

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	Jose Luis Arroyo Barrigüete

Information – Faculty members	
Professor :	
Name	Carlos Martínez de Ibarreta Zorita
Department	Quantitative Methods
Office	Alberto Aguilera 23, OD-413
e-mail	charlie@comillas.edu
Telephone	2261
Office hours	
Professor :	
Name	Antonio Rua Vieites
Department	Quantitative Methods
Office	Alberto Aguilera 23, OD-419
e-mail	rvieites@icade.comillas.edu
Telephone	2290
Office hours	
Professor	
Name	Tomás Curto González
Department	Quantitative Methods
Office	Alberto Aguilera 23, CD-435
e-mail	tcurto@icade.comillas.edu
Telephone	2248
Office hours	
Professor	
Name	Francisco Borrás Pala
Department	Quantitative Methods
Office	Alberto Aguilera 23, CD-427
e-mail	fborras@icade.comillas.edu
Telephone	2224
Office hours	
Professor	

Name	José Portela González
Department	Quantitative Methods
Office	Alberto Aguilera 23, CD-435
e-mail	Jose.Portela@iit.comillas.edu
Telephone	2248
Office hours	
Professor	
Name	José Luis Arroyo Barrigüete
Department	Quantitative Methods
Office	Alberto Aguilera 23, CD-428
e-mail	jlarroyo@icade.comillas.edu
Telephone	
Office hours	
Professor	
Name	Carlos Alvarez Fernández
Department	Quantitative Methods
Office	
e-mail	calvarez@icade.comillas.edu
Telephone	
Office hours	
Professor	
Name	Leandro Sergio Escobar Torres
Department	Quantitative Methods
Office	
e-mail	lescobar@icade.comillas.edu
Telephone	
Office hours	

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

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 5 General knowledge of the field of study

CGI 6 Oral and written communication

CGI 8 Technological knowledge related to the study context

Specific skills of the area-subject

CE11 Knowledge and understanding of Econometric Models

COURSE CONTENT

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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	
Classroom Methodology: Activities	Competences
Presentation about the general context of every topic	CG01, CG02, CG04, CG05, CG06, CG08, CE11
Realization and discussion of examples of practical application	
Correction of fundamental issues in weekly workshops	
General tutoring of practical application of tasks	
Basic introduction to the use of econometrical technological applications and obtainment and treatment of economic data gotten out of web sources	
Realization of a learning game each week	
Realization of intermediate tests	
Realization of final exam of the subject	

Out of Classroom Methodology: Activities	Competences
<p>Realization of the final project of empirical application (proposal + final handing). It will include the presentation, in an informative outline, of the main research results (poster, graphical abstract or video)</p> <p>Preparation for the intermediate tests</p> <p>Study and preparation for the final exam</p>	<p>CG01, CG02, CG04, CG05, CG06, CG08, CE11</p>

SUMMARY OF WORKING HOURS OF THE STUDENT		
HOURS IN CLASS		
Lecture classes	Practical classes	
30	30	
HOURS OUT OF CLASS		
Monographic and research works, individual or collective	Individual and/or group study and organized reading	Exercises and resolution of cases and problems
20	35	35
CREDITS ECTS: 6 (150 hours)		

GRADING CRITERIA

Grading activities	Criteria	Weight
Exam	Numerical grading 0-10 Test questions and some open questions	55%
Final project of empirical application	Essential to be done with a minimum quality (score of 5 on final delivery) in order to pass the course. Proposal (30% of the grade) + final delivery (70% of the grade) Grading following a rubric <ul style="list-style-type: none"> • Originality of the topic • Theoretical context • Depth • Structure and format of the academic paper • Quality Analysis • Divulgateion section 	20%
Continuous evaluation in class: written tests and learning tests online	Numerical grading 0-10	20%
Experiment proposal	Numerical grading 0-10	5%

- In order to pass the subject, it is a mandatory requisite in any of the summons to **obtain at least 4.50 points** in the final exam (in a scale from 0 to 10)
- It will be possible to obtain up to 0.5 extra points for participation in various voluntary activities proposed by the instructor (analysis of press articles, review contest, etc.).
- 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 (2º): 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	Date	Delivery date
Experiment design proposal	Second week	Second week
Proposal of empirical project	Middle of the course	Middle of the course
Empirical project	From the teacher's OK to the proposal	last day of the course
Delivery of the empirical project		last day of the course

BIBLIOGRAPHY

Basic Bibliography
Text Books
<ul style="list-style-type: none"> 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
<p>Reading of some articles of scientific magazines for the realization of some of the workshops to be handed periodically:</p> <ul style="list-style-type: none"> 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
<p>http://www.learneconometrics.com/gretl.html for the manual of application of software Gretl :Adkins, L.C. Using Gretl for Principles of Econometrics</p>
Notes
<p>In Moodle Rooms about some topics and sections</p>
Software
<p>Software GRETl (free software) available in http://gretl.sourceforge.net/</p>
Complementary Bibliography
Text Books
<p>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</p>
Papers
<p>Different papers of scientific magazines for its analysis and replication</p>
Web Pages
<p>References in Moodle to some interesting directions to compliment and apply some concepts</p>