UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2015/16
Subject (*)	Análise estatística de datos		Code	730495005
Study programme	Mestrado Universitario en Materiais Complexos: Análise Térmica e Reoloxía (plan 2012)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Obligatoria	3
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
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General description				

Study programme competences / results	
Code	Study programme competences / results
A4	Knowing and applying statistical methods to analyze data from complex material testing
B2	The students have the skill to apply their knowledge and their ability to solve problems in new or unfamiliar contexts within broader (or multidisciplinary) contexts related to their field of study
B3	That students are able to integrate knowledge and handle complexity, and formulate judgments from an information that, being limited or not complete, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments
B4	That the students can communicate their conclusions and the knowledge and last reasons behind that conclusions to specialized and non specialized audience in a clear and unambiguous way
B6	Learning to learn
B7	Solving problems effectively
B9	To work autonomously with initiative
B12	Communicate effectively in the work environment
B13	Analysis-oriented attitude
B18	Ability for abstraction, understanding and simplification of complex problems
C2	Have a good command of spoken and writing expression and understanding of a foreign language.
C4	Developing for the exercise of an open, educated, critical, committed, democratic and solidary citicenship, able to analyze reality, diagnose problems, formulate and implement solutions based on knowledge and oriented to the common good.
C6	Critically assessing the knowledge, technology and information available to solve the problems they face with.
C7	To assume as a professional and citizen the importance of learning throughout life.
C8	To assess the importance of research, innovation and technological development in the socio-economic and cultural progress of society.

Learning outcomes			
Learning outcomes	Study programme competences / results		
To train students in theoretical and methodological principles for quantitative research, in the sense of design of experiments and regression models		BR7	
Know the most common statistical techniques in the field of thermal analysis and rheology		BR2 BR6 BR7	
Coñecer e aplicar técnicas estatísticas á análise de datos procedentes de ensaios de materiais complexos	AR4		

Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en ámbitos novos ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo		BR2	
Que os estudantes sexan capaces de integrar coñecementos e enfrontarse á complexidade de formular xuízos a partir dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vinculadas á aplicación dos seus coñecementos e xuízos		BR3	
Que os estudantes saiban comunicar as súas conclusións e os coñecementos e razóns últimas que as sustentan a públicos especializados e non especializados dun modo claro e sen ambigüidades		BR4	
Aprender a aprender		BR6	
Resolver problemas de forma efectiva		BR7	
Traballar de forma autónoma con iniciativa		BR9	
Comunicarse de xeito efectivo nun ámbito de traballo		BR12	
Actitude orientada á análise		BR13	
Capacidade de abstracción, comprensión e simplificación de problemas complexos		BR18	
Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.			CR2
Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.			CR4
Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.			CR6
Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.			CR7
Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.			CR8

Contents	
Topic	**Sub-topic**
I. Exploratory data analysis	1.1. Introduction to statistical analysis 1.1.1 Summary numerical data: Measures characteristics: measurements of position, dispersion and shape. 1.1.2. Vector statistics. 1.2. graphical representations
II. Regression Models	2.1. Simple linear regression model. 2.2. Elements of a regression model. 2.2.1.The linear model. 2.2.2. Parameter estimation by least squares. 2.2.3. Properties of estimators. 2.2.4. Inference on the parameters. 2.3. Validation of a regression model. 2.4. Tools for the study of the regression.
III. Design and Analysis of Experiments	3.1. Basic principles of design of experiments'. 3.2 Pplanning stages of an experiment. 3.3. Designs with a source of variation. The ANOVA model. 3.4. Designs with several factors. Factorial designs. 3.5. Factorial designs and response surfaces. 3.6. Experimental designs applications to complex materials.

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	A4 B2 B3 B4 B6	10	13	23

Supervised projects	C2 C4 C6 C7 C8	5	20	25
ICT practicals	B7 B12 B13	2	12	14
Objective test	A4 B2 B9 B18	2	8	10
Personalized attention		3	0	3
(*)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 keynote address is a teaching method based on the theoretical exposition by the teacher as a means of transmission of basic knowledge on the subject. These make an oral presentation complemented by the use of media and the introduction of some questions to students in order to impart knowledge and facilitate learning. The master class is also known as "conference" or "expository method" or "lecture". This last method is usually reserved for a special type of lesson taught by a teacher on special occasions, with a content which is an original production based on the almost exclusive use of the word as a means of transmitting information to the audience.
Supervised projects	Methodology designed to promote independent learning of students, based on the assumption by the students responsibility for their own learning under the tutelage of Professor and in various settings (academic and professional). It refers primarily to learning "how to do things." It is an option based on the assumption by the students responsibility for their own learning. The education system is based on two basic elements: the independent learning of students and monitoring of this learning by the class teacher
ICT practicals	Methodology that allows students to effectively learn through practical activities (demonstrations, simulations, data analysis using statistical packages, etc.) the theory of a field of knowledge, using information technology and communications . ICT brings excellent support and a channel for information processing and practical application of knowledge, facilitating learning and skills development by students.
Objective test	Multiple choice test of basic issues matter.

Personalized attention	
Methodologies	**Description**
Guest lecture / keynote speech Supervised projects	Resolution of doubts, clarifications, etc. Analysis and critical evaluation of scientific literature. Help your approach and follow up. Personal monitoring of each stage of the course work set (individual or group). Accompanying the students to explain what is going to visit and relevance. Direct and continuous monitoring of student can be registered in a personalized way to give us any variable indices to evaluate or verify their successful integration into the dynamics of the course. Guardianship and coordination of planned activities, resolution of doubts, additional explanations, etc.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Guest lecture / keynote speech	A4 B2 B3 B4 B6	Theoretical explanation of nuclear issues or basic notions of matter. Attendance by students at these sessions is mandatory and compute the final grade.	20

Supervised projects	C2 C4 C6 C7 C8	Methodology designed to promote independent learning and group of students, based on the assumption by the students responsibility for their own learning under the tutelage of Professor and in various settings (academic and professional). It refers primarily to learning "how to do things	20
ICT practicals	B7 B12 B13	Including the provision that students do the various jobs protected. It deals with fundamental questions of art using ICT, particularly the use of statistical programs for data processing. Through small group or individual tutoring, the teacher will guide the process of doing work as non-contact method based on the practices during the course.	20
Objective test	A4 B2 B9 B18	review test	40
Others			

Assessment comments
The presentation by the student of the course work outlined in the course must be done at least on the official date of the examination of the subject for each of the calls to those present.

Sources of information	
Basic	- Cao R., Franciso M, Naya S., Presedo M., Vázquez M., Vilar J.A. and Vilar J.M. (2001). Introducción a la Estadística y sus aplicaciones. . Editorial Pirámide - José Hernández Orallo, M.José Ramírez Quintana, Cèsar Ferri Ramírez. (2004). INTRODUCCIÓN A LA MINERÍA DE DATOS. Editorial Pearson. - Faraway, J.J. (2004). Linear models with R. . Chapman and Hall. - Ugarte L. Militino A. and Arnholt A. (2007). Probability and Statistics with R. CRC Press - Draper, N.R. y Smith, H. (1998). Applied Regression Analysis.. Wiley. Greene, W. - Peña, D. (2002). Regresión y diseño de experimentos. . Alianza Editoria - Venables, W.N. y Ripley, B.D. (2002). Modern applied statistics with S. . Springer - http://www.r-project.org/ (). . - Vikneswaran (2005). An R companion to ?Experimental Design?. URL http://CRAN.R-project.org/doc/contrib/Vikneswaran-ED-companion.pdf. - Gareth J., Witten, D., Hastie, T. and Tibshirani R. (2013). An Introduction to Statistical Learning. Springer
Complementary	- Montgomery, D.C. (2009). Design and Analysis of Experiments. 7th Edition,. J. Wiley and Sons - Box, G.E.P., Hunter, W.G. y Hunter J.S. (2005). Statistics for Experimenters: Design, Innovation, and Discovery. 2nd. Edition, . Wiley, New York

Recommendations
Subjects that it is recommended to have taken before
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.