 1. INTRODUCTION TO EXPERIMENT DESIGN

Topic 1. **Design of experiments**
1.1 Objectives and analysis of experimental analysis
1.2 The experimental control
1.3 Applications in Economics and Business area

Topic 2. Hypothesis testing
2.1 Hypothesis testing. Fundamentals and elements
2.1 Hypothesis testing on a parameter
2.3 Hypothesis testing for 2-groups experiments: average and proportion comparisons
2.4 Applications in Economics and Business area

BLOCK 2. CAUSAL MODELS

Topic 3. The multiple linear regression model
3.1 Economic and econometric models: elements and work stages
3.2 The model's basic hypotheses

Topic 4. Estimation
4.1 Estimation of ordinary minimum squares
4.2 Results interpretation
4.3 Goodness of fit
4.4 Applications in Economics and Business area

Topic 5.
5.1 Modelling of qualitative characteristics and non-linearities

Topic 6. Validation. Hypothesis testing
6.1 Statistical and economical validity
6.2 Constraints and Individual and joint tests of significance
6.3 Applications in the Economics and Business area

Topic 7. Prediction
Topic 7B. Specification and sensitivity analysis
7.1 Utilization of a professional data set
7.2 Interpretation of regression results and definition of the reference person
7.3 Sensitivity of estimators to changes in specification

Topic 8: Logit models
8.1 Limitations of the linear probability model
8.2 Main characteristics and interpretation of Logit and Probit results
8.3. Other models

Topic 9: Multicollinearity
9.1 Perfect multicollinearity
9.2 Near multicollinearity: consequences, detection and correction

Topic 10. Heteroscedasticity and Autocorrelation
10.1 Concept, causes and consequences
10.2 Detection: residual graphs and hypothesis test
10.3. Correction and prevention. Generalized minimum squares. Robust estimation

BLOCK 3. APPLIED ESTATITSICAL AND ECONOMETRIC ANALYSIS
Topic 11: Analysis and replication of papers with quantitative models

TEACHING METHODOLOGY

Methodological general aspects of the subject

Classroom Methodology: Activities	Competences
Presentation about the general context of every topic	**CE18.1 Application of statistical and econometrics models in the business context**
Realization and discussion of examples of practical application	
Correction of fundamental issues in weekly workshops	**CE6 Ability to apply the theory and reasoning to economic reality**
General tutoring of practical application of tasks	**CGI 1 Ability of analysis and synthesis**
Basic introduction to the use of econometrical technological applications and obtainment and treatment of economic data gotten out of web sources	**CGI 2 Decision-making and solving of problems**
Realization of a learning game each week	**CGI 8 Technological knowledge related to the re of study**
Realization of one or two intermediate test	
Realization of final exam of the subject	**CE65 Knowing of scientific method in the Business Administration Context**

Out of Classroom Methodology: Activities	Competences
Realization of the final project of empirical application (proposal + final handing)	**CE18.1 Application of statistical and econometrics models in the business area**
Elaboration of a summary video of the empirical project	
Preparation for the test	**CE6 Ability to apply the theory and reasoning to the economic reality**
Study and preparation for the final exam	
	CGI 1 Ability of analysis and synthesis

	CGI 2 Decision-making and solving of problems **CGI 4 Ability to manage information gotten out of different sources** **CGI 6 Oral and written communication** **CGI 8 Technological knowledge related to the re of study** **CG 14 Ability to work autonomously** **CE65 Knowing of scientific method in the Business Administration Context**

GRADING CRITERIA

Grading activities	Criteria	Weight
Continuous evaluation in class: written tests and learning tests online	Numerical grading 0-10	15%
Midterms	Numerical grading 0-10	15%
Final project of empirical application	Grading following a rubric • Originality of the topic • Theoretical context • Depth • Structure and format of the academic paper • Quality Analysis	20%
Exam	Numerical grading 0-10	50%
EXTRAS		
Video of project + oral defense in Quantitative Methods Projects Conference		0,3 plus up to +0,7
Post in the FB group of "Econometric projects"		+0,2

- In order to pass the subject, it is a mandatory requisite in any of the summons to **obtain at least 5 points** (in a scale from 0 to 10)
- As for the final project of empirical application, the instructor may and probably will select some groups, and conduct and oral evaluation of the project. This evaluation is intended **to check the reliability of the report's authorship and the involvement of each member team in the project.**
- Students in the Extraordinary Summons (2°): the same grading system as in the common summons (all components of continuous evaluation carried out during the course are weighted). Any student not doing or failing the practical project or weekly workshops must do them again for this summons. The philosophy of that an extraordinary summons cannot be a way to avoid carrying out the empirical project or workshops underlies.
- Exchange students (OUT) and rest of summons: 100% final exam but stated recommendation to do and hand in the empirical project as a way to better understand the subject and to apply it to the economic and business reality. The final grade will be the better of these two options: 1) 100% final exam, 2) 70% final exam + 30 % group case.
- Student with excuse of absence: each case will be studied individually, searching the balance between equity and learning objectives.

SUMMARY OF PLAN OF WORK

In class and out of class activities
HE Experiment design proposal
P1 Midterm topics 1 &2
P2 Midterm topics 3,4,5& 6
Proposal of empirical project
Delivery of the empirical project
3-min summary video (Optional)

SUMMARY OF WORKING HOURS OF THE STUDENT		
HOURS IN CLASS		
Lecture classes	Practical classes	Activities academically managed
30	30	
HOURS OUT OF CLASS		
Autonomous work about theoretical content	Autonomous work about practical content	Group workshops
35	35	20
		CREDITS ECTS: 6

BIBLIOGRAPHY

Basic Bibliography
Text Books
• Martínez de Ibarreta, Álvarez, Budría, Curto, Borrás, Escobar, Portela, Rúa (2018) 101 PREGUNTAS DE MODELOS CUANTITATIVOS (Y SUS RESPUESTAS), EV Services (available at University bookshop)   • Martínez de Ibarreta, Álvarez, Borrás, Budría, Curto, Escobar, (2017) 101 MODELOS CUANTITATIVOS PARA LA ECONOMIA Y LA EMPRESA EN 101 EJEMPLOS, EV Services (available at University bookshop)   • Hill, Griffiths, Lim (2011) PRINCIPLES OF ECONOMETRICS 4ª edición (International Student Version), Wiley
Papers
Reading of some articles of scientific magazines for the realization of some of the workshops to be handed periodically: • Fair, Ray C, 1978. "A Theory of Extramarital Affairs," Journal of Political Economy, University of Chicago Press, vol. 86(1), pages 45-61, February.   • Hamermesh, Daniel S & Biddle, Jeff E, 1994. "Beauty and the Labor Market," American Economic Review, American Economic Association, vol. 84(5), pages 1174-94, December.

- Bernard, Ab. & Busse, Mr (2004). "Who wins the Olympic Games: Economic resources and medal totals". Review Of Economics And Statistics vol. 86 (1), pages 413-417

Web Pages
http://www.learneconometrics.com/gretl.html for the manual of application of software Gretl :Adkins, L.C. Using Gretl for Principles of Econometrics

Notes
In Moodle Rooms about some topics and sections

Software
Software GRETL (free software) available in http://gretl.sourceforge.net/

Complementary Bibliography

Text Books
Gujarati, D.M (2009) Econometría (5ª edición), Mc Graw Hill Stock, J. y Watson, M. (2012) Introducción a la Econometría (3ª ed),Ed. Pearson Wooldridge, J.M. (2010) Introducción a la Econometría, un Enfoque Moderno (4ª edición), Cengage Learning

Papers
Different papers of scientific magazines for its analysis and replication

Web Pages
References in Moodle to some interesting directions to compliment and apply some concepts