

1. Key Information			
Module Code: 13604	Module Title: Statistics I		
Credit Points: 4	Module Status: Compulsory	Module Block: Basic Knowledge	
Course Title: BSc in Engineering and Management		Module Theme: Mathematics	

2. Lecturer:	Esther Cabezas-Rivas	Tutorial Hours:	Friday from 10 to 12 (by appointment)
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3. Required Reading:	
<i>Statistics for Business and Economics: Global Edition</i>	Paul Newbold
<i>Applied Statistics and Probability for Engineers</i>	Douglas C. Montgomery & George C. Runger
<i>Applied statistics for engineers and scientists</i>	Jay Devore & Nicholas Farnum

4. General overview of the module

We will learn how to analyse different datasets with a meaningful approach in business and management. Firstly, we will study how to perform descriptive analysis based on univariate and bivariate statistics. Next, we will make a brief introduction to probabilities and we will describe some theoretical concepts, such as Bayes' theorem. This topic will set up the basics for the definition of a general probability distribution. However, we will focus on the most frequently used distributions: Poisson, binomial, uniform, exponential and normal distribution.

We finally will describe how to conduct hypothesis test, especially as regards to inferential statistics for one sample, and two samples. We will finish the course through the description of analysis of variance (ANOVA) for comparing different samples. The statistical tools and knowledge included within this subject will be the starting point of the subsequent subjects: Statistics II.

5. Recommended prior knowledge	
13601	Cálculo
13609	Informática

6. Module objectives – Learning outcomes	
Basic and general Competences	
<ul style="list-style-type: none"> • CB5 Develop learning competences for lifelong learning. • 02 Apply technologies, skills and economic tools for engineering and management. • 03 Define, solve and describe complex technical problems. • 04 Learn how to analyse different components which influence decision making processes. • 05 Communicate using scientific languages, based on graphical and symbolic elements used in engineering and management. 	
Specific Competences	
<ul style="list-style-type: none"> • 13 Solve mathematical problems through the application of knowledge of algebra, linear algebra, geometry, differential geometry, differential and integer calculus, differential and partial equations, numerical methods, numerical algorithms, statistics and optimizations. 	

7. Teaching and learning units	
Unit	
1. Descriptive statistics	
<ul style="list-style-type: none"> • Basic notions and data collection. • Types of variables • Presenting data in tables and graphs • Quantitative analysis: measures of central tendency and variation • Empirical rule and Chebishev's theorem • Bivariate data analysis 	
2. Fundamentals of probability	
<ul style="list-style-type: none"> • Events and probabilities • Conditional probability and independent events • Law of Total Probability and Bayes' theorem 	
3. Probability distributions	
<ul style="list-style-type: none"> • Definition, types of distributions • Discrete probability distributions: Binomial and Poisson • Continuous probability distributions: Uniform, Exponential and Normal 	

4. Inferential statistics

- Hypothesis tests
- One sample inference for the mean, the population proportion & the variance
- Two – sample inference for two means and two population proportions

8. Teaching and learning methods

Unit	Theory (Classroom)	Practical (Classroom)	Practical (Laboratory)	Practical (Field work)	Practical (ICT)	Self-guided study	TOTAL HOURS
1	2	2			2	13	19
2	3	4			4	19	30
3	3	4			4	19	30
4	4	4			4	19	31
TOTAL HOURS	12	14	0	0	14	70	110

9. Assessment

Overview	Nº of activities	Weighting (%)
Continuous assessment		
- Academic assignments.	4	20
- Multiple choice tests.	4	20
Exam	2	60
- Written open answer questions		51
- Multiple choice tests.		9

Student evaluation will consist of both continuous and summative assessments:

1. Continuous assessment: The submission of practical work either carried out individually or in groups and participation in the different activities both inside the classroom, such as the analysis, summation and discussion of required readings, and outside including company visits, will account for this mark. This part of the assessment carries a weighting of 40% towards the final mark.
2. Summative assessment: These tests can combine both theoretical and practical content. This part of the assessment carries a weighting of 60% towards the final mark.

Continuous assessment is attendance based and non-recoverable. Therefore, the mark obtained for this part of the assessment will serve for both the first summative assessment and any subsequent repeat if required. The repeat will only be available at the end of the semester.

The first partial test will be done halfway through the semester. The second part test and the final exam will take place simultaneously at the end of the semester.

- Students who **pass the first partial test** (that is, obtain a grade ≥ 5 out of 10) will eliminate the subject of such test for the first general exam at the end of the semester, which means that they will only have to complete the second partial in the first general session.
- Students who **do not pass the first partial test** (that is, have obtained a grade of <5 out of 10) will be examined on the whole subject in the first general session.
- The **second general exam** will include all the material for all students.

To pass the module a grade of 5 or more in each summative test must be obtained. If this condition is fulfilled, the final mark will be calculated by the average weightings of the mean mark in the summative assessment in combination with the continuous assessment; the final mark achieved must be 5 or above to pass the module. Otherwise, the final mark will be the one from the exam.

Attendance is compulsory to ensure that you extract the most value from the module and meet the learning requirements. Therefore, session absence accounting for more than 15% of the prescribed hours will result in the inability to be awarded a mark for continuous assessment. Consequently, the maximum mark that can be achieved will be that obtained solely from the summative assessments.

Students enrolling in the module for the second time will receive specific instructions from their lecturer on what is required for them to pass the continuous assessment element. The final mark will be obtained by combining the summative assessment (80%) and the continuous assessment (20%), having to gain a final mark equal to or greater than 5 to pass the module. To pass the module a grade of 5 or more in each summative test must be obtained. If

this condition is fulfilled, the final mark will be calculated by the average weightings of the mean mark in the summative assessment in combination with the continuous assessment; the final mark achieved must be 5 or above to pass the module. Otherwise, the final mark will be the one from the exam.

All students must comply with the rules of writing, spelling and grammar in the development of their work and their assessment tests.

**Guía Docente Provisional*