



Teaching Guide

Identifying Data					2024/25
Subject (*)	Mathematical techniques	Code	630G03006		
Study programme	Grao en Paisaxe				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	2nd four-month period	First	Basic training	6	
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Departamento profesorado máster Matemáticas				
Coordinador	Cuellar Cerrillo, Nuria	E-mail	nuria.cuellar@udc.es		
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Web	www.usc.gal/en/node/41099				
General description	<p>This course is part of the basic subjects taught in the first year of the curriculum leading to the degree in Landscape. The matter that makes up this course is divided into two blocks: Statistics and Calculus. The Statistics block will be taught at the EPS of Lugo, by the Department of Statistics, Mathematical Analysis and Optimization of the University of Santiago de Compostela. The teaching of the Calculus block will be carried out at the ETSA, by the Department of Mathematics of the University of A Coruña. The teaching of both parts will be carried out simultaneously and throughout the second semester. The objective of this subject is to offer the basic knowledge of Mathematics that is considered essential for all students to be able to solve mathematical problems that may appear in later courses, or in their professional future.</p>				

Study programme competences / results

Code	Study programme competences / results
A5	CE05 - Conocimiento adecuado y aplicado al paisaje del cálculo matricial, la trigonometría y la geometría métrica y proyectiva.
A13	CE13 - Conocimiento aplicado del cálculo numérico, el cálculo diferencial e integral, las ecuaciones diferenciales y los métodos estadísticos.
B1	CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio
B2	CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio
B3	CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética
B4	CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado
B5	CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía
B6	CG1 - Conocer el papel de las bellas artes, la historia y las teorías del paisaje, así como las tecnologías y ciencias humanas relacionadas con este.
B10	CG5 - Conocimiento en materias básicas, científicas y tecnológicas que permitan un aprendizaje continuo, así como una capacidad de adaptación a nuevas situaciones.
C1	CT1 - Expresarse correctamente, tanto de forma oral como escrita, en las lenguas oficiales de la comunidad autónoma. Capacidad de análisis y síntesis. Capacidad para el razonamiento y la argumentación. Capacidad para elaborar y presentar un texto organizado y comprensible. Capacidad para realizar una exposición en público de forma clara, concisa y coherente.
C2	CT2 - Utilizar las herramientas básicas de las tecnologías de la información y las comunicaciones (TIC) necesarias para el ejercicio de su profesión y para el aprendizaje a lo largo de su vida. Habilidad en el manejo de tecnologías de la información y de la comunicación (TIC). Capacidad para obtener información adecuada, diversa y actualizada. Utilización de información bibliográfica y de Internet.



C3	CT3 - Desenvolverse para el ejercicio de una ciudadanía respetuosa con la cultura democrática, los derechos humanos y la perspectiva de género. Capacidad para trabajar en grupo y abarcar situaciones problemáticas de forma colectiva.
C4	CT4 - Adquirir habilidades para la vida. y hábitos, rutinas y estilos de vida saludables.
C5	CT5 - Estimular la capacidad para trabajar en equipos interdisciplinares o transdisciplinares, para ofrecer propuestas que contribuyan a un desarrollo sostenible ambiental, económico, político y social.
C6	CT6 - Capacidad de gestionar tiempos y recursos: desarrollar planes, priorizar, actividades. identificar las críticas, establecer plazos y cumplirlos. Capacidad de trabajo individual, con actitud autocrítica.
C7	CT7 - Valorar la importancia que tiene la investigación, la innovación y el desarrollo tecnológico en el avance socioeconómico y cultura de la sociedad.
C8	CT8 - Entender la importancia de la cultura emprendedora y conocer los medios al alcance de las personas emprendedoras.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Acquire the ability to: -Organize, summarize and represent data. -Formulate problems in terms of statistical models. -Perform the calculations required by the proposed methods. -Interpret the results of the statistical analysis.	A5 A13	B6 B10	C1 C2 C3 C4 C5 C6 C7 C8
Know and apply numerical calculus and differential and integral calculus: -Know and use the differential calculus of one and several variables. -Know and properly apply the integration methods of functions of one variable. -Establish the basic concepts of the definite integral and know its applications. -Understand the fundamental concepts related to differential equations. -Recognize and integrate equations of first order and higher order than the first. -Know and be able to apply approximate methods for solving first-order differential equations.	A13	B1 B2 B3 B4 B5 B6 B10	C1 C2 C3 C4 C5 C6 C7 C8
Know and apply the methods of descriptive statistics to organize, summarize, present and obtain synthetic measures related to a set of data obtained from a population or a sample. - Know the fundamentals of probability calculation and its specific language, as the basis of the statistical inference process, particularly the concepts of random experiment, random variable and probability distribution of a variable, and apply it to problem solving and to identify situations in these concepts are manifested. - Know and apply the basic techniques of statistical inference: sampling, estimation, estimation and precision and uncertainty measurements associated with the inference process.			

Contents	
Topic	Sub-topic
Topic 1. Exploratory data analysis.	Sampling distribution of a variable. Summary measures. Regression and correlation.
Topic 2. Random variables.	Random variables. Population distribution of a variable. Summary measures. Commonly used probability distribution models.
Topic 3. Statistical inference techniques.	Confidence intervals based on one and two samples. Contrast of hypotheses based on one and two samples.
Topic 4. Real functions and vector functions.	Real valued functions and vector functions. Limits and continuity. Derivation. Relative and conditional extremes.
Topic 5. Integration.	Integration. Numerical integration.



Topic 6. Ordinary differential equations.	Ordinary differential equations. Methods of solving ordinary differential equations. Numerical resolution of first order differential equations.
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Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Introductory activities	B6 C8	1	0	1
Guest lecture / keynote speech	A5 A13 B10 C6 C7	27	30	57
Problem solving	A13 B1 B2 B6 B10 C1 C2 C3 C4 C5 C6	27	60	87
Objective test	A13 B1 B2 B3 B4 B5 C1 C2	4	0	4
Personalized attention		1	0	1

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description
Introductory activities	In the first class of the course there will be a presentation of the contents, skills and objectives to be achieved with this subject. A brief test may be carried out in order to know the competences that the student possesses.
Guest lecture / keynote speech	Oral presentation complemented by the use of audiovisual media, in which the teacher will present the different topics of the subject, as well as the problems that the student must learn to solve. Throughout it, the student will be able to intervene by asking questions that facilitate her instruction and the teacher will ask questions addressed to the students in order to transmit knowledge and facilitate learning.
Problem solving	As the subject develops, the teacher will propose assignments and/or deliver problem sets that the students must solve. Problem sets are not tests. Its resolution will begin in the classroom, where the students, in small groups, will discuss where their difficulty lies and how their resolution can be faced. The student will finish carrying them out independently and will be able to check if they have done them correctly, in the classroom or on the USC Virtual Campus.
Objective test	Theoretical-practical exam of the subject taught.

Personalized attention	
Methodologies	Description
Problem solving Guest lecture / keynote speech	Throughout the course each student should carry out two sessions of 30 minutes each with the teacher. In them the teacher will solve the doubts that the student presents

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Objective test	A13 B1 B2 B3 B4 B5 C1 C2	Evaluation of the continuous follow-up of the matter. The active participation in the classes, the realization of works and exposed problems, as well as their delivery on time will be taken into account.	90
Problem solving	A13 B1 B2 B6 B10 C1 C2 C3 C4 C5 C6	Final exam, consisting of two theoretical-practical tests corresponding to the two blocks of the subject: Calculus and Statistics.	10

Assessment comments



First opportunity: The evaluation of the students in the first opportunity will be based on the following sections: Final exam. It will consist of two theoretical-practical tests, corresponding to the subject of each block: Statistics and Calculus. To pass the subject, it will be necessary to obtain an average grade, between the two blocks, greater than or equal to 5, and not have a grade lower than 4 in any of them. Students who do not meet any of these requirements will have a fail grade on the first opportunity (the numerical grade will be the minimum between 4.5 and the average of the grades obtained in each block). Evaluation of the continuous follow-up of the matter. The interest and active participation of the student will be valued, both in the expositive and interactive classes, the completion of the work and problems raised, as well as its delivery on time. The final exam has a weight of 90% and the continuous evaluation has a weight of 10% in the course grade.

Observation of the evaluation of the calculus block: To evaluate the follow-up of the calculus block, two tests will be carried out throughout the semester. The first test will correspond to the subject taught in Topic 4, and the second to the subject taught in Topics 5 and 6. If the grades obtained in these tests are not less than 3, the average grade between the two is considered, with a weighting of 90%, to which would be added the evaluation of the continuous follow-up of the matter, with a weighting of 10%; If the total result is greater than or equal to 5, then the student may choose not to take the final exam, in which case the grade obtained by continuous assessment and partial exams will represent 100% of the final grade for the Calculus block.

Observation of the evaluation of the statistics block: To evaluate the monitoring of the statistics block, two tests will be carried out throughout the semester. The first test will correspond to the matter taught in Theme 1, and the second to the matter taught in Themes 2 and 3. If the grades obtained in these tests are not less than 3, the average grade between the two is considered, with a weighting of 90%, to which would be added the evaluation of the continuous follow-up of the matter, with a weighting of 10%; If the total result is greater than or equal to 5, then the student may choose not to take the final exam, in which case the grade obtained by continuous assessment and partial exams will represent 100% of the final grade for the Statistics block.

Second opportunity (July): The evaluation of second chance students will be based on the following sections: - Final exam: It will consist of two theoretical-practical tests, corresponding to the subject of each block: Calculus and Statistics. Those students who have passed one of the blocks in the first opportunity, may choose not to take the exam in that block, since the grade obtained in the first opportunity is saved. - Evaluation of the continuous follow-up of the subject, equal to that established for the first opportunity. The final exam has a weight of 90% and the continuous evaluation has a weight of 10% in the course grade. To pass the subject on the second chance, it will be necessary to obtain an average grade, between the two blocks, greater than or equal to 5, and not have a grade lower than 4 in any of them. Students who do not meet any of these requirements will have a fail grade on the second chance (the numerical grade will be the minimum between 4.5 and the average of the grades obtained in each block).

Both opportunities:

- 1) The students with recognition of part-time dedication and academic dispensation of exemption from attendance (which they must communicate to one of the teachers of the subject), will be evaluated, both in the first and on a second opportunity, only for the grade obtained in the final exam. Like the rest of the students, to pass the subject, they will have to have an average grade between the two blocks of the exam, greater than or equal to 5, and not have a grade lower than 4 in any of them.
- 2) There are no differentiated evaluation criteria for repeating students.
- 3) The fraudulent performance of the tests or evaluation activities, once verified, will directly imply the qualification of suspense in the call in which it is committed, in accordance with the current academic regulations of the UDC and the USC.



<p>Basic</p>	<p>CÁLCULO: Larson, R.; Hostetler, R. P.; Edwards, B. H. (2006). Cálculo, volúmenes 1 y 2. Madrid, McGraw-Hill. Robert A. Adams (2009). Cálculo. Pearson Educación S. A., Madrid. Rogawski, J. (2016). Cálculo. Una variable. Barcelona, Editorial Reverté. https://elibro-net.accedys.udc.es/es/ereader/bibliotecaudc/46777 Rogawski, J. (2012). Cálculo. Varias variables. Barcelona, Editorial Reverté. https://elibro-net.accedys.udc.es/es/ereader/bibliotecaudc/46778 ESTADÍSTICA: Arriaza Gómez, A.J. y otros (2008). Estadística básica con R y R-commander. Universidad de Cádiz. Delgado de la Torre, R. (2008). Probabilidad y Estadística para Ciencias e Ingenierías. Delta Publicaciones. Espejo Miranda, I. (2006). Estadística Descriptiva y Probabilidad (Teoría y Problemas). Universidad de Cádiz. http://sestio.uca.es/repos/l_edyp/pdf/febrero06/lib_edyp.c1.pdf Espejo Miranda, I. (2015). Inferencia Estadística (Teoría y Problemas). Universidad de Cádiz. http://sestio.uca.es/repos/l_inf_est/pdf/actual/lib_inf.pdf Cao, R. e outros (2006). Introducción a la Estadística y sus aplicaciones. Ed. Pirámide. Framiñán Torres, J.M. y otros (2016). Problemas resueltos de probabilidad y estadística. Universidad de Sevilla. Madsen, B. S. (2016). Statistics for non-statisticians. Springer. Mendenhall, W.M. (2016). Statistics for engineering and the sciences. CRC Press, Taylor & Francis Group. Montgomery, D. C. y Runger, G.C. (2010). Probabilidad y Estadística aplicadas a la Ingeniería. Limusa Wiley. Moore, D. S. (2005). Estadística aplicada básica. Antoni Bosch, D.L.</p>
<p>Complementary</p>	<p>CÁLCULO Ayres, F. (1992). Cálculo Diferencial e Integral. Madrid, McGraw-Hill. Granero, F. (2001). Cálculo integral y aplicaciones. Madrid, Prentice-Hall. Martínez Sagarzazu, E. (1996). Ecuaciones diferenciales y cálculo integral. Servicio Editorial Univ. del País Vasco. Simmons, G. F.; Krantz, S. G. (2007). Ecuaciones diferenciales. Teoría, técnica y práctica. México, McGraw-Hill. Larson, R. y Edwards, B. (2017). Matemáticas I: cálculo diferencial. Cengage Learning. https://elibro-net.accedys.udc.es/es/lc/bibliotecaudc/titulos/108520 Larson, R. y Edwards, B. (2017). Matemáticas II: cálculo integral. Cengage Learning. https://elibro-net.accedys.udc.es/es/lc/bibliotecaudc/titulos/108522 Larson, R. y Edwards, B. (2017). Matemáticas III: cálculo de varias variables. Cengage Learning. https://elibro-net.accedys.udc.es/es/lc/bibliotecaudc/titulos/108524 ESTADÍSTICA: Martínez, M (2009): R for Biologist. NIMBioS. (http://cran.r-project.org/) Milton, J. S. (2007). Estadística para biología y ciencias de la salud. McGraw-Hill. Navidi, W. (2006). Estadística para Ingenieros y Científicos. McGraw-Hill. Parra Frutos, I. (2003). Estadística Empresarial con Microsoft Excel. Problemas de Inferencia Estadística. Ed. AC. Ross, S.M. (2014). Introduction to probability and statistics for engineers and scientists. Elsevier-Academic Press. Ryan, T.P. (2007). Modern Engineering Statistics. John Wiley & Sons. Ross, S.M. (2014). Introduction to probability and statistics for engineers and scientists. Elsevier-Academic Press. Ryan, T.P. (2007). Modern Engineering Statistics. John Wiley & Sons. Walpole, R. E. y otros (1999). Probabilidad y estadística para ingenieros. Prentice-Hall.</p>

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

Recommendations for the study of the matter Attend classes, both expository and interactive. Solve the problems proposed in the bulletins of each topic. Participate in scheduled tasks. Use individual tutorials, both in person and through TIC.

(*)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.