UNIVERSIDADE DA CORUÑA

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 másterMatemáticas			
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 álxebra 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 A2 A3	B1 B5 B6	C1

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
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. 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. 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.

Sources of information	
Basic	- 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	- Devore, J.L. (2008). Probabilidad y Estadística para Ingeniería y Ciencias. Thomson - Gonick, L. y Smith, W. (2001). Á estatística ¡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 Ingenieríos. 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