Teaching Guide				
Identifying Data				2021/22
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	Matemáticas			
Coordinador	Presedo Quindimil, Manuel Antonio	E-mail	manuel.antonio.presedo.quindimil@udc.es	
Lecturers	Carpente Rodriguez, Maria Luisa Costa Bouzas, Julian Presedo Quindimil, Manuel Antonio	E-mail	luisa.carpente@udc.es julian.costa@udc.es manuel.antonio.presedo.quindimil@udc.es	
Web				
General description	Descriptive statistics. Exploratory data analysis. Probability. Probability models.			
Contingency plan	1. Modifications to the contents No changes will be made. 2. Methodologies *Teaching methodologies that are maintained All teaching methodologies are maintained (guest lecture, laboratory practices, seminar and mixed), changing only the mechanisms of personalized attention to students, which will consist of video-tutorials, virtual classes and virtual tutorials. *Teaching methodologies that are modified None of them. 3. Mechanisms for personalized attention to students Moodle, 1-2 times a week to provide the material, consisting of notes, video-tutorials or videos of the classes. Teams, 2-3 times a week (for virtual tutoring or virtual classes). 4. Modifications in the evaluation There will be no modifications in the assessment, except that this will be done using the tools Moodle and Teams. *Evaluation observations: 5. Modifications to the bibliography or webgraphy No changes will be made.			

Study programme competences	
Code	Study programme competences
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		
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	Ordinary class hours	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	Description	Qualification
Seminar	A2 B6	During the course, students will prove their interest in the subject and his mastery of it by performing two written tests (controls), each with a maximum mark of 10%. These two tests will correspond to Chapters 1 and 2 of the course. Students who do not obtain the maximum of 20% of the mark corresponding to this part will be able to retrieve the remaining part when taking the final exam of the subject.	20
Mixed objective/subjective test	B1	The final exam, with a value between 60% and 80% (depending on Chapters 1 and 2 written control grades), will consist of a theoretical and a practical written test.	60

Laboratory practice	C1 C2	Students will develop lab practice exercises specifically designed to assess their monitoring of the subject. The correct completion of these exercises will be supervised by the professor in the classroom. To evaluate the degree of understanding and learning of these practices, 2 or 3 assessment tests will be scheduled. They will be performed during the laboratory classes having a 20% of the final grade. For enrolled full-time students, the practice mark is not retrievable by performing another test. Enrolled part-time students, who have not been evaluated of laboratory practices, may perform a specific test to retrieve the 20% of the mark corresponding to that part.	20

Assessment comments
Students will finish the class period with a maximum of 40% of the grade, achieved with the two written tests (10% each) and the two or three tests evaluating the laboratory practices (20%). On the date set by the Faculty in its annual program, students will perform, in writing, the final exam of the subject (60%), where they will have to answer theoretical questions, solve theoretical and practical issues, and calculate the solution of several problems. For this test, students will only bring the material expressly authorized (e.g. pen or calculator).The grade obtained in the final exam (60%) will be re-scaled so that students will have the opportunity to retrieve the 20% of the mark corresponding to the written controls (the 20% of the laboratory practice assessment mark cannot be retrieved). Thus, depending on the score obtained by the student in the two written controls, the highest score of the final exam will be between 6 and 8 points (out of 10). Thus, denoting by P the laboratory practice grade (between 0 and 2 points), denoting by C the written controls (Chapters 1 and 2) final grade (between 0 and 2 points) and denoting by F the final exam grade (between 0 and 10 points), the course final grade will be P+C+0'1*(8-C)*F.The day of the final exam, part-time students, who have not been previously evaluated for the laboratory practice part, will be able to perform a specific test to retrieve the 20% of the mark corresponding to that part. In the second-chance, the marks obtained by continuous evaluation (the two controls and the tests of the laboratory practices) are maintained and the student only has to repeat the final exam. This will be of the same type and with the same weight in the final mark that in the first-chance, that is, the same formula will be applied to calculate the final grade, but now F is the grade that the student has obtained in the second-chance final exam. The fraudulent performance of the tests or evaluation activities will directly imply the grade of failure (0) in the subject. The evaluation system in the case of academic dispensation will be the same as that described in this section. -->

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 - R Development Core Team (2000). Introducción a R. http://www.r-project.org/ - 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

(*)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.