UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				**2019/20**
Subject (*)	Statistics		**Code**	730G05012
Study programme	Grao en Enxeñaría Naval e Oceánica			
Descriptors				
Cycle	**Period**	**Year**	**Type**	**Credits**
Graduate	1st four-month period	First	Basic training	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
Coordinador	Naya Fernandez, Salvador	**E-mail**	salvador.naya@udc.es	
Lecturers	Naya Fernandez, Salvador	**E-mail**	salvador.naya@udc.es	
	Tarrio Saavedra, Javier		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
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
B5	That the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy
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**		
Adquirir coñecementos, aptitudes e habilidades para a análise estatística de datos que conleve a extracción de coñecemento útil na industria e en todos os ámbitos da enxeñaría naval e oceánica.	A1	B2 B3 B5	
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.		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 B5 C1	30	30	60
Problem solving	B5 B6 C1	20	20	40
ICT practicals	C1 C4 C7	10	35	45
Mixed objective/subjective test	A1	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.
Mixed objective/subjective 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, the main contents of the course. Debate will be encouraged among students and between students and teacher. In the case of students with academic dispensation, person-to-person and virtual tutorials (e-mail, videoconferences) will be available, which will allow the student to follow properly the subject.

Assessment

Methodologies	Competencies / Results	Description	Qualification
ICT practicals	C1 C4 C7	Presentation of the works suggested by teachers with free statistical software R.	25
Mixed objective/subjective test	A1	Exame escrito tipo test constituido por entre 15 e 20 preguntas, tanto prácticas como teóricas, acerca da materia do curso.	75
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. &amp; 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

Para
axudar a conseguir unha contorna inmediata sostida e cumprir co obxectivo da
acción número 5: ?Docencia e investigación saudable e sustentable
ambiental e social? do "Plan de Acción Green Campus Ferrol:

A entrega dos traballos documentais que se realicen nesta
materia:

? Solicitaranse en formato virtual e/ou soporte
informático.

? Realizarase a través de
Moodle, en formato dixital sen necesidade de imprimilos.

? En caso de ser necesario
realizalos en papel:

- Non se empregarán
plásticos.

- Realizaranse impresións a
dobre cara.

- Empregarase papel
reciclado.

- Evitarase a impresión de
borradores.

? Débese de facer un uso
sustentable dos recursos e a prevención de impactos negativos sobre o
medio natural.

? Traballarase para identificar e modificar prexuízos e
actitudes sexistas, e influirase na contorna para modificalos e fomentar
valores de respecto e igualdade.

? Deberanse detectar situacións
de discriminación e propoñeranse accións e medidas para corrixilas.