UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2017/18
Subject (*)	Statistics		Code	730G05012
Study programme	Grao en Enxeñaría Naval e Oceánica			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	Second	Obligatoria	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
Coordinador	Tarrio Saavedra, Javier	E-mail	javier.tarrio@udc.es	
Lecturers	Tarrio Saavedra, Javier	E-mail	javier.tarrio@udc.es	
Web				
General description	This subject introduces the basic concepts of statistical data analysis, from the exploratory analysis (including the main graphic techniques) to statistical inference, through the introduction to probability, the concept of random variable and the fundamental tools of statistical quality control, focusing the teaching to the resolution of practical problems in oceanic, naval and maritime engineering.			

Study programme competences / results	
Code	Study programme competences / results
A1	Skill for the resolution of the mathematical problems that can be formulated in the engineering. Aptitude for applying the knowledge on: linear algebra; geometry; differential geometry; differential and integral calculation; differential equations and in partial derivatives; numerical methods; algorithmic numerical; statistics and optimization
B1	That the students proved to have and to understand knowledge in an area of study what part of the base of the secondary education, and itself tends to find to a level that, although it leans in advanced text books, it includes also some aspects that knowledge implicates proceeding from the vanguard of its field of study
B2	That the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to prove itself by the elaboration and defense of arguments and the resolution of problems in its area of study
B3	That the students have the ability to bring together and to interpret relevant data (normally in its area of study) to emit judgments that include a reflection on relevant subjects of social, scientific or ethical kind
B6	Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas.
C1	Using the basic tools of the technologies of the information and the communications (TIC) necessary for the exercise of its profession and for the learning throughout its life.
C4	Recognizing critically the knowledge, the technology and the available information to solve the problems that they must face.
C7	Capacidade de traballar nun ámbito multilingüe e multidisciplinar.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Participación en proxectos multidisciplinares de enxeñaría naval e oceánica.	A1	B1 B2 B3	
Modelar estatiscamente sistemas e procesos complexos de todos os ámbitos da Enxeñaría Naval e Oceánica.	A1	B6	C1
Resolver problemas con datos aplicando diversas técnicas estatísticas de forma efectiva para a enxeñería naval.		B1 B2	C1 C4 C7

Contents

Topic	Sub-topic
The following topics develop the contents established in the tab of the Memoria de Verificación, which are:	Statistical data analysis. Probability calculation. Point estimation and confidence intervals. Hypothesis testing. Introduction to quality control.
Description of a statistical variable.	General Concepts. Frequency distributions. Graphical representations. Typical measures.
Description of several statistical variables.	Statistical vector. Linear regression. correlation.
Probability.	General Concepts. Axiomatic definition of Kolmogorov. Assigning probabilities: Laplace rule.
Conditional probability.	Definition of conditional probability. Independence of events. Theorems product, the total probability and Bayes.
One-dimensional random variables.	Concept of one-dimensional random variable. Discrete random variables and continuous. Transformation of random variables. Typical measures of a random variable. Inequality of Tchebychev.
Significant distributions Discreet.	Notable discrete random variables: discrete uniform distribution. Distribution Bernoulli. Binomial distribution. Geometric Distribution. Negative binomial distribution. Poisson distribution. hypergeometric distribution
Significant distributions continuous.	Continuous random variable notable: normal. The central limit theorem. Approach Distributions. Chi-square distribution of Pearson. Student's t-distribution. Distribution F Fisher-Snedecor.
Introduction to Statistical Inference.	General Concepts. Sampling. Generation of random variables. Concept of precise estimator. The sampling distribution of a statistic in precise.
Point estimation.	Properties of estimates. Methods of obtaining estimates. Precise estimate of the average. Precise estimator of the variance. Precise estimate of proportion.
Estimation of confidence intervals.	Concept of confidence interval. Confidence intervals for the mean. Confidence interval for the variance. Confidence interval for a proportion. Confidence intervals for the difference in averages. Confidence interval for the ratio of variances. Confidence interval for the difference in proportions.
Hypothesis tests	General Concepts. The critical significance level and a contrast. Power of a contrast. General procedure of hypothesis testing. Resistances for the medium. Contrast to the variance. Contrast to a ratio. Contrasts for the difference in averages. Contrast to the ratio of variances. Contrast to the difference in proportions. Contrasts position. Goodness-of-fit. Test of independence. Homogeneity tests.
Introduction to statistical quality control	Basic concepts. Six Sigma Methodology. Main statistical quality control tools

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 B2 B3 C1	30	45	75
Problem solving	B1 B6 C1	20	30	50
ICT practicals	C1 C4 C7	10	10	20
Objective test	A1 B1	2.125	2.125	4.25
Personalized attention		0.75	0	0.75
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	**Description**
Guest lecture / keynote speech	The main contents of the subject will be explained with the help of suitable audiovisual means (laptop and video canon).
Problem solving	Problem-solving seminars will be held in intermediate-sized groups in order to establish the concepts presented in the master sessions and to provide knowledge of the methodologies for the practical resolution of statistical problems.
ICT practicals	Part of the practical classes will be carried out in a computer lab where, with the help of a statistical package (free software R), different practices will be developed using real or simulated data, previously provided to the students.
Objective test	At the end of the couse, a test type exam composed of 15-20 questions (practical and theoretical concerning with the subject contents) will be done.

Personalized attention	
Methodologies	**Description**
Guest lecture / keynote speech	There will be lectures where the teacher will explain, with the help of appropriate audiovisual media (laptop and video projector), the main contents of the course. Encouraged at all times the debate among students and between students and teacher.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Objective test	A1 B1	Exame escrito tipo test constituido por entre 15 e 20 preguntas, tanto prácticas como teóricas, acerca da materia do curso.	100
Others			

Assessment comments
Evaluation at the first opportunityThe mark of the objective test will be weighted with the score corresponding to the optional delivery of works related to the practices carried out with statistical software R (maximum 1.5 points) and with the mark corresponding to the attendance at class (1 point), being necessary to obtain at least a score of 3.5 out of 10 in the objective test to be able to make this compensation. Evaluation at thesecond opportunity The evaluation will be done following the same procedure as at the first opportunity. In the case of students with recognition of part-time dedication and academic exemption from attendance that decide not to attend classes, will be evaluated in the two opportunities as the rest of the students who are in a similar situation.

Sources of information	
Basic	- Cao R., Franciso M, Naya S., Presedo M., Vázquez M., Vilar J.A. y Vilar J.M. (2001). Introducción a la Estadística y sus aplicaciones. Editorial Pirámide - Montgomery, D. C. & Runger, G. C. (2004). Probabilidad y Estadística aplicadas a la Ingeniería.. Editorial Limusa-Wiley - http://www.r-project.org/ (). .
Complementary	

Recommendations
Subjects that it is recommended to have taken before

CALCULUS/730G01101 LINEAR ALGEBRA/730G01106
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.