



COURSE GUIDE SUBJECT

1. DETAILS OF THE COURSE			
1.1. Name: Advanced Statistics			
1.2 Code: 63102202	1.3 Plan: ADE (2010)	1.4.Level: Undergraduate	
1.5 Course: 2nd	1.6. Type: Compulsory	1.7. Semester: 1st	
1.9. ECTS: 6	1.9.1.Theoretical: 4	1.9.2.Practical: 2	
1.10. Descriptors: Statistical inference, Analysis of Variance and Simple linear regression.			
2. LECTURER			
2.1. Name: Rafael Rumí Rodríguez			
2.2. Department: Statistics and Applied Mathematics			
2.3. Field of Knowledge: Statistics and Operations Research			
2.4. Office: 2.57 CITE III			
2.6. Mentoring: Time and place will be set at the beginning of the term			
2.6.1. 1 st Semester:		2.6.2. 2 nd Semester:	
2.7. Phone: 950 01 5306	2.8. E-Mail: rrumi@ual.es	2.9. Virtual platform WEB CT: Yes	
2.10. Personal Webpage: www.ual.es/personal/rrumi			
3. DATA OF THE DEPARTMENT			
3.1. Name: Statistics and Applied Mathematics			
3.2. Fields of Knowledge of the Department: Statistics,			
3.3. Director: Carmelo Rodríguez Torreblanca			
3.3.1. Office: 2.49 CITE III	3.3.2.Phone: 950 01 4549	3.3.3.E-Mail: crt@ual.es	
3. 4. Head of Administration: Francisco Guillén			
3.4.1. Office: 2.30 CITE III	3.4.2. Phone: 950 01 5665	3.4.3 Fax: 950 01 5167	3.4.4.E-Mail: fguillen@ual.es

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**4. CONTEXT****4.1. Main objective of the course:**

This subject strengthens the approach of statistics as a tool for obtaining and analyzing business information as well as information about the economic and social environment through the treatment and modelling of databases using statistical inference techniques. This way, the procedures included in this subject provide us with methods to infer properties of a population from a small part of it, called sample. This subject also offers the student the opportunity of learning and experiencing with the statistical software SPSS, which will be used to perform the statistical studies with databases.

4.2 Previous knowledge:

This subject is a continuation of 1st course subject Statistics. Some knowledge of the subject Maths of 1st course is also needed

4.3. Prior conditions:

None

5. COMPETENCIES AND OBJECTIVES**5.1 COMPETENCIES OF THE COURSE****5.1.1. GENERAL COMPETENCIES:**

Capacity to solve problems
Capacity to learn to work autonomously.
Application of knowledge
Understand and own knowledge

5.1.2. Specific objectives

Specific conceptual competencies (theoretical knowledge) :
Knowing and applying the basic concepts of Statistical Inference

Specific procedural competencies (practical knowledge):
Acquiring skills and master computer tools applied to different areas.

5.2 OBJECTIVES OF THE COURSE**5.2.1. GENERAL OBJECTIVES OF THE COURSE**

- Knowledge of the theoretical and practical foundations of Statistical Inference
Knowing, applying and assessing the usefulness of estimation methods (point estimation and confidence intervals) and hypothesis tests (parametric and non-parametric)
Knowledge about how to apply adeptly the Analysis of Variance and Simple Linear Regression models.
knowing and operating with ease the computer program for statistical analysis SPSS
Using correctly the statistics notation and vocabulary.

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6.CONTENTS

6.1. THEORETICAL CONTENTS:

Module I: Introduction to Statistical Inference

Unit 1: Multidimensional random variable

1. Joint distribution and independency
2. Expectation and variance
3. Reproductivity
4. Central limit theorem
5. Normal associated distributions

Unit 2: Samples and statistics

1. General setting of Inference and basic concepts
2. Parametric point estimation:
 - Sample mean, variance and proportion.
 - Mean square error
 - Properties: Unbiasness, relative efficiency and consistency.

Module II: Confidence intervals estimation and hypothesis tests

Unit 3: Confidence intervals estimation

1. General setting of the problem
2. General methodology to obtain a confidence interval
3. Determination of exact and approximate confidence intervals of frequent use.

Unit 4: Parametric hypothesis tests

1. General setting of the problem
 - Error types
 - Power of a test
 - P-value concept
2. General methodology to obtain a hypothesis test
3. Hypothesis tests of frequent use

Module III: Data analysis methods


Unit 5: Non-parametric hypothesis tests

1. General setting of the problem
2. Normality tests
3. Independence chi-square test
4. Randomness test

Unit 6: Analysis of variance

1. Introduction


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<ol style="list-style-type: none"> 2. The means test. The ANOVA table 3. Ad hoc comparisons. Analysis of mean differences. 4. Checking previous assumptions. Analysis of residuals. 5. Non-parametric alternative: The Kruskal-Wallis test <p>Unit 7: Linear regression model</p> <ol style="list-style-type: none"> 1. Introduction. The simple linear regression model. 2. Parameter estimates 3. Inferences over the model 4. Checking previous assumptions.
<p>6.2. PRACTICAL CONTENTS:</p> <p>All practical lessons will deal with the SPSS computer program. In each of the practical lessons the contents of the theoretical lessons will be used and the student will learn to apply them using the SPSS.</p> <p>Student will be required to solve problems autonomously using the SPSS computer program, and this will be the core of their evaluation.</p>

<p>7. METHODOLOGY</p> <p>7.1 Methodology for the treatment of the theoretical contents : <u>Before</u> the date of the lesson, students should download and print the slides of the corresponding unit, available via WebCt. Even though attendance is not compulsory, students are expected to attend to the theoretical lessons for a better understanding of the subject. The lecturer will explain the concepts of the unit, using the given slides. Students will be motivated to participate actively in class. Related material will be provided by the lecturer for each unit: Applets, videos, web links, recommended bibliography, etc.</p> <p>As autonomous work, students should study the contents, look up the bibliography and attend to mentoring if necessary.</p>
<p>7.2 Methodology for the treatment of practical content: Practical contents are closely related to theoretical contents, so student must have covered the corresponding theoretical content. attend to the practical lessons. At the beginning of the class the teacher will summarize the needed theoretical contents to perform the lesson and will explain briefly how the exercises in the SPSS have to be done. the exercises proposed in each lesson have to be solved on your own. The lecturer will reply questions and solve problems when performing the proposed exercises. In some of the lessons, the teacher will ask for the solutions of the exercises (using WebCt), which will become part of the evaluation.</p> <p>As autonomous work, students should operate the SPSS program, available in the free-access computer room in the University, and complete all the exercises proposed in the practical lessons, in order to acquire great skills using the program.</p>

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7.3 Workload of the student (calculated by number of hours)		
WORKING HOURS OF THE STUDENT		
7.3.1. IN-CLASS HOURS (with professor)		
TEACHING ACTIVITY	NO. HOURS	
CLASS of theory (THEORY GROUP ACCORDING TO OD)	31	
CLASS OF PRACTICAL TRAINING (PRACTICE GROUPS ACCORDING TO OD)	Laboratory	
	Problems	
	Informatics	14
	Field	
	Other	
SUBTOTAL IN-CLASS HOURS		
45		
HOURS FOR TESTS AND EXAMS		
5		
7.3.2 . AUTONOMOUS WORKING HOURS (not in-class, estimated)		
HOURS OF PREPARATION FOR ACTIVITIES AND WORK (theory)	40	
HOURS OF PREPARATION FOR ACTIVITIES AND WORK (practice)	40	
HOURS OF STUDY FOR TESTS AND EXAMS	25	
OTHER		
SUBTOTAL AUTONOMOUS WORKING HOURS		
105		
TOTAL WORKING HOURS		
STUDENT		
150		

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8. BIBLIOGRAPHY OF THE COURSE

8.1 Recommended Reading:

SPSS Statistics 19 Guide to Data Analysis - With CD (*Marija Norusis*)
 Elementary statistics (Mario F. Triola)
 Statistics for business and economics (David R. Anderson, Dennis J. Sweeney, Thomas A. Williams)

8.2 Web addresses:

You can check the existing bibliography in the University Library in the following link:

<http://almirez.ual.es/search/x?SEARCH=63102202>

9 EVALUATION SYSTEM

9.1 Aspects and/or criteria:

The evaluation of the subject will be mostly based on the performance in the SPSS computer practice. Students are expected not only to obtain the numerical result of a problem, but also to interpret it theoretically. They should know how to apply the procedures explained in theory, when to apply them, how these procedures work and why, interpret the results and study the previous conditions before applying them.

Students should also be able to extract the important information provided by the statistical procedures learnt in theory and write simple reports expressing the solution to the proposed exercises.

It will be specially well valued the clarity of the concepts, the correct use of the mathematical terminology and notation, the reasoning skill and deep understanding of statistical procedures.

9.2 Modalities and instruments:

Written final exam
 Computer practices during practical lessons.
 Handing in activities through WebCt
 Handing in activities in class

9.3 Marking system:

The total mark of the subject is 10 points, divided this way:

1. **Six points, as** maximum, can be obtained completing a two hours computer practice in the computer room, whose contents will correspond to the ones that have been dealt with during the practical lessons. This computer practice will take place in the date of the last practical lesson of the subject (see Temporary sequencing in the WebCt)
2. **Two points, as** maximum, can be obtained handing in through WebCt the exercises solved in some of the practical lessons. These practical lessons will be selected by the lecturer (at least one). In order to obtain the two points, it is an essential requirement to hand in the required exercises in the date and hour (within the deadline) pointed by the lecturer.
3. **Two points, as** maximum, can be obtained through a theoretical-practical written final exam over the contents of the subject, to check if the student has reached the objectives.
- 4.

The marks of 2. ,obtained during the course, will be maintained for the extraordinary exam in September, whilst 1. and 3. will be again evaluated in September.

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