



Universidad  
de Alcalá

# COURSE GUIDE

## ECONOMIC STATISTICS

**Degree in Economics and  
International Business  
University of Alcalá**

**Academic Year 2022/2023  
First Year – Second Term**

## GENERAL INFORMATION

Subject:	Economic Statistics
Code:	363000
Degree Title:	Economics and International Business
Department and Area	Department of Economics Quantitative Methods for Economics and Business
Module type:	Basic Training
ECTS credits:	9 ECTS
Year and Term:	First year, second term
Teaching Staff:	<ul style="list-style-type: none"><li>• Javier Bas (<a href="mailto:javier.bas@uah.es">javier.bas@uah.es</a>)</li><li>• Eva Senra Díaz (<a href="mailto:eva.senra@uah.es">eva.senra@uah.es</a>)</li></ul>
Staff Consultation Hours:	Will be published at the beginning of term
Language of Teaching:	English

## 1. MODULE DESCRIPTION

Economic Statistics is taught in the first year of the degree in International Business and Economics, in the second term. This basic course introduces students to the fundamental concepts of Statistics from the practical point of view of data analysis. As this is a foundation course, the only requirement is to have studied mathematics at high school level or equivalent.

This module deals with the basic concepts of statistics that will be applied generally to support and develop other topics covered throughout this degree. The material covered will be used to analyse and interpret published statistical information relating to different aspects of economics. The student will also learn to ascertain how to draw general conclusions regarding economics. Furthermore, the material covered will help the student to develop advanced quantitative analysis techniques and methodologies that will be dealt with in more depth in postgraduate studies.

Studying economic statistics is compulsory and is of the utmost importance as it will be applied to other topics covered later in this degree. The knowledge gained will allow the student to explore later topics in more depth using the same statistical methodology.

Requirements: Basic knowledge of calculus, and analytical and graphical command of variable functions at high school level or equivalent.

## 2. LEARNING OUTCOMES

The student is expected to develop the following skills through studying this module. These will be assessed throughout the term, see below for details of assessment methods.

### Basic skills

CB1. That students have demonstrated to have acquired sufficient knowledge in an area of study which usually starts from the base obtained from general secondary school education, knowledge which is generally supported by advanced textbooks but also includes some aspects incorporating knowledge from the forefront of your field of study.

CB2. That students have the ability to apply their knowledge to their work in a professional way and possess the skills necessary to defend questions which arise and to solve problems within their study area.

CB3. That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflecting on relevant issues of a social, scientific or ethical nature.

CB4. That students can transmit information, ideas, problems and solutions to both specialized and non-specialized audiences.

CB5. That students have developed those learning skills necessary to undertake further studies with a high level of autonomy.

### General skills

CG1. Acquire the negotiation skills used in international institutions and companies.

CG2. Ability to analyse data and reports specifically from international sources (companies, international institutions such as the IMF, the WTO or the Bank for International Settlements).

CG3. Interest in updating the permanent requirements of organization and planning techniques for international business and public activities.

CG4. Ability to assess the multiplicity of social, political, technical, etc. factors that converge in international business and institutional decisions.

CG5. Acquire current ethical criteria subject to continuous updating in different countries through anti-corruption codes, international charters of economic rights, etc.

CG6. Ability to join interdisciplinary teams made up of people from very different countries and backgrounds.

CG7. Scientific and professional curiosity for the continuous use of analytical and conceptual instruments typically used in international economic relations.

CG8. Motivation to achieve quality in professional practice and in its development.

CG9. Curiosity for learning new techniques and instruments that are continually being introduced in the international world.

CG10. Written and oral expression skills that can be used in different settings.

CG11. Ability to use the English language to search for information and use resources in that language, and in the preparation and presentation of academic activities.

### Transversal skills

CT1. Acquire techniques and skills related to professional practice, including the application of the appropriate deontological regulations.

CT2. Knowledge of the resources available to access information and to use them effectively.

CT3. Acquire oral and written communication skills in modern languages both in professional settings and in other contexts.

CT4. Understand the ideas and arguments that are expressed in a foreign language, both written and orally, in everyday situations and in professional and specialized contexts.

CT5. Manage proficiently the digital tools most frequently used in a professional environment (word processor, databases and spreadsheets) and an advanced level of use in electronic communication, navigation and data search programs (email and Internet).

CT6. Design presentations using computer programs and the ability to structure information appropriately and transmit it clearly and efficiently, with a basic understanding of operating data transmission networks.

CT7. Knowledge of the main management techniques, conflict resolution, job selection and team motivation in a working environment with the use of effective strategies in time management.

CT8. Plan and develop research in a specific field of study, in accordance with its own academic and scientific requirements.

CT9. Knowledge of the history of the University of Alcalá, the functioning of European institutions and the historical, social, economic and cultural reality of European and Iberian American countries.

### Subject-specific skills:

CE9.- Reinforce and/or acquire Mathematical analysis capacities for Economics.

CE10.- Use and apply mathematical language as a global vehicle to express complex concepts in modern economic analysis.

CE11.- Acquire the basic knowledge of Descriptive Statistics, Probability and Statistical Inference.

CE12.- Endorse capabilities in the field of International Economics to describe and interpret statistical data, correctly applying punctual and interval confidence estimation methods.

Learning outcomes:

This subject provides the most elementary statistical concepts that will be employed in the rest of the subjects in the Degree: either to analyse and interpret published statistical information relative to different aspects in Economics; or to describe and observed analyse microdata and measure the degree of confidence of a generalization of their conclusions; or to act as support to the development of more sophisticated quantitative techniques that will be studied in other subjects later.

### 3. SYLLABUS

Blocks	Total number of classes, credits or hours
<p><b>I. Description of statistical variables</b> Following a brief introduction to the content and the basic concepts of random phenomena that will be studied throughout the module, the student will learn the tabulation, representation and concise description of one-dimensional statistical micro-data, focusing on aspects of economic interest, such as concentration and two-dimensional statistical data.</p>	See itinerary and timetable below
<p><b>II. Descriptive models for the analysis of statistical dependence and the dynamics of economic phenomena.</b> The next block will begin with the description of statistical dependence relationships between variables by means of correlation. The student will then learn how to describe the functional form of potential dependence relationships through descriptive regression techniques. The description and analysis of the temporal evolution of random phenomena will be studied from various perspectives as it is of utmost importance in economic activity. Firstly, it will be studied from the perspective of descriptive decomposition techniques in the one-dimensional time series. Secondly, it will be studied from the perspective of its application for prediction and methodology of indices when dealing with complex stochastic phenomena.</p>	See itinerary and timetable below
<p><b>III. Random phenomena, theory of probability and statistical inference</b> A brief introduction to the Theory of Probability is given as a foundation for the population study of stochastic phenomena that will be addressed throughout this module. In this introduction, the student will revise events, probability, random variables and their probability distribution and essential characteristics. They will study the basic Binomial, Poisson and Normal population models which can accurately reproduce a large number of common stochastic behaviour patterns in the economic sphere. Lastly, the student will be given a brief introduction to sampling and estimation theories as well as statistical and estimation hypotheses before studying and applying estimation processes (point and interval estimation). Statistical hypothesis testing will also be studied to make inferences on the mean value of a variable and to calculate the proportion of binary variables.</p>	See itinerary and timetable below

The content of this module will be presented in a practical way that can be applied to real-world economic situations and agents.

## Itinerary

<b><u>PART I</u></b>	<b><u>Description of one-dimensional and two-dimensional statistical variables</u></b>	
<b>Lesson 1</b>	INTRODUCTION TO STATISTICS	<p>Statistics and random phenomena. Population, elements and characters. Methods of observation. Measuring the Characters: Variables and measure scales. Steps in a Statistical Study. Qualitative and Quantitative Data. Tables. Frequency distributions: absolute, relative, accumulated. Graphs.</p>
<b>Lesson 2</b>	DESCRIPTION OF UNIVARIATE DATA SETS (I)	<p>Location Measures. Non-central tendency measures. Measures of central tendency.</p>
<b>Lesson 3</b>	DESCRIPTION OF UNIVARIATE DATA SETS (II)	<p>Variability Measures. Moments. Measures of Shape. Graphical Summary: The box and whiskers plot. Concentration measures. Transformation of Variables.</p>
<b><u>PART II</u></b>	<b><u>Descriptive models for analyzing statistical dependence and the dynamics of economic phenomena</u></b>	
<b>Lesson 4</b>	2-DIMENSIONAL STATISTICS AND STATISTICAL DEPENDENCE	<p>Information of a two-way table. Two-way tables: correlation and contingency tables. Marginal Frequency distributions. Conditional Frequency distributions. Moments in two-way tables Statistical independence.</p>
<b>Lesson 5</b>	REGRESSION AND CORRELATION	<p>Introduction to dependence modelling. Least-square regression. Correlation: degree of intensity in the dependence relationship. Forecasting with the linear model. Introduction to non-linear regression.</p>
<b>Lesson 6</b>	TIME SERIES DESCRIPTIVE ANALYSIS	<p>Introduction to the dynamic characteristics of variables. Time Series components. Models. Methods to compute the trend. Methods to compute the seasonal variations. Forecasting. Seasonal adjustment. Rates of growth.</p>
<b>Lesson 7</b>	INDEX NUMBERS (I)	<p>Introduction to the analysis of complex phenomena dynamics. Simple index numbers. Non-weighted composite index numbers Weighted composite index numbers: Laspeyres and Paasche index numbers. The elaboration of index numbers by groups. Variation rate, effect and share.</p>

<b>Lesson 8</b>	INDEX NUMBERS (II)	Base shifting. Renewal and linking of two series. Value index numbers and deflating. Chain index numbers. The Consumer Price Index (CPI).
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<b><i>PART III</i></b>	<b><i>Random Phenomena. Theory of Probability and Statistical Inference</i></b>	
<b>Lesson 9</b>	RANDOM PHENOMENA AND PROBABILITY MODELS	Random phenomena. Events and operations with events. The axiomatic definition of probability and the assignment of probabilities to events. Conditional probability. Independence. Law of Total Probability and Bayes Theorem.
<b>Lesson 10</b>	RANDOM VARIABLES AND FUNDAMENTAL CHARACTERISTICS	Introduction. Random variable. Distribution Function of a random variable. Discrete one-dimensional random variable. Continuous one-dimensional random variable. Characteristics of the random variables: Mean and variance. Standardization of a random variable. Introduction to two-dimensional random variables.
<b>Lesson 11</b>	MAIN PROBABILITY DISTRIBUTIONS	Introduction Main discrete distributions: Bernoulli, Binomial and Poisson distributions. Main continuous distributions: Normal distribution. Central Limit Theorem.
<b>Lesson 12</b>	INTRODUCTION TO ESTIMATION	Populations, parameters, samples and estimators. Desirable properties for point estimators. Main point estimators and their characteristics. Point estimation in normal populations. Point estimation with big samples. Introduction to confidence intervals. Most common confidence intervals.
<b>Lesson 13</b>	INTRODUCTION TO HYPOTHESIS TESTING	Introduction to hypothesis testing. Test statistic and its sampling distribution. Rejection and acceptance regions. Typical errors in hypothesis testing. Steps to make a test. Most common hypothesis tests.

## TIMETABLE

(Timetable is approximate and will vary according to the teaching calendar)

Lessons will take the form of group seminars (all students on the course), tutorials (small group classes) and practical exercises.

Week	Content
<b>1</b>	Lesson 1: INTRODUCTION TO STATISTICS Group tutorial/seminar: Basic required foundation knowledge. Practical exercise: Introduction to using spreadsheets.
<b>2</b>	Lesson 2: DESCRIPTION OF UNIVARIATE DATA SETS (Part I) Practical exercise: Tables and graphs of discrete statistical variables and attributes. Practical exercise: Tables and graphs of continuous statistical variables and attributes.
<b>3</b>	Lesson 3: DESCRIPTION OF UNIVARIATE DATA SETS (Part II) Practical: Description of discrete attributes and variables. Practical exercise: Averages.
<b>4</b>	Lesson 4: 2-DIMENSIONAL STATISTICS AND STATISTICAL DEPENDENCE Practical exercise: Description of continuous variables: Measures of concentration.
<b>5</b>	Lesson 5: REGRESSION AND CORRELATION Practical exercise: Two-dimensional tabulation and description of marginal and conditional distributions. Practical exercise: Linear dependence and regression. Group seminar/tutorial (lessons 1-4).
<b>6</b>	Lesson 6: TIME SERIES DESCRIPTIVE ANALYSIS Test 1- Written test on lessons 1-4 (part of continuous assessment). Practical exercise: Regression and correlation.
<b>7</b>	Lesson 7: INDEX NUMBERS (Part I) Practical exercise: Time series: Calculating trends and seasonal component. Practical exercise: Time series: prediction, seasonal adjustment and evolution rates.
<b>8</b>	Lesson 8: INDEX NUMBERS (Part II) Practical exercise: Index calculation. Practical exercise: group indices and analysis of index variation. Group seminar/tutorial (Lessons 5-8).
<b>9</b>	Lesson 9: RANDOM PHENOMENA AND PROBABILITY MODELS Practical exercise: Basis change, time series link and deflation. Practical exercise: modelling events, operations of events and calculating probability Seminar/ Group tutorial (Lessons 1-8)
<b>10</b>	Test 2- Written test on lessons 1-8 (part of continuous assessment). Practical exercise: Assigning probability and calculus applied to probability.
<b>11</b>	Lesson 10: RANDOM VARIABLES AND FUNDAMENTAL CHARACTERISTICS Practical exercise: Characteristics of one-dimensional random variables. Practical exercise: Calculating probabilities and quantiles using tables and spreadsheets.
<b>12</b>	Lesson 11: MAIN PROBABILITY DISTRIBUTIONS Practical exercise: Normal distribution. Practical exercise: Binomial and Poisson distributions.
<b>13</b>	Lesson 12: INTRODUCTION TO ESTIMATION Practical exercise: Point and confidence interval estimation. Seminar / group tutorial (Lessons 9-12).
<b>14</b>	Lesson 13: INTRODUCTION TO HYPOTHESIS TESTING Practical exercise: <u>Parametric tests of hypothesis for the mean and proportion</u> Seminar/group tutorial: (Lessons 1-13).
<b>15</b>	Test 3- Written test on lessons 1-13 (part of continuous assessment) + final exam (during examination period).



## 4. LEARNING AND TEACHING METHODS

### 4.1. Distribution of credits

72 contact hours <sup>1</sup>	Theory classes: 19.5 hours (thirteen 90-minute lessons) Practical classes: 34.5 hours (twenty-three 90-minute lessons) Group seminars + group tutorials: 9 hours (six 90-minute lessons) Tests: 6.5 hours (3 tests lasting 90, 120 and 180 minutes respectively) ECTS tutorials: 2.5 hours
Independent study: 153 hours	
Total hours of study: 225 hours	

### 4.2. Teaching methods, materials and resources

Practical Classes to solve exercises and empirical applications of the theoretical contents	<ul style="list-style-type: none"> <li>Classes are taught in various formats, including lectures and interactive seminars. In lectures, problem-solving methods are explained. The student will solve economic case studies by applying the theoretical concepts covered in the module. In seminars, the student will have the opportunity to contribute to problem-solving and discuss the methods used.</li> <li>Lessons are taught in small groups using the overhead projector, whiteboard and computer spreadsheets.</li> <li>The bibliography given below should be used for homework tasks related to these lessons. Additional relevant ad-hoc materials is also provided on the university virtual learning platform.</li> </ul>
Applied assignments, presentations and exercises	<ul style="list-style-type: none"> <li>Throughout the term the student must do various applied assignments covering a range of topics studied in this module. They will analyse micro-data using computer technology</li> </ul>
Practical small group seminars + group tutorials	<ul style="list-style-type: none"> <li>The practical assignments students must do are discussed in small-group seminars. Students must also attend group tutorials in which the tutor addresses and directs the learning process as well as clarifying any doubts students have and giving advice about tests students must sit as part of continuous assessment.</li> <li>Lessons are taught in small groups. The overhead projector, whiteboard and computer spreadsheets are used</li> </ul>
Reading, analysis and interpretation of articles, books and different	<ul style="list-style-type: none"> <li>Students complement the material with the reading, analysis and interpretation of additional material</li> </ul>

<sup>1</sup> In case of restrictions of physical presence in the classroom imposed through health sanitary authorities, the University of Alcalá guarantees the full achievement of the learning skills by online teaching and evaluation. However, physical presence would be resumed as soon as the restrictions were eased.

documents	
Debate on a proposed topic	<ul style="list-style-type: none"> <li>Individual or group work the student has to do, to acquire and assimilate theoretical and applied concepts, and the ability to communicate</li> </ul>
Looking for information and employment of electronic resources (web pages, online dictionaries, ...)	<ul style="list-style-type: none"> <li>We will collaborate with the CRAI-Library professionals so that the students carry out an activity that develops the informational competences in the use and management of the information</li> </ul>
Seminars, workshops, conferences, ...	<ul style="list-style-type: none"> <li>Within the format of seminars, workshops and conferences, contents are reinforced</li> </ul>
Attendance to the students individually or in a group to celebrate tutorials, to follow them	<ul style="list-style-type: none"> <li>During the course, the students will be attended individually or by groups to make tutorials</li> </ul>

We will collaborate with the CRAI-Library professionals so that the students carry out an activity that develops the informational competences in the use and management of the information. As agreed at the last Faculty Meeting on March 11, 2019, it is important that a university student has the necessary information skills, and it is appropriate that this training is provided by the Library.

## 5. ASSESSMENT: Assessment methods, marking criteria and grading scale

### **IMPORTANT:**

The following instructions explain the assessment methods used in this course. Please, note that **the assessment system will depend on the teaching staff and to the number of students per group. Students will be duly informed at the beginning of term.**

## **Standard assessment procedure**

### **A. Continuous assessment:**

The student will usually adopt the process of continuous assessment. If this is unsuitable due to extenuating circumstances, the student may be allowed to accomplish a single final exam instead, depending on approval from the Dean of the School. See section B below for details about this final exam. This agrees with the University of Alcalá's "Regulations for assessment", dated 24th March 2011.

To pass continuous assessment, the student must perform the following: attend classes, actively participate in class, solve cases studies and applied tasks (individual and group tasks) and take theoretical tests throughout the term. The student must successfully complete at least 75% of the tasks set during the term.

Subject-specific skills will be assessed in the following three ways:

- Theory: Assessment of the student's knowledge of theory content.
- Theory in practice: Assessment of the student's ability to select, adapt and empirically apply statistical instruments taught in theory classes.

- **Application:** Assessment of the student's ability to adapt and apply course material to solve practical problems using real-world data and ICT.

The student must take written tests throughout the term as part of the continuous assessment process, as detailed in the module timetable. These tests assess the material covered up until that date and last approximately the same time as a theory lesson. The maximum duration of the final exam is 3 hours.

- **Assessment criteria: Theoretical dimension of course-specific skills (worth 30% of final score)**
  - The theory section of the written mid-term tests consists of:
    - Multiple choice questions. For each wrong answer, 50% of the mark for that question is deducted; and/or
    - Theoretical essay questions: The student must give and defend their opinion. Answers must be short as space may be limited.
- **Assessment criteria: Theoretical-practice dimension of course-specific skills (worth 45% of final score)**
  - In written mid-term tests, there is clearly defined 'theory in practice' section that consists of theoretical-practical exercises like those completed in class.
- **Assessment criteria: Applied course-specific skills (worth 20% of final score)**
  - Throughout the term the student must carry out various applied tasks and/or resolve case studies using computer technology. This assesses the student's ability to apply these skills.
- **Assessment criteria: General skills (worth 5% of final grade)**
  - Throughout the term the tutor will observe and evaluate the students' participation in classes and their general performance in tests and other activities.

The student must obtain at least 30% in each of the above continuously assessed areas to pass the course. The final grade will be calculated from the weighted average of points obtained in each of the aforementioned skill areas. Zero points will be given for any assignment or test that has not been completed. The student must obtain at least 50% of the maximum possible overall grade to pass.

## **B. Final Exam**

If extenuating circumstances prevent any student from following the continuous assessment process and he/she wishes to be assessed by a final exam instead, he/she must submit a written request to the Dean of the School of Economics during the first two weeks of the term explaining why continuous assessment is unsuitable for him/her. Acceptable reasons for this that do not require further investigation include doing an internship, work obligations, family obligations, health reasons and disabilities, among others. This is in accordance with article 3.2 of the University of Alcalá's "Regulations of Assessment", published on the 24th March 2011. In this case, the student will take a final exam lasting up to 3 hours. The following assessment criteria will be used:

- **Assessment criteria: Theory (worth 30% of final grade)**
  - The theory section of the final exam consists of the following:
    - Multiple choice questions. For each wrong answer, 50% of the mark for

that question is deducted; and/or

- Theoretical essay questions: The student must give and defend their opinion. Answers must be brief as space is limited.
- **Assessment criteria: 'theory in practice' dimension of subject-specific skills (worth 45% of final grade)**
  - In the final exam, there is a clearly defined 'theory in practice' section consisting of theoretical-practical exercises like those done in class.
- **Assessment criteria: 'applied' dimension of subject-specific skills (worth 20% of final grade)**
  - At the beginning of the final exam, the student must hand in all applied assignments and/or resolved case studies that were set throughout the term. They will be assessed on these. The student must keep in contact with their tutor throughout the term and communicate with them at least a month before sitting the exam so that the required assessment materials can be prepared.
- **Criteria for assessment of general skills (worth 5% of final grade):**

The aforementioned general skills will be assessed through the student's performance in exams.

To pass the module by this method, the student must obtain at least 30% in each of the assessment areas. The final grade will be calculated from the weighted average of each of the above assessment areas. No points will be given for any work not completed. The student must obtain at least 50% overall to pass this module.

#### **Examination resit period:**

If a student does not pass the course during the standard assessment period (*convocatoria ordinaria*), he/she must take another exam during the designated examination resit period (*convocatoria extraordinaria*). The nature of this assessment will be like that stated above in the section entitled 'B. FINAL EXAM'.

#### **Final Score:**

The student will receive a numeric decimal score which corresponds to a qualitative classification. (This conforms to the European Credit Transfer System Royal Decree 1125/2003 which stipulates that the student must receive a numeric decimal grade and a qualitative classification). The grading scale is as follows:

0.0 – 4.9 *FAIL (SUSPENSO)*

5.0 – 6.9 *PASS (APROBADO)*

7.0 – 8.9 *VERY GOOD (NOTABLE)*

9.0 – 10 *EXCELLENT (SOBRESALIENTE)*

9.0 – 10 *OUTSTANDING (MATRICULA DE HONOR, limited to a maximum of 5% of students)*

## **6. BIBLIOGRAPHY**

#### **Required reading:**

Parts I and II (and III, Lesson 7):

CASAS, J.M.; et al. (2010): Estadística para las Ciencias Sociales. Ed. Centro de Estudios

Ramón Areces.

Reminder of part III:

CASAS, J.M.; CORTIÑAS, P.; ZAMORA, A.I. (2010): Estadística económica y empresarial. Distribuciones e inferencia. Ed. Centro de Estudios Ramón Areces.

Practical exercises:

CASAS, J.M.; GARCIA, C.; RIVERA, L.F.; ZAMORA, A.I. (2006): Ejercicios de Estadística: Descriptiva y Probabilidad para Economía y Administración de Empresas. Ed. Pirámide.

CASAS, J.M.; GARCIA, C.; RIVERA, L.F.; ZAMORA, A.I. (2006): Ejercicios de Inferencia Estadística y muestreo para Economía y Administración de Empresas. Ed. Pirámide.

SLAGER, D. (2016): Essential Excel 2016. A Step-by-Step Guide. Apress.

WINSTON, W.L. (2016): Microsoft Excel 2016. Data Analysis and Business Modelling. Microsoft Press.

**Further reading**

Parts I and II:

CASAS, J.M.; SANTOS, J. (2002): Introducción a la Estadística para Economía. Ed. Centro de Estudios Ramón Areces.

MARTIN PLIEGO, J.J. (1994): Introducción a la Estadística Económica y Empresarial (Teoría y Práctica). Ed. AC.

URIEL, E.; MUÑIZ, M. (1988): Estadística Económica y Empresarial. Teoría y ejercicios. Ed. AC.

Part III:

ARANDA, J.; GÓMEZ, J. (1992): Fundamentos de Estadística para Economía y Administración de Empresas. Ed. PPU.

ARNAIZ, G. (1990): Introducción a la Estadística Teórica. Ed. Lex Nova.

CANAVOS, C.G. (1987): Probabilidad y Estadística. Aplicaciones y Métodos. Ed. McGraw-Hill.

CASAS, J.M. (2000): Estadística I: Probabilidad y Distribuciones. Ed. Centro de Estudios Ramón Areces.

CASAS, J.M. (1997): Inferencia Estadística. Ed. Centro de Estudios Ramón Areces.

CASAS, J.M. (1996): Tablas y Fórmulas Estadísticas. Ed. Centro de Estudios Ramón Areces.

Practical exercises:

LÓPEZ ORTEGA, J. (1994): Problemas de Inferencia Estadística. Ed. Flores Tebar.

MARTIN, F.J.; MONTERO, J.M.; RUÍZ-MAYA, L. (2000): Problemas de Inferencia Estadística. Ed. AC.

SANZ, J.A.; VEDATE, A.; RIVAS, A.; GONZALEZ, J. (1996): Problemas de Estadística Descriptiva y Empresarial. Ed. Ariel.

TOLEDO, I. Y ARNAIZ, G. (1989): Problemas de Estadística. Ed. Lex Nova.

**Additional learning materials are available on the university online learning platform (Blackboard).**

## 7. INFORMATIVE NOTE

The University of Alcalá guarantees its students that, if due to health requirements, the competent authorities prevent the total or partial attendance to the teaching activity, the academic programmes would achieve their objectives through a teaching and evaluation methodology online, returning to presential methods as soon as possible.



#### Respecting SDG

In teaching this subject, the Sustainable Development Goals contained in the United Nations 2030 Agenda will be followed. Special emphasis will be placed on reducing inequalities, climate action and the protection of life in both terrestrial and marine ecosystems. Regarding business management, there will be an impact on the supply of decent work, the achievement of responsible production and consumption goals and the use of renewable and non-polluting energy.