



Guía Docente				
Datos Identificativos				2023/24
Asignatura (*)	Modelos Estadísticos para a Innovación en Tecnoloxía Mariña		Código	730542016
Titulación				
Descriptorios				
Ciclo	Período	Curso	Tipo	Créditos
Mestrado Oficial	2º cuatrimestre	Primeiro	Optativa	6
Idioma	Inglés			
Modalidade docente	Presencial			
Prerrequisitos				
Departamento	Matemáticas			
Coordinación	Tarrio Saavedra, Javier	Correo electrónico	javier.tarrio@udc.es	
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Web	http://www.master-seas40.unina.it			
Descrición xeral	The course is applicative with the aim to train students on statistical tools for monitoring of complex data from marine technology systems. Applications and case studies are addressed to train students to formulate and define strategies for quality control and monitoring in order to support decision making process in a big data framework.			

Competencias / Resultados do título	
Código	Competencias / Resultados do título

Resultados da aprendizaxe		
Resultados de aprendizaxe	Competencias / Resultados do título	
Ability to analyze data via regression analysis and to use statistical tool to reduce the dimensionality of a dataset. Ability to perform analysis through R, an opensource package for statistics.	BM1 BM2 BM3 BM4 BM5 BM6 BM7 BM9 BM12	CM2 CM4 CM6 CM7 CM8

Contidos	
Temas	Subtemas
Multivariate data description and inference.	Exploratory analysis of multivariate data. Statistical inference of multivariate data. Introduction to R statistical software.
Elements of unsupervised learning.	Principal component analysis (PCA). Unsupervised clustering or classification methods.
Elements of supervised learning	Multivariate linear regression models.
Selection, regularization of linear models and dimension reduction methods.	Ridge regression. Least absolute shrinkage and selection operator (LASSO). Principal component regression. Partial least squares (PLS) regression.
Classification methods.	Introducción. Métodos de clasificación supervisada.



Statistical Process Control (SPC).	Control charts of variables and attributes. Hotelling's T2 control chart. Regression adjustment. Interpretation of out-of-control signals.
Case studies to be solved using R statistical software.	Case studies in the field of naval and maritime engineering.

Planificación				
Metodoloxías / probas	Competencias / Resultados	Horas lectivas (presenciais e virtuais)	Horas traballo autónomo	Horas totais
Sesión maxistral	B2 B6 B7 B8 B10 B13 C2 C4 C6 C8	21	21	42
Prácticas a través de TIC	B3 B4 B5 B6 B7 C2 C7 C8	21	21	42
Traballos tutelados	B3 B4 B5 B6 B7 B8 B10 B13 C2 C4 C6 C7 C8	0	64	64
Proba obxectiva	B2 B3 B4 C2	1	0	1
Atención personalizada		1	0	1
*Os datos que aparecen na táboa de planificación son de carácter orientativo, considerando a heteroxeneidade do alumnado				

Metodoloxías	
Metodoloxías	Descrición
Sesión maxistral	Classroom activity that aims to show, describe and explain the fundamental concepts of the subject. It consists of oral exposition complemented with the use of audiovisual/multimedia and interaction with students, in order to provide knowledge and facilitate learning.
Prácticas a través de TIC	These are interactive sessions, developed using computer tools, in which the teachers will provide the necessary knowledge for the proper application of the statistical techniques taught in the keynote speech, in addition to supporting and supervising the practical work and knowledge acquired by the students. Different packages of the R statistical software will be used (which the student will have to know and handle) for the description and study of different real or simulated case studies.
Traballos tutelados	Individual and/or group work that will be carried out, supervised by the teachers of the subject. They will be dealing with the application and use of statistical techniques as well their application in the marine domain.
Proba obxectiva	Evaluation test that will be carried out at the end of the course in the corresponding official calls. It will consist of a written test in which it will be necessary to answer different theoretical and practical questions.

Atención personalizada	
Metodoloxías	Descrición
Sesión maxistral Prácticas a través de TIC Traballos tutelados	In the master classes, debate between students and between students and the teacher will be encouraged at all times. In order to solve problems, it will be important to personally attend to the students in the event of any doubts that may arise. This attention will also serve, on the one hand, to the teacher to detect possible problems in the methodology used to teach the subject and, on the other, to the students to consolidate theoretical knowledge and to express their concerns about the subject. Personalized attention to the student during ICT practical classes will also be essential, especially until they become familiar with the statistical software to be used, as well in the supervision of the projects.

Avaliación			
Metodoloxías	Competencias / Resultados	Descrición	Cualificación



Prácticas a través de TIC	B3 B4 B5 B6 B7 C2 C7 C8	Practical classes using R statistical software will be developed.	25
Proba obxectiva	B2 B3 B4 C2	Exam composed of both theoretical and practical questions about the contents of the subject.	50
Traballos tutelados	B3 B4 B5 B6 B7 B8 B10 B13 C2 C4 C6 C7 C8	Individual and/or group work will be carried out, supervised by the teachers of the subject. They will be dealing with the application and use of statistical techniques as well their application in the marine domain.	25

Observacións avaliación

Evaluation at the first opportunity: The grade of the objective test will be weighted with the grade corresponding to the delivery of work related to the practices carried out with R statistical software and the completion of supervised work (maximum 5 points out of 10).

Evaluation in the second opportunity: The evaluation will be made following the same procedure as in the first opportunity.

Academic dispensation will not be accepted.

All the activities will have only one opportunity for delivery during the academic year, except for the final exam, which will have two official exam opportunities.

General EMJMD Sustainable Ship and Shipping SEAS 4.0 evaluation rules:

- Students will have only two opportunities to pass a course. If failing to do so, they may be forced to leave the degree.
- No part time or lecture attendance exemption are allowed in this degree.

Fontes de información

Bibliografía básica	<ul style="list-style-type: none"> - James, G., Witten, D., Hastie, T., Tibshirani, R. O. (2013). An introduction to statistical learning. New York: Springer - Montgomery D. (2009). Introduction to Statistical Quality Control. Wiley & Sons - Cano, E. L., Moguerza, J. M., & Redchuk, A. (2012). Six sigma with R: statistical engineering for process improvement (Vol. 36). Springer Science & Business Media - Flores, M., Fernández-Casal, R., Naya, S., & Tarrío-Saavedra, J. (2021). Statistical Quality Control with the qcr Package. The R Journal
Bibliografía complementaria	

Recomendacións

Materias que se recomenda ter cursado previamente

Materias que se recomenda cursar simultaneamente

Materias que continúan o temario

Observacións

To help to achieve a sustainable environment and meet the objective of action number 5: "Healthy and sustainable environmental and social teaching and research" of the "Green Campus Ferrol Action Plan":

- 1.- The delivery of the documentary works carried out in this subject:
 - 1.1. It will be requested in virtual format and/or computer support.
 - 1.2. It will be done through Moodle, in digital format without the need to print them.
 - 1.3. If done on paper:
 - Plastics will not be used.
 - Double-sided prints will be made.
 - Recycled paper will be used.
 - Draft printing will be avoided.
- 2.- A sustainable use of resources and the prevention of negative impacts on the natural environment must be made.
- 3.- The importance of ethical principles related to the values of sustainability in personal and professional behavior must be taken into account.
- 4.- As it is included in the different regulations of application for university teaching, the gender perspective must be incorporated in this subject (non-sexist language will be used, bibliography of authors of both sexes will be used, intervention in student class will be encouraged and students...).
- 5.- We will work to identify and modify prejudices and sexist attitudes, and the environment will be influenced to modify them and promote values of respect and equality.
6. Situations of discrimination based on gender must be detected and actions and measures will be proposed to correct them.
7. The full integration of students who, due to physical, sensorial, psychic or sociocultural reasons, experience difficulties in an ideal, egalitarian and profitable access to university life will be facilitated.



(*)A Guía docente é o documento onde se visualiza a proposta académica da UDC. Este documento é público e non se pode modificar, salvo casos excepcionais baixo a revisión do órgano competente dacordo coa normativa vixente que establece o proceso de elaboración de guías