1 - COURSE DESCRIPTION

Econometrics is the application of statistics tools and mathematical methods to describe, analyse and predict economic and business phenomenon. The main concern of Econometrics is related with the art of using economic theory and statistical techniques to analyse real world data sets.

This is an introductory Econometrics course. Students will learn the basic techniques to analyse, model and interpret business and economic data. On one hand, the course will provide a broad training in basic econometric methods and tools, mostly related to linear regression analysis. On the other hand, students will learn practical applications to real economic and business problems using those econometric approaches. Particular emphasis is given to the careful interpretation of numerical results and to understanding the implications of those results for economic policy and business decision making.

2 - OBJECTIVES AND SKILLS

The course aims to provide students with a rigorous reasoning using the econometric approach when analysing problems and making decisions. Students will also learn practical applications mostly related within an economic and business context.

Objectives to be attained along the course:

- Apply econometric techniques for making decisions with quantitative and categorical data within an economic and business context.
- Understand the regression model (simple and multiple), its scope and limitations.
- Interpret and evaluate relationships between variables using econometrics.
- Understand and drive the properties of OLS.
- Interpret, evaluate and apply inferential methods to linear regression.
- Understand the use and implications of data scaling, functional form and dummy variables in regression modelling.
- Identify the presence of estimation problems.
- Acquire fluency in the use of SPSS software in order to apply econometric techniques using real world data.
**Skills** to be acquired during the course:

- Fostering a logic and rigorous reasoning when facing quantitative analysis.
- The analysis and critical assessment of numerical results.
- The ability to formulate, express and solve a problem or question with a model.
- The ability to identify the relevant elements when facing a business decision.

### 3 - METHODOLOGY AND WEIGHTING

There will be a distribution 60/40 between theoretical and practical sessions.

**Lectures:**

*Theoretical sessions* will be concerned with the study of the different econometric tools. The appropriate use of mathematical and statistics concepts and methods is very relevant in this part of the course. Along the different lectures, examples and/or discussions about real applications will be provided in order to improve the understanding of the different theoretical concepts.

These theoretical sessions are supported with a *course pack* that will be distributed at the beginning of the course. This course pack contains lecture notes about the material of the course but must to be completed by the students with their own *class notes*.

**Classes:**

*Practical sessions* will consist on discussions about practical worksheets so called *Problem Sets*. Students are required to work by themselves on these Problem Sets that will be provided in advance to the due date.

**Computer Classes:**

In addition, practical sessions are complemented with computer classes along the course. Students will learn how to use *SPSS software* (statistical software) in order to apply econometric techniques with real data sets. An assessed project will be required at the end of the course. This project consists on the estimation of a regression model with real data using SPSS software.

Course Material of 6 credits ECTS

(6 x 25h/credit = 150 h. of course work/student on average)

<table>
<thead>
<tr>
<th>Teaching Methodology</th>
<th>Weighting</th>
<th>Time Dedication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>(20)%</td>
<td>30 hours</td>
</tr>
<tr>
<td>Problem Sets</td>
<td>(20)%</td>
<td>30 hours</td>
</tr>
<tr>
<td>SPSS application</td>
<td>(20)%</td>
<td>30 hours</td>
</tr>
<tr>
<td>Individual studying</td>
<td>(40)%</td>
<td>60 hours</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
<td><strong>150 hours</strong></td>
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### 4 – CONTENT

The programme of the course is divided into six parts (units) that are detailed below. The sessions are a combination of theoretical lectures and practical classes (problem sets and computer classes). The course material will be provided by the teacher in the different sessions.

**UNIT 1: INTRODUCTION**

**SESSION 1: PRESENTATION**

**Lecture 1**: Presentation of the programme, aims and guidelines of the course. Definition of Econometrics and its applications.
SESSION 2: REVIEW OF STATS. & BASIC CONCEPTS IN ECONOMETRICS

Lecture 2: Definition of population, sample, random variable, expected value, sample covariance, sample variance and correlation coefficient.

SESSION 3: ESTIMATOR & ITS PROPERTIES

Lecture 3: Definition of estimator and its properties: unbiasedness, efficiency, consistency and sufficiency.

UNIT 2: SIMPLE LINEAR REGRESSION MODEL (SLRM)

SESSION 4: INTRODUCTION

Lecture 4: The simple linear regression model and its assumptions.

SESSION 5: CLASS

Problem Set 1: Descriptive and correlation analysis.

SESSION 6: COMPUTER CLASS

SPSS 1: Introduction, descriptive and correlation analysis.

SESSION 7: ESTIMATION


SESSION 8: PROPERTIES OF THE REGRESSION COEFFICIENTS


SESSION 9: TRANSFORMATION OF VARIABLES


SESSION 10: MULTIPLE LINEAR REGRESSION MODEL (MLRM)

Lecture 8: Model derivation and interpretation of the estimated coefficients.

SESSION 11: CLASS

Problem Set 2: OLS estimation.

SESSION 12: COMPUTER CLASS

SPSS 2: Estimation of the regression model.
SESSION 13: MID-TERM REVIEW
Lecture 9: Review of the first half of the course (units 1 and 2).

UNIT 3: HYPOTHESIS TESTING
SESSION 14: HYPOTHESIS TESTING IN THE SLRM
Lecture 10: One-tailed test and two-tailed test (normal and Student tests).

SESSION 15: HYPOTHESIS TESTING IN THE SLRM (cont.)
Lecture 11: F-test (Fisher test).

SESSION 16: HYPOTHESIS TESTING IN THE MLRM
Lecture 12: Individual and overall tests.

SESSION 17: HYPOTHESIS TESTING IN THE MLRM (cont.)
Lecture 13: Test for the addition of a group of variables and test for linear restrictions in the coefficients.

SESSION 18: CLASS
Problem Set 3: Hypothesis testing.

SESSION 19: COMPUTER CLASS
SPSS 3: Hypothesis testing

UNIT 4: DUMMY VARIABLES
SESSION 20: DUMMY VARIABLES (DV)
Lecture 14: Definition, application, types and interpretation.

SESSION 21: HYPOTHESIS TESTING WITH DV
Lecture 15: t-test, F-test and Chow test.
SESSION 22: CLASS
Problem Set 4: Dummy variables.
UNIT 5: ESTIMATION PROBLEMS

SESSION 23: CAUSALITY, SPECIFICATION ERRORS & MULTICOLLINEARITY


SESSION 24: HETEROSCEDASTICITY

Lecture 17: Definition, causes and how to detect the problem.

SESSION 25: COMPUTER CLASS

SPSS 4: Dummy variables and validation.

UNIT 6: TIME SERIES

SESSION 26: INTRODUCTION

Lecture 18: Definition, basic concepts and applications.

SESSION 27: AUTOCORRELATION

Lecture 19: Definition, causes and how to detect the problem.

SESSION 28: COMPUTER CLASS

SPSS 5: Project.

SESSION 29: CLASS

Problem Set 5: Estimation problems.

SESSION 30: FINAL REVIEW

Lecture 20: Review of the course.
5 - EVALUATION SYSTEM (ORDINARY AND EXTRAORDINARY)

ORDINARY EVALUATION

Your final grade in the course will be based on a combination of different items that are described in the following table:

| Grading System: |
|-----------------|------------------|
| A. Class participation | 10% |
| B. Problem Sets | 20% |
| C. Mid-term Exam | 15% |
| D. SPSS project | 20% |
| E. Final Exam | 35% |
| TOTAL | 100% |

A. CLASS PARTICIPATION (10%)

Two main criteria will be used in reaching judgment about your class participation:

1-Assistance:
Assistance to class is compulsory.
(1) Students must comply with the 70% attendance rule. Otherwise they will lose their 1st and 2nd chance, and go directly to the 3rd one (they will need to enrol again in this course next academic year).
(2) Punctuality will be taken into consideration when grading this assistance item and the teacher reserves the right to allow attendance to class to those students not being on time.
(3) General attitude and behaviour in class will be also considered. Students affecting the class environment in a negative way will lose points in the assistance grade.

2-Active participation:
Participation in class will be evaluated positively if students:
(1) attain a threshold quantity of contributions that is sufficient for making a reliable assessment of comment quality. Additionally,
(2) participation will be evaluated in quality terms. A high quality comment reveals depth of insight, rigorous use of case evidence, consistency of argument, and realism. A high quality presentation of ideas must consider the relevance and timing of comments, and the flow and content of the ensuing class discussion. It demands comments that are concise and clear, and that are conveyed with a spirit of involvement in the discussion at hand.

B. PROBLEM SETS (20%)

Five Problem Sets will be required during the course. Problem sets can be solved individually or in groups. However, each student is assessed individually. The due dates for each Problem set will be announced in advance. Solutions to Problem Sets have to be submitted individually at the beginning of the class in which the solutions will be discussed. Late submissions are not accepted. The final grade in this item of the evaluation will be the average grade in the five Problem Sets.

C. MID-TERM EXAM (15%)

The mid-term exam will take place around session 15 and will cover Units 1 and 2 of the content of the course. The exam will contain not only theoretical questions based on the knowledge of concepts and mathematical proofs but also practical exercises similar to the ones contained in the Problem Sets.

D. SPSS PROJECT (20%)
Students are also expected to complete a SPSS project and present it in written form. This project will give you the opportunity to reflect on what you have learnt in the computer classes and apply it to some practical problems. This project mainly consists on the estimation and interpretation of a regression model with real data using SPSS software. More details of the project will be provided during the computer classes (5 sessions). It is due at the end of the second semester.

E. FINAL EXAM (35%)

The final exam will take place at the end of the second semester and will cover all the content of the course. The exam will contain not only theoretical questions based on the knowledge of concepts and mathematical proofs but also practical exercises similar to the ones contained in the Problem sets.

EXTRAORDINARY EVALUATION (RETAKE POLICY)

- Each student has 4 chances to pass any given course distributed in two consecutive academic years (regular period and July period).
- Students who do not comply with the 70% attendance rule will lose their 1st and 2nd chance, and go directly to the 3rd one (they will need to enrol again in this course next academic year).
- Grading for July retakes will be subject to the following rules:
  - Students failing the course in the first regular period (grade lower than 5) will have to do a retake in July (except those not complying with the attendance rules, which are banned from this possibility).
  - Dates and location of the July retakes will be posted in advance and will not be changed. Please take this into consideration when planning your summer.
  - The retake will consist on an exam similar to the final exam of the ordinary period of evaluation.
  - There are two grading criteria for the July retakes:
    - 60% of the grade: grade achieved during the period of continuous evaluation (mid-term and final exam are not included) and 40% of the grade: grade in the July extraordinary exam
    - 80% of the grade: grade in the July extraordinary exam and 0% of the grade for the continuous evaluation.
  - The maximum grade that a student may obtain in the retake will be 8 out of 10. Students must choose between the above two options by writing an email to the teacher one week before the date of the July exam.

- Grading for 3rd and 4th retakes will be subject to the following rules:
  - Students failing the course in the extraordinary period (July retake) or in the consecutive period (3rd chance) and those students not complying with the attendance rule in the ordinary period are eligible for an additional retake in the next academic year (they will need to enrol again in this course next academic year).
  - Dates and location of the 3rd and 4th retakes will be posted in advance and will not be changed. Please take this into consideration when planning your academic year.
  - The retake will consist on an exam similar to the final exam of the ordinary period of evaluation.
  - The grading criteria for the 3rd and 4th retakes is the following:
    - 100% of the grade: grade in the retake exam (maximum grade will be 8 out of 10)
6 - USE OF ELECTRONIC DEVICES IN CLASS

Cell phones must be turned off and out of sight during class. Students who do not comply with this rule will lose points in the participation grade.

This subject does not require the use of a laptop in class; nevertheless, if you want to bring your laptop, please contact your professor.