



Teaching Guide

Identifying Data					2024/25
Subject (*)	Probability and Basic Statistics			Code	614G02003
Study programme	Grao en Ciencia e Enxeñaría de Datos				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	1st four-month period	First	Basic training	6	
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Departamento profesorado máster Matemáticas				
Coordinador	Costa Bouzas, Julian	E-mail	julian.costa@udc.es		
Lecturers	Costa Bouzas, Julian	E-mail	julian.costa@udc.es		
Web					
General description	Descriptive statistics. Exploratory data analysis. Probability. Probability models.				

Study programme competences / results

Code	Study programme competences / results
A1	CE1 - Capacidade para utilizar con destreza conceptos e métodos propios da matemática discreta, a álgebra lineal, o cálculo diferencial e integral, e a estatística e probabilidade, na resolución dos problemas propios da ciencia e enxeñaría de datos.
A2	CE2 - Capacidade para resolver problemas matemáticos, planificando a súa resolución en función das ferramentas dispoñibles e das restricións de tempo e recursos.
A3	CE3 - Capacidade para a análise de datos e a comprensión, modelado e resolución de problemas en contextos de aleatoriedade.
B1	CB1 - Que os estudantes demostrasen posuír e comprender coñecementos nunha área de estudo que parte da base da educación secundaria xeral, e adóitase atopar a un nivel que, aínda que se apoia en libros de texto avanzados, inclúe tamén algúns aspectos que implican coñecementos procedentes da vangarda do seu campo de estudo
B5	CB5 - Que os estudantes desenvolvesen aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores cun alto grao de autonomía
B6	CG1 - Ser capaz de buscar e seleccionar a información útil necesaria para resolver problemas complexos, manexando con soltura as fontes bibliográficas do campo.
C1	CT1 - 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.
C2	CT2 - Estimular a capacidade para traballar en equipos interdisciplinares ou transdisciplinares, para ofrecer propostas que contribúan a un desenvolvemento sustentable ambiental, económico, político e social.

Learning outcomes

Learning outcomes	Study programme competences / results		
Have knowlegde about statistical techniques and knowing how to use them for the exploratory data analysis.	A1 A2 A3	B1 B5 B6	C1
Have knowlegde and understand the general concepts about probability models.	A1 A2 A3	B1 B5 B6	C1 C2
Knowing how to model in simple random contexts using probabilistic tools.	A1 A2 A3	B1 B5 B6	C1



Knowing how to use auxiliary computer tools for Statistics: statistical packages and programming languages with statistical orientation; and knowing how to critically interpret the results.	A1	B1	C1
	A2	B5	
	A3	B6	

Contents	
Topic	Sub-topic
Probability	Definition of probability. Properties Conditional probability. Bayes? theorem
Univariate random variables	Discrete random variables Continuous random variables Central limit theorem Applications: Reliability and simulation
Multivariate random variables	Bivariate discrete random variables Bivariate continuous random variables Marginal distributions Conditionated distributions Independent random variables Characteristic measures Multivariate random variables
Descriptive statistics	Frequency distributions Graphical representations Location and dispersion measures Two dimensional statistical variable Linear simple regression

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A3 B5	30	48	78
Laboratory practice	C1 C2	20	16	36
Seminar	A2 B6	10	10	20
Mixed objective/subjective test	B1	4	0	4
Personalized attention		12	0	12

(*)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	Students will receive lectures where the professor, with the help of relevant audiovisual media, will present the theoretical and practical contents of the subject. Participation and debate will be encouraged at all times.
Laboratory practice	Laboratory practices will be held in a computer lab. It will be learned how to use the free statistical software R, and its programming structures. Statistical studies using both real and simulated data will be performed.
Seminar	Seminars will reinforce both the applied nature of the subject and its interactivity. Students will be able to express their doubts and concerns regarding the subject, and they will have the opportunity to perform, with the professor supervision, similar questions to those proposed in the exams. Additionally, with a very individualized attention, they will be able to complete the lab practices.
Mixed objective/subjective test	Students will have to show proficiency in the theoretical aspects of the subject and their ability to solve problems in the field of probability and statistics.

Personalized attention



Methodologies	Description
Seminar Guest lecture / keynote speech Laboratory practice	For problem solving, it will be important to personally help students with the questions that may arise. This attention will also serve, on the one hand, to the professor to detect potential problems in the methodology used to teach the subject and, on the other hand, to the students to strengthen theoretical knowledge and to express their concerns about the subject.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Seminar	A2 B6	During the course, students will prove their interest in the subject and his mastery of it by performing one written test.	10
Mixed objective/subjective test	B1	The final exam will consist of a mixed theoretical/practical test.	60
Laboratory practice	C1 C2	In order to evaluate the degree of understanding and learning of these practices, 2 or 3 evaluation tests will be scheduled, which will be carried out during the laboratory classes.	30

Assessment comments
<p>On the date set by the faculty in its annual program, students will take the final test of the subject, in which they will have to answer theoretical questions, solve theoretical-practical issues, and calculate the solution of various problems; for this test the students will only be allowed to bring with them the material expressly authorized.</p> <p>In the second opportunity, the grades obtained by continuous evaluation (the control and the laboratory practice tests) are maintained and the student only has to repeat the final test.</p> <p>All aspects related to "academic dispensation", "dedication to study", "permanence" and "academic fraud" will be governed in accordance with the current academic regulations of the UDC.</p>

Sources of information	
Basic	<ul style="list-style-type: none"> - Cao, R., Francisco, M., Naya, S., Presedo, M.A., Vázquez, M., Vilar, J.A. y Vilar, J.M. (2001). Introducción a la Estadística y sus aplicaciones. Ediciones Pirámide - Eguzkitza Arrizabalaga, J.M. (2014). Laboratorio de estadística y probabilidad con R. Gami Editorial
Complementary	<ul style="list-style-type: none"> - Devore, J.L. (2008). Probabilidad y Estadística para Ingeniería y Ciencias. Thomson - Gonick, L. y Smith, W. (2001). Á estadística ¡en caricaturas!. SGAPEIO - Hernández, V., Ramos, E. y Yáñez, I. (2007). Probabilidad y sus aplicaciones en Ingeniería Informática. Ediciones Académicas - Horgan, J.M. (2009). Probability with R. An Introduction with Computer Science Applications. Wiley - Montgomery, D.C. y Runger, G.C. (2004). Probabilidad y Estadística aplicadas a la Ingeniería. McGraw-Hill - Blasco Lorenzo, A. y Pérez Díaz, S. (2015). Modelos aleatorios en ingeniería. Paraninfo - Ugarte, M.D., Militino, A.F., Arnholt, A.T. (2008). Probability and Statistics with R. Chapman and Hall/CRC - Walpole, R.E., Myers, S.L. y Myers, R. (2000). Probabilidad y Estadística para Ingenieros. Prentice Hall

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus



Regression Models/614G02012

Statistical Modeling of High Dimensional Data/614G02013

Statistical Inference/614G02007

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.