| Teaching Guide | | | | |
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| Identifying Data | | | | 2017/18 |
| Subject (*) | Statistics I | | Code | 611G02006 |
| Study programme | Grao en Administración e Dirección de Empresas | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Graduate | 2nd four-month period | First | FB | 6 |
| Language | SpanishGalicianEnglish | | | |
| Teaching method | Face-to-face | | | |
| Prerequisites | | | | |
| Department | Economía | | | |
| Coordinador | Sanchez Sellero, Maria del Carmen | E-mail | c.sanchez@udc.es | |
| Lecturers | Garcia-Carro Peña, Beatriz<br>Lado González, Eva Mª<br>Mourelle Espasandin, Estefania<br>Perez Lopez, Jose Benito<br>Sanchez Sellero, Maria del Carmen | E-mail | beatriz.garcia-carro@udc.es<br>eva.lado@udc.es<br>estefania.mourelle@udc.es<br>benito.perez@udc.es<br>c.sanchez@udc.es | |
| Web | | | | |
| General description | In the first part of the subject, the aim is to learn and understand the basic concepts on Descriptive Statistics, Time Series and Index Numbers. In the second part, the objective is to learn and understand the essential concepts on Probability Calculus. | | | |

| Study programme competences / results | |
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| Code | Study programme competences / results |
| A4 | Elaborate advisory reports on specific situations of companies and markets |
| A6 | Identify the relevant sources of economic information and to interpret the content. |
| A7 | Understand economic institutions as a result and application of theoretical or formal representations which explain the evolution of the economy. |
| A8 | Derive, based on from basic information, relevant data unrecognizable by non-professionals. |
| A10 | Read and communicate in a professional environment at a basic level in more than one language, particularly in English |
| A11 | To analyze the problems of the firm based on management technical tools and professional criteria |
| A12 | Communicate fluently in their environment and work by teams |
| B1 | CB1-The students must demonstrate knowledge and understanding in a field of study that part of the basis of general secondary education, although it is supported by advanced textbooks, and also includes some aspects that imply knowledge of the forefront of their field of study |
| B2 | CB2 - The students can apply their knowledge to their work or vocation in a professional way and have competences typically demostrated by means of the elaboration and defense of arguments and solving problems within their area of work |
| B3 | CB3- The students have the ability to gather and interpret relevant data (usually within their field of study) to issue evaluations that include reflection on relevant social, scientific or ethical |
| B4 | CB4-Communicate information, ideas, problems and solutions to an audience both skilled and unskilled |
| B5 | CB5-Develop skills needed to undertake further studies learning with a high degree of autonomy |
| B6 | CG1-Perform duties of management, advice and evaluation in business organizations |
| B7 | CG2-Know how to use the concepts and techniques used in the various functional areas of the company and understand the relationships between them and with the overall objectives of the organization |
| B10 | CG5-Respect the fundamental and equal rights for men and women, promoting respect of human rights and the principles of equal opportunities, non-discrimination and universal accessibility for people with disabilities. |
| C1 | Express correctly, both orally and in writing, in the official languages of the autonomous region |
| C4 | To be trained for the exercise of citizenship open, educated, critical, committed, democratic, capable of analyzing reality and diagnose problems, formulate and implement knowledge-based solutions oriented to the common good |
| C5 | Understand the importance of entrepreneurial culture and know the means and resources available to entrepreneurs |

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| C6 | Assess critically the knowledge, technology and information available to solve the problems and take valuable decisions |
| C7 | Assume as professionals and citizens the importance of learning throughout life. |
| C8 | Assess the importance of research, innovation and technological development in the economic and cultural progress of society. |

| Learning outcomes | | | |
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| Learning outcomes | Study programme competences / results | | |
| Knowing and understanding the fundamentals on Data Analysis and Descriptive Statistics. | A4<br>A10<br>A11<br>A12 | B1<br>B2 | C1<br>C4<br>C5<br>C6<br>C7<br>C8 |
| Knowing and understanding the handling of basic techniques for Data Analysis and Descriptive Statistics. | A4<br>A6<br>A7<br>A8<br>A10 | B6<br>B10 | C1<br>C5<br>C6<br>C7<br>C8 |
| Knowing and understanding the fundamentals on Probability Calculus. | A4 | B3<br>B4 | C1<br>C4<br>C5<br>C6<br>C7<br>C8 |
| Handling the basic concepts on Probability Calculus. | A4 | B5<br>B7 | C8 |

| Contents | |
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| Topic | Sub-topic |
| LESSON 1: ONE-DIMENSIONAL FREQUENCY DISTRIBUTIONS | 1.1. Statistics: concept and contents<br>1.2. The statistical analysis<br>1.3. Frequency distribution: concept and graphs<br>1.4. Moments in one-dimensional distributions<br>1.5. Measures of central tendency and position<br>1.6. Measures of dispersion or variability<br>1.7. Measures of shape: measures of skewness and measures of kurtosis<br>1.8. Outliers: detection and effects |
| LESSON 2: TWO-DIMENSIONAL FREQUENCY DISTRIBUTIONS | 2.1. Two-dimensional frequency distributions<br>2.2. Moments in two-dimensional distributions<br>2.3. Single regressions |
| LESSON 3: TIME SERIES | 3.1. Time series: concept and graphs<br>3.2. Decomposition of a time series: components and scheme<br>3.3. Trend analysis<br>3.4. Seasonality analysis. Seasonally adjusted time series<br>3.5. Variation rates analysis in a time series context |

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| LESSON 4: INDEX NUMBERS | 4.1. Introduction<br>4.2. Composite indexes<br>4.3. Application of index numbers<br>4.4. Main indexes in the Spanish economy |
| LESSON 5: INTRODUCTION TO PROBABILITY CALCULUS | 5.1. Deterministic phenomena and random phenomena<br>5.2. Probability: definition and postulates<br>5.3. Conditional probability. Independence of events<br>5.4. Probability theorems |
| LESSON 6: ONE-DIMENSIONAL AND TWO-DIMENSIONAL RANDOM VARIABLE | 6.1. One-dimensional random variable<br>6.2. Discrete random variables: probability distribution function and cumulative probability distribution<br>6.3. Continuous random variables: density functions and cumulative distribution<br>6.4. Characteristics of one-dimensional random variables<br>6.5. Introduction to the two-dimensional random variable |
| LESSON 7: RANDOM VARIABLES: MAIN DISTRIBUTIONS | 7.1. Bernoulli distribution<br>7.2. Binomial distribution<br>7.3. Poisson distribution<br>7.4. Uniform distribution<br>7.5. Normal distribution<br>7.6. Distributions derived from the Normal distribution |
| LESSON 8: CONVERGENCE AND CENTRAL LIMIT THEOREM | 8.1. Convergence in probability<br>8.2. Convergence in distribution<br>8.3. Central Limit Theorem |

| Planning | | | | |
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| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A7 B1 B2 B3 B4 | 17 | 34 | 51 |
| Workshop | A4 A6 A11 B5 B6 | 15 | 30 | 45 |
| ICT practicals | A8 C4 | 3 | 6 | 9 |
| Mixed objective/subjective test | A4 A6 B7 | 4 | 8 | 12 |
| Collaborative learning | A12 B10 C1 | 4 | 8 | 12 |
| Long answer / essay questions | C1 C6 C7 | 3 | 6 | 9 |
| Seminar | A11 | 4 | 0 | 4 |
| Speaking test | A10 C5 C6 C7 C8 | 2 | 4 | 6 |
| Personalized attention | | 2 | 0 | 2 |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. | | | | |

| Methodologies | |
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| Methodologies | Description |
| Guest lecture / keynote speech | Lesson given by the teacher that may have different formats (theory, problems and/or general examples, general guidelines of the subject, etc.). The teacher might use audiovisual and computer means. In addition, s/he can introduce some questions posed to the students.<br>The objective is to introduce the student into the concepts of the subject, in order to transmit the knowledge base the student needs to start his/her work and his/her learning. |
| Workshop | The main objective in these classes will be the realization of especially practical tasks, with the teacher's support and supervision: proposal and solution of applications from the theory, proposal and supervision of works, problems, exercises, presentations, expositions, debates and comments on works, solving doubts about the theory, etc..<br>It is also possible that the teacher explains some concepts, especially for clarifying their application, or in any case as a mere comment about the keynote speech. |

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| ICT practicals | The main objective in these classes will be the development of especially practical tasks, with the teacher's support and supervision. The computer is employed in these classes, which are reserved for lessons or concepts where the intensity of the calculations needs the computer tool. In addition, the students are introduced into the work with Statistics by using computer means. |
| Mixed objective/subjective test | Written test used for evaluating the learning. This test may consist of a combination of different formats of questions, as exercises, test, etc.. The final objetive is that the student develops his/her capacity of reasoning and the teacher has a tool for assessing the knowledge, skills and abilities of the students.<br>Two mixed test will be carried out: the first one covers the lessons on Descriptive Statistics, Time series and Index numbers; the second one corresponds to the lessons on Probability Calculus. |
| Collaborative learning | Work in groups of students in order to solve the tasks assigned by the teacher to optimize their own learning and that of the rest of classmates.<br>Before handling the work in groups, several classes will be dedicated to pose the doubts and/or difficulties found when doing the work. In this manner, a debate is created among the students, their classmates and the teacher, who encourages the interrelation in the work and the critical spirit. |
| Long answer / essay questions | Written test with answers of certain amplitude. This test can be a combination of exercises belonging to different lessons, with short questions and/or multiple choice questions.<br>This test allows for measuring the knowledge the student is acquiring and, in this manner, analyzing his/her evolution in the subject. |
| Seminar | Technique for working in groups. Each group will be divided into two sub-groups of students.<br>There will be tutorial sessions with a total duration of 4 hours per student distributed along several sessions. These sessions may be used for developing the practical tasks supported by TICs, to solve doubts related to problems or to prepare the exam. The place and the hours for these sessions will be announced sufficiently in advance in class. |
| Speaking test | Activity designed to respond orally to questions, specially assessing the capacity of reasoning. It allows for measuring different abilities of the student. This activity may also include the realization and exposition of practical exercises (type I and type II).<br>The exposition will be individual, although its realization and evolution can combine individual cases and/or cases in groups.<br>Type I exercises: individual exercises that the students will develop along the different classes at the teacher's proposal.<br>Type II exercises: exercises in groups based on bulletins provided by the teachers; although they do not have to be identical, they will be of the same style.<br>The participation of the student in class will be evaluated in this section. The selection of the type of activity or activities to carry out will be subject to the teacher's criterion. |

| Personalized attention | |
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| **Methodologies** | **Description** |
| Workshop<br>Collaborative learning | Time reserved for attending and solving the doubts of the students, either in an individual manner or in small groups. |

| Assessment | | | |
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| **Methodologies** | **Competencies / Results** | **Description** | **Qualification** |
| Mixed objective/subjective test | A4 A6 B7 | For the purpose of motivating the continued and well-distributed work of the student, the teacher will carry out a first mixed test (first assessment test). This exam covers the lessons on Descriptive Statistics, Time series and Index numbers (lessons 1 to 4), and it represents the 40% of the final mark.<br>The second mixed test (second assessment exam) corresponds to the lessons on Probability Calculus (lessons 5 to 8) and it is done in the same date as the final (official) exam; it represents the 30% of the final mark. | 70 |

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| Speaking test | A10 C5 C6 C7 C8 | This activity allows for assessing the student's participation in class. The type/s of speaking test will be under the teacher's criterion. The activities susceptible to be assessed would be: attendance to class, the answer to questions posed by the teacher, the realization and exposition of practical exercises in class (either individual or in groups) or any other kind of activity designed for the initial purpose. | 10 |
| Collaborative learning | A12 B10 C1 | It constitutes the realization of the work in groups.<br>The work consists of learning how to deal with a spreadsheet in order to apply the statistical techniques developed in class. The work will be evaluated in the computer room. The teacher might consider the attendance to the training sessions in the computer room as a part of the work.<br>The work will be assessed following the teacher's criterion. | 10 |
| Long answer / essay questions | C1 C6 C7 | They will be developed in the second part of the subject. It is a written exam with questions of certain amplitude. It might include short questions and/or multiple choice questions. | 10 |

**Assessment comments**

The exams and evaluation activities of the subject will only be carried out according to the planned dates, except for an exceptional cause, under the teacher's criterion. The dates for developing the mixed test and the long answer questions will be announced in class sufficiently in advance.
The mixed tests (assessment tests) are considered essential for the evaluation; for this reason, it is necessary to obtain at least a 40% of the total mark in each one of them, that is, a mark of 4 points, so as to compute with the remaining evaluation activities.
The first assessment exam will be considered as "passed" conditioned to obtaing a mark equal or higher than 4 points. If this first exam is "passed", in the final (official) exam it will only be necessary to do the second assessment exam.
The students who have not reached the minimum mark in the mixed tests (assessment tests) but with a mark higher than 5 points in the global count of the evaluation will not have passed the subject and their mark in the final act will be 4.5 points.
The subject will be passed when at least five points (or more) were obtained in the global count of the subject, conditioned to have reached the minimum mark in the assessment tests.
For the students who have "passed" one part of the subject by means of a mixed test (assessment test): this fact will only have validity for the current academic year. If a student with one part of the subject "passed" is not able to pass the whole subject in the opportunities of June or July, his/her final mark will be "failing" and he/she will have to re-take the whole subject in the folowing academic years.
Those students interested in raising their mark can take the final exam, with prior notification to the teacher and his/her consent.
Evaluation criteria for the second opportunity will be the same as the one applied in the first opportunity (it means a 70% for the exam and a 30% for the mark obtained in the continuous evaluation).
There are specific conditions for the early call opportunity (art. 19 Normas de Avaliación, Revisión e Reclamacións das Cualificacións dos Estudos de Grao e Mestrado Universitario). This exam accounts for 100% of final mark.
Part-time students will be evaluated with the same criteria than full-time students.
With respect to the "Absent" mark and according to the regulation approved by the Faculty Board, the people that only take part in evaluation activities whose total weight is lower than the 20% of the final mark will get "Absent" as their final mark.
Following the rules approved by the Faculty Board, it is forbidden to enter the classroom where the evaluation activities are being held with any device that allows for communicating with the outside and/or information storage.

**Sources of information**

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|---|---|
| **Basic** | - Casas Sánchez, J. M. y otros (2006). Ejercicios de Estadística Descriptiva y probabilidad. Madrid, Pirámide<br>- Martín-Pliego, F. J., Montero, J. M. y Ruiz-Maya, L. (2006). Problemas de Probabilidad. Madrid, Thomson<br>- Martín-Pliego, F. J. y Ruiz-Maya, L. (2006). Fundamentos de Probabilidad. Madrid, Thomson<br>- Esteban García, J. y otros (2004). Estadística Descriptiva y nociones de Probabilidad. Madrid, Thomson<br>- Montiel, A. M., Rius, F. y Barón, F. J. (1997). Elementos básicos de Estadística Económica y Empresarial. Madrid, Prentice Hall<br>- Levine, D. M. et al. (2011). Statistics for managers using MS Excel, 6/E. Prentice Hall<br>- Levine, D. M., Krehbiel, T. C. and Berenson, M. L. (2010 (5th ed.)). Business Statistics: A first course. Upper Saddle River, Pearson Education<br>- Newbold, P., Carlson, W. and Thorne, B. (2010). Statistics for business and economics, 7/E. Pearson/Prentice Hall<br>Os tres últimos libros servirán como referencia bibliográfica para o grupo de inglés (grupo A) desta materia. |
| **Complementary** | - García-Carro Peña, B., Sánchez Sellero, M. C. y Martínez Filgueira, X. M. (2003). Curso práctico de Probabilidad con aplicaciones económicas. Universidad da Coruña<br>- Cao Abad, R. y otros (2001). Introducción a la Estadística y sus aplicaciones. Madrid, Pirámide<br>- Sánz, J. A., Bedate, A., Rivas, A. y González, J. (1996). Problemas de Estadística Descriptiva Empresarial. Madrid, Ariel<br>- Tomeo Perucha, V. y Uña Juárez, I. (2009). Estadística Descriptiva. Madrid, Garceta<br>- Uña Juárez, I., San Martín Moreno, J. y Tomeo Perucha, V. (2010). Cálculo de Probabilidades. Madrid, Garceta<br>- Benítez Márquez, M.D. y otros (2012). Estadística Descriptiva. Madrid, McGraw-Hill |

| **Recommendations** |
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| **Subjects that it is recommended to have taken before** |
| Mathematics I/611G02009 |
| **Subjects that are recommended to be taken simultaneously** |
| Mathematics II/611G02010 |
| **Subjects that continue the syllabus** |
| Statistics and Introduction to Econometrics/611G02014 |
| **Other comments** |
| At the beginning of the second semester, supplementary and explanatory rules will be provided to all the groups (the English group included). The group A of this subject will be entirely taught in English. Evaluation criteria for this group will be the same than those determined for the rest of the groups. The support material will be available in the virtual platform of the subject (Moodle) for all groups. |