COURSE DESCRIPTION

STATISTICS AND ECONOMETRICS FOR BUSINESS

3RD YEAR 1ST SEMESTER

BUSINESS ADMINISTRATION

IN-CLASS TEACHING

ACADEMIC YEAR 2020/2021

SCHOOL OF BUSINESS & ECONOMICS
## 1. COURSE IDENTIFICATION

### 1.- SUBJECT:

<table>
<thead>
<tr>
<th>Name:</th>
<th>Statistics and Econometrics for Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>b307</td>
</tr>
<tr>
<td>Year (s) course is taught:</td>
<td>Third</td>
</tr>
<tr>
<td>Semester (s) when the course is taught:</td>
<td>First</td>
</tr>
<tr>
<td>Type:</td>
<td>Core</td>
</tr>
<tr>
<td>ECTS of the course:</td>
<td>9</td>
</tr>
<tr>
<td>Hours ECTS:</td>
<td>45</td>
</tr>
<tr>
<td>Language:</td>
<td>Spanish and English</td>
</tr>
<tr>
<td>In-class teaching:</td>
<td>In-class teaching</td>
</tr>
<tr>
<td>Degree (s) in which the course is taught:</td>
<td>Business Administration</td>
</tr>
<tr>
<td>School which the course is taught:</td>
<td>School of Business &amp; Economics</td>
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</table>

### 2.- ORGANIZATION OF THE COURSE:

- **Department:** Applied Mathematics and Statistics
- **Area of knowledge:** Statistics and Operations Research

## 2. LECTURERS OF THE SUBJECT

### 1.- LECTURERS:

<table>
<thead>
<tr>
<th>Instructor in charge</th>
<th>CONTACT</th>
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</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Diego Mondéjar Ruiz</td>
</tr>
<tr>
<td>Phone (ext):</td>
<td>91 456 63 00 (15393)</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:diego.mondejarruiz@ceu.es">diego.mondejarruiz@ceu.es</a></td>
</tr>
<tr>
<td>Office:</td>
<td>0.08B</td>
</tr>
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<table>
<thead>
<tr>
<th>Lecturer(s)</th>
<th>CONTACT</th>
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<tbody>
<tr>
<td>Name:</td>
<td>Roberto Atanes Torres</td>
</tr>
<tr>
<td>Phone (ext):</td>
<td>91 456 63 00 (15358)</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:roberto.atanestorres1@ceu.es">roberto.atanestorres1@ceu.es</a></td>
</tr>
<tr>
<td>Office:</td>
<td>0.04B</td>
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<tr>
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<tbody>
<tr>
<td>Name:</td>
<td>Miguel Córdoba Bueno</td>
</tr>
<tr>
<td>Phone (ext):</td>
<td>91 456 63 00 (15358)</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:corbue@ceu.es">corbue@ceu.es</a></td>
</tr>
<tr>
<td>Office:</td>
<td>0.04B</td>
</tr>
</tbody>
</table>
2.- TUTORIALS:

For any queries students can contact lecturers by e-mail, phone or visiting their office during the teacher’s tutorial times published on the students’ Virtual Campus.

3. COURSE DESCRIPTION

The observed information follows a behaviour which allows generalising the sample behaviour to the represented population. Big Data is flooding our socioeconomic environment, so it is essential to know Statistical Inference in order to understand the current times and having the adequate basis to make predictions and estimations, either temporary or cross-sectional. To take this subject, it is recommendable to have prior knowledge of Descriptive Statistics and Computing Science.

4. COMPETENCIES

1.- COMPETENCIES

<table>
<thead>
<tr>
<th>Basic and General Competencies</th>
<th>Specific Competencies</th>
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</thead>
<tbody>
<tr>
<td>CB1</td>
<td>CE2</td>
</tr>
<tr>
<td>CB2</td>
<td>CE4</td>
</tr>
<tr>
<td>CB3</td>
<td></td>
</tr>
<tr>
<td>CG1</td>
<td></td>
</tr>
</tbody>
</table>

2.- LEARNING OUTCOMES:

Application of appropriate statistical tools to study and analysis of data.
Interpretation of statistical analysis from an economic viewpoint.
To apply the statistical techniques for decision making in risk ambiance within the context of economic research.

5. LEARNING ACTIVITIES

1.- DISTRIBUTION OF STUDENTS’ ASSIGNMENT:

<table>
<thead>
<tr>
<th>Total hours of the course</th>
<th>270</th>
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</table>
### 6. ASSESSMENT OF LEARNING

1. **CLASS ATTENDANCE:**
   
   In order to be eligible for examination by continuous assessment students must attend at least 75% of scheduled class time (attendance sheets will be used), except for students of 4th and 5th course. As students may be absent 25% of the classes, no attenuating circumstances will be accepted for absences.

2. **ASSESSMENT SYSTEM AND CRITERIA:**

   **ASSESSMENT SYSTEM**

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE2</td>
<td>Written test with multiple choice or objective questions</td>
<td>10%</td>
</tr>
<tr>
<td>SE3</td>
<td>Written test with reasoning questions</td>
<td>30%</td>
</tr>
<tr>
<td>SE4</td>
<td>Written test with exercises, problems, etc.</td>
<td>60%</td>
</tr>
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   **ORDINARY EVALUATION (Continuous assessment)**

   Continuous evaluation will be done considering the following:
   
   - Two written examinations: with questions of essay type, test and exercises; each exam will count 25% towards the final grade.
   - A final examination: compulsory exam consisting of problems, essay type questions and test, meant to show knowledge of the topics covered during the semester. The weight of this exam on the final grade will be 50%. To apply the continual evaluation system the student should get a minimum of 3 (over 10) in this exam.

   Class attendance will not be counted in the computation of the final grade. However, a minimum attendance of 75% is required in order to apply the continual evaluation.

   **EXTRAORDINARY EVALUATION**

   A student who does not pass the subject in the Continual Evaluation system can be assessed in the Extraordinary Evaluation. This evaluation is a written exam consisting of problems, essay type questions and test, meant to show knowledge of the topics covered during the semester. The weight of this exam on the final grade will be 100%
1. SUBJECT PROGRAMME:

THEORETICAL:

PART I: STATISTICAL INFERENCES

Unit 1. Sampling theory
- Concept of inference. Statistical inference
- Concept of population, census and sample
- Types of sampling. Simple random sample
- Concept of statistic

Unit 2. Estimation theory
- Concept of estimator. Sample mean, sample variance and sample quasivariance. Characteristics
- Probability distribution of the estimators according to the different types of probability distribution of the population
- Properties of the estimators: unreliability, efficiency, consistency, sufficiency, invariance and robustness

Unit 3. Confidence intervals
- Concept of confidence interval
- Confidence intervals of the population mean in different distributions of population probability
- Confidence intervals for population variance in normal populations
- Application of Chebyshev’s theorem to obtain confidence intervals
- Determination of sample size

Unit 4. Main concepts in hypothesis testing
- Statistical hypothesis
- Types of contrasts
- Errors type I and type II: level of significance and the power of a test
- Critical region

Unit 5. Non-parametric tests
- Contrasts of sample randomness
- Contrasts of population normality
- Contrasts of population distribution
- Contrasts of independence. Contrast of homogeneity

Unit 6. Parametric tests
- Contrasts of significiation
- Contrasts of Neyman-Pearson

PART II: MULTIVARIATE ANALYSIS

Unit 7. Factor Analysis
- Concept and hypothesis of Factor Analysis
- Stages of the Factor Analysis
- Communalities and eigenvalues
- Methods of factor extraction. Principal Components Analysis
- Factor rotation
- Factor Scores
- Interpretation of factors

Unit 8. Clustering
• Concept and types of clustering: qualitative and quantitative
• Methods of clustering
  • Hierarchical: Dendogram
    - Single linkage.
    - Complete linkage
    - Average linkage
    - Ward’s method
    - Centroid’s method
  • Non-hierarchical
    - Secuential
    - Parallel
  • Other methods
• Validation of clutering

Unit 9. Discriminant Analysis
• Fundamentals: Characteristics of variables
• Types of Discriminant Analysis
  • Simple analysis
  • Multiple analysis
• Hypothesis
• Stages of the Discriminant Analysis
• Discriminant function
• Inference and probability in Discriminant Analysis
• Validation of the classification
• Interpretation of the discriminant function

PRACTICAL:
At the end of each theoretical unit, the students will be carried out practices. The teacher will solve a series of problems in class, with the participation of the students. Later, they will have to solve and expose in class another series of problems that will have available in the Portal del Alumno.

8. BIBLIOGRAPHY

1.- ESSENTIAL BIBLIOGRAPHY:

2.- ADDITIONAL BIBLIOGRAPHY:
3.- WEB RESOURCES:

In English:
- Bloomberg: platform with financial information (real-time data, news or analytics).
- Compustat: Database with company data.
- Eurostat: http://epp.eurostat.ec.europa.eu
- Kaggle: https://www.kaggle.com/
- Quandl: https://www.quandl.com/
- The Data and Story Library: http://lib.stat.cmu.edu/DASL/
- Seeing theory: https://seeing-theory.brown.edu/index.html

In Spanish:
- Bank of Spain: https://www.bde.es/bde/es/
- Community of Madrid: http://www.madrid.org
- Learn with Alf: http://aprendeconalf.com
- Madrid City Council: datos.madrid.es/
- SABI: Database with economic and financial information about spanish and portuguese companies.
- Spanish Government: datos.gob.es
- Spanish National Statistics Institute: http://www.ine.es

9. ATTITUDE IN THE CLASSROOM

1.- REGULATIONS

Any irregular act of academic integrity (no reference to cited sources, plagiarism of work or inappropriate use of prohibited information during examinations) or signing the attendance sheet for fellow students not present in class will result in the student not being eligible for continuous assessment and possibly being penalized according to the University regulations.

10. EXCEPTIONAL MEASURES

Should an exceptional situation occur which prevents continuing with face-to-face teaching under the conditions previously established to this end, the University will take appropriate decisions and adopt the necessary measures to guarantee the acquisition of skills and attainment of learning outcomes as established in this Course Unit Guide. This will be done in accordance with the teaching coordination mechanisms included in the Internal Quality Assurance System of each degree.