UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2018/19
Subject (*)	Statistics		Code	730G03008
Study programme	Grao en Enxeñaría Mecánica			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	Basic training	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	EconomíaEmpresaMatemáticas			
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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	
Code	Study programme competences
A1	Capacidade para a resolución dos problemas matemáticos que poidan formularse na enxeñaría. Aptitude para aplicar os coñecementos sobre: álxebra lineal; xeometría; xeometría diferencial; cálculo diferencial e integral; ecuacións diferenciais e en derivadas parciais; métodos numéricos; algorítmica numérica; estatística e optimización.
B2	Que os estudantes saiban aplicar os seus coñecementos ao seu traballo ou vocación dunha forma profesional e posúan as competencias que adoitan demostrarse por medio da elaboración e defensa de argumentos e a resolución de problemas dentro da súa área de estudo
B3	Que os estudantes teñan a capacidade de reunir e interpretar datos relevantes (normalmente dentro da súa área de estudo) para emitiren xuízos que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética
B4	Que os estudantes poidan transmitir información, ideas, problemas e solucións a un público tanto especializado como leigo
B5	Que os estudantes desenvolvan aquelas habilidades de aprendizaxe necesarias para emprenderen estudos posteriores cun alto grao de autonomía
B6	Ser capaz de concibir, deseñar ou poñer en práctica e adoptar un proceso substancial de investigación con rigor científico para resolver calquera problema formulado, así como de comunicar as súas conclusións ?e os coñecementos e razóns últimas que as sustentan? a un público tanto especializados como leigo dun xeito claro e sen ambigüidades
B7	Ser capaz de realizar unha análise crítica, avaliación e síntese de ideas novas e complexas
C1	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C4	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.

Learning outcomes	
Learning outcomes	Study programme competences

Participación en proxectos multidisciplinares de enxeñaría industrial.	A1	B3 B4 B5	C1
Modelar estatiscamente sistemas e procesos complexos de todos os ámbitos da Enxeñaría Industrial.	A1	B3 B5 B6 B7	C1
Resolver problemas con datos aplicando diversas técnicas estatísticas de forma efectiva para a enxeñería industrial.	A1	B2 B3	C4

Contents	
Topic	**Sub-topic**
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	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 B2 B3 B4 C4	30	45	75
Problem solving	A1 B2 B6 B7 C4	20	30	50
ICT practicals	C1	10	10	20
Objective test	A1 B3 B5	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. 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	Description	**Qualification**
ICT practicals	C1	Presentation of the works suggested by teachers with free statistical software R.	25
Objective test	A1 B3 B5	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	- http://www.r-project.org/ (). . - Cao R., Franciso M, Naya S., Presedo M., Vázquez M., Vilar J.A. y Vilar J.M. (2005). Introducción a la Estadística y sus aplicaciones. Editorial Pirámide - Montgomery D., Runger G. C. (2014). Applied Statistics and Probability for Engineers. Wiley
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

<p>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: </p><p>

A entrega dos traballos documentais que se realicen nesta
materia: </p><p>

? Solicitaranse en formato virtual e/ou soporte
informático. </p><p>

? Realizarase a través de
Moodle, en formato dixital sen necesidade de imprimilos. </p><p>

? En caso de ser necesario
realizalos en papel: </p><p>

- Non se empregarán
plásticos. </p><p>

- Realizaranse impresións a
dobre cara. </p><p>

- Empregarase papel
reciclado. </p><p>

- Evitarase a impresión de
borradores. </p><p>

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

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

? Deberanse detectar situacións
de discriminación e propoñeranse accións e medidas para corrixilas.</p>