

## **COURSE INFORMATION**

### **Title: Statistics and Data Analysis**

Course number: 757709203 / 757609107 [English Total]  
Minor: Natural Sciences (Faculty of Experimental Sciences)  
Degree in Environmental Sciences and Geology  
Department of Economics  
Academic Year: 2018-2019  
Compulsory course. 1<sup>st</sup> year  
Second semester: 6 credits

Timetable:

*Classes:* 18.00-20.00, Wednesdays. Fiteen sessions  
*Problem sessions:* 16.00-17.00, Thursdays. Ten problem sessions.  
*Computer sessions:* 17.00-19.00, Thursdays. Ten computer sessions.

Check final dates and any changes on the Moodle site for the course.

## **TEACHING STAFF**

Instructor: Isabel Serrano Czaia  
Department: Economics (Departamento de Economía)  
Office: P4-33 (Experimental Sciences building, orange doors)  
Phone: +34 959 218223  
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Office hours:

First Semester: 10.30-13.30, Tuesdays & Thursdays  
(P3-18 Labour Labour Sciences building – Tel. 959219680)

Second Semester: 9.00-12.00, Mondays.  
11.00-13.00 & 17.00-18.00, Wednesdays  
(P4-33 Experimental Sciences building – Tel. 959218223)

Students are welcome to come to my office to discuss homework problems or any aspect of the course during office hours or at other times by email appointment.

## **SYLLABUS**

### **1. DESCRIPTION**

The subject "Statistics and Data Analysis" starts from basic statistical knowledge to advanced statistical techniques that facilitate the design and analysis of experiments. It aims at applying interesting models in Environmental Sciences and Geology. This subject is developed by combining theoretical and practical classes in the classroom, with classes of application of statistical techniques that are studied on real data in the computer classroom. To work in small groups, the teacher proposes and guides students through activities that help them to reinforce and assimilate the contents, both in problem solving in class and in the management of statistical tools in the computer classroom.

## 2. PREREQUISITES

No formal prerequisites are required. A knowledge of basic mathematics (calculus) are of great help to understand the subject. Students are expected to attend classes regularly.

## 3. OBJECTIVES/LEARNING OUTCOMES

The learning outcomes of this subject is that students have the ability to apply quantitative and qualitative techniques of statistical research in the field of environmental sciences and geology.

## 4. TEACHING METHODOLOGY

The bulk of the subject will be presented in the classroom, with support from Moodle where students can find the slides used in class as well as complementary material to facilitate their understanding of the subject. The small group sessions will be devoted to improving comprehension of the subject. I highly encourage in-class participation and the solution of problems given as homework and online questionnaires as it can make a difference to the final grade.

There will be ten computer sessions (2h each) covering different aspects of the subject (contents in Module 4). Computer handout for each computer session will be at students' disposal in Moodle.

## 5. CONTENTS

### **Module 1: Descriptive Statistics of Datasets**

Describing data by tables and graphs. Measures of Location (Central and Relative Position of Data), Dispersion and Shape. Box-Plot diagram.

### **Module 2: Introduction to Probability, Random Variables and Their Distribution.**

Introduction to Probability, Univariate Random Variables (Discrete and Continuous) and Distribution Functions. Some Special Univariate Discrete and Continuous Distributions. The Central Limit Theorem and approximation between distributions. Sampling distributions of sample means.

### **Module 3: Estimation and Inferential Statistics**

Point estimation. Confidence interval. Introduction to parametric Hypothesis testing. Relation between Confidence interval and Hypothesis testing.

### **Module 4: Computer Sessions (Excel + Rcmdr)**

Application of Module 1 contents using real data. Parametric and non-parametric univariate and bivariate Hypothesis testing. Regression analysis. Relationships Between Two Categorical Variables. Introduction to Multivariate Analysis.

## 6. BIBLIOGRAPHY

Textbooks:

*Statistical Inference*, by Casella, G. – Berger, R.E., Wadsworth Inc., 1990

*Statistics: the art and science of learning from data*, by Alan Agresti, Christine A. Franklin, 2nd ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2007

Other references of interest:

*Basic Statistics: Understanding Conventional Methods and Modern Insights*, by Wilcox, Rand R., Oxford University Press USA - OSO, 2009. ProQuest Ebook Central, <http://0-ebookcentral.proquest.com.columbus.uhu.es/lib/bibuhuelib-ebooks/detail.action?docID=453655>.

*The Art of Data Analysis: How to Answer Almost Any Question Using Basic Statistics. Jarman*, by Kristin H., John Wiley & Sons, Incorporated, 2013. ProQuest Ebook Central, <http://0-ebookcentral.proquest.com.columbus.uhu.es/lib/bibuhuelib-ebooks/detail.action?docID=1175199>.

Students can find in the Moodle site for this course many links to documents and other material of interest for the different topics treated.

## 7. ASSESSMENT/GRADING

The grading breakdown is as follows:

30% Computer sessions + 10% problem assignments and online questionnaires + 60% final exam.

1. Activities in the classroom and online questionnaires. They have a weight of 10% on the overall rating. A minimum mark is not required.
2. Evaluation of the computer practices (weight of 30% on the final rating): there are two activities (one with Excel and the second with Rcmdr) applying the techniques studied on a set of real data. These activities are graded on a scale from 0 to 10 points. The practical part can be passed provided that the mark obtained in each one of the activities is greater than or equal to 5 points.
3. Final exam (60% of the final rating). The exam will contain three or four exercises. Students are required to obtain a minimum score of 5/10 in the exam to obtain the final average grade.

Final results will be given in terms of a numerical scale between 0 and 10 (including tenths), with the corresponding qualitative ratings below:

- $\leq 4.9$ : Fail (D)
- 5.0 - 6.9: Pass (C)
- 7.0 - 8.9: Pass with Merit (B)
- 9.0 - 10: Distinction (A)

The total number of distinctions cannot exceed 5% of the students enrolled in the subject in the academic year (unless the number of students enrolled is lower to 20, in which case one distinction can be awarded)

The grading system is subject to the Bachelor's Degree Exam Regulations of the University of Huelva (Normativa de Evaluación para las Titulaciones de Grado de la Universidad de Huelva). Please refer to:

<[http://www.uhu.es/sec.general/Normativa/Texto\\_Normativa/Normativa\\_de\\_Evaluacion\\_grados.pdf](http://www.uhu.es/sec.general/Normativa/Texto_Normativa/Normativa_de_Evaluacion_grados.pdf)>.

In particular, please note that make-up exams and other special circumstances will be subject to article 19 of these regulations.'