



Teaching Guide				
Identifying Data				2019/20
Subject (*)	Mathematics 2	Code	730G05005	
Study programme	Grao en Enxeñaría Naval e Oceánica			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	Basic training	6
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
Coordinador	Brozos Vázquez, Miguel	E-mail	miguel.brozos.vazquez@udc.es	
Lecturers	Brozos Vázquez, Miguel	E-mail	miguel.brozos.vazquez@udc.es	
Web	campusvirtual.udc.es/moodle			
General description	This course is an introduction to the main concepts of Linear Algebra and Integrals over parths and surfaces. The Linear Algebra part includes the study of Vector Spaces and Linear Maps, including a basic analysis of diagonalization and Jordan normal form of endomorphisms. The study of Integrals over paths and surfaces requires the introduction and study of the main basic properties of these two concepts finishing with some of the important theorems within this area.			

Study programme competences	
Code	Study programme competences
A1	Skill for the resolution of the mathematical problems that can be formulated in the engineering. Aptitude for applying the knowledge on: linear algebra; geometry; differential geometry; differential and integral calculation; differential equations and in partial derivatives; numerical methods; algorithmic numerical; statistics and optimization
B1	That the students proved to have and to understand knowledge in an area of study what part of the base of the secondary education, and itself tends to find to a level that, although it leans in advanced text books, it includes also some aspects that knowledge implicates proceeding from the vanguard of its field of study
B2	That the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to prove itself by the elaboration and defense of arguments and the resolution of problems in its area of study
B5	That the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy
B6	Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas.
C4	Recognizing critically the knowledge, the technology and the available information to solve the problems that they must face.

Learning outcomes			
Learning outcomes		Study programme competences	
Identify mathematical concepts and tools to solve problems that can appear in an engineering context.		A1	B1 B2 B5 B6
To show the ability of using techniques of Linear Algebra, Geometry and Calculus to be applied in problem solving.		A1	B1 B2 B5 B6

Contents	
Topic	Sub-topic



Sets and functions in $\mathbb{R}^n$	Scalar and vector functions. Level sets. Continuity. Continuity in compact sets.
Differential Calculus	Directional derivative. Partial derivative. Differential of a function. Gradient vector. Jacobian matrix. Higher order derivatives. Introduction to vector calculus. Taylor polynomial for scalar functions. Critical points. Hessian matrix. Conditional extreme values. Lagrange multipliers.
Integral Calculus.	Double integrals. Triple integrals. Change of variables. Applications to the computation of areas and volumes.
Differential Geometry	Parameterized curves and line integrals. Integrals of vector functions. Gradient functions and conservative vector fields. Green's theorem. Parameterized surfaces. Rotational and divergence. Surface integrals. Stokes theorem. Divergence theorem.

### Planning

Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Guest lecture / keynote speech	A1 B5 B6 C4	30	30	60
Mixed objective/subjective test	A1 B1 B2 B5 B6 C4	8	8	16
Supervised projects	A1 B1 B2 B5 B6 C4	0	10	10
Problem solving	A1 B1 B2 B5 B6 C4	30	30	60
Personalized attention		4	0	4

(\*)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	Oral exhibition complemented with the use of audiovisual means and some questions headed to the students, with the purpose to transmit knowledges and facilitate the learning
Mixed objective/subjective test	Written exam used for the evaluation of the learning, whose distinctive stroke is the possibility to determine if the answers given are or no correct. It constitutes an instrument of measure, elaborated rigorously, that allows to evaluate knowledges, capacities, skills, performance, aptitudes, attitudes, etc
Supervised projects	Homework that professors are going to asses during the course.
Problem solving	Technic by means of which one has to solve a specific problematic situation related to the contents of the subject.

### Personalized attention

Methodologies	Description
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Supervised projects	<p>The contents of the subject as well as the developed methodologies require that students work by themselves. This will generate some questions that they can ask during the classes or during the office hours.</p> <p>The students with recognition of part-time dedication and academic exemption from attendance can use the tutorials as a reference in order to follow the course and the autonomous work.</p>
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Assessment			
Methodologies	Competencies	Description	Qualification
Mixed objective/subjective test	A1 B1 B2 B5 B6 C4	Written exam will be used to assess learning of the contents of the subject. The exam consists of three parts, the first one will be performed during the course as a partial exam. This part will be eliminatory and retrievable. The second part will be developed throughout the course by making homework and will be graded by assessing gained competences. The third part will be performed during the usual period of final exams and will assess the first, second and third parts.	80
Supervised projects	A1 B1 B2 B5 B6 C4	Homework that professors are going to asses during the course.	20

Assessment comments
<p>Students with recognition of part-time dedication and academic exemption from attendance will be graded under the same conditions than other students, as explained above.</p> <p>The second opportunity will be developed in the same conditions as the first one.</p>

Sources of information	
<b>Basic</b>	<ul style="list-style-type: none"> <li>- Marsden, J., Tromba, A. (2004). Cálculo Vectorial. Addison-Wesley</li> <li>- Hwei P. Hsu (1987). Análisis Vectorial. Addison-Wesley</li> <li>- Larson, R., Hostetler, R., Edwards, B. (1999). Cálculo y Geometría Analítica, Vol. 2. McGraw-Hill</li> <li>- Gómez Bernúdez, C, Gómez Gratacos, F. (2018). Problemas de Cálculo. Andavira</li> <li>- Salas, L., Hille, E., Etgen, G. (2013). Calculus, vol I-II. Reverté</li> </ul>
<b>Complementary</b>	Recoméndase recursos bibliográficos da páxina <a href="http://maxima.sourceforge.net/">http://maxima.sourceforge.net/</a> para o uso do programa Maxima, que servirá de apoio nesta materia.

Recommendations
<b>Subjects that it is recommended to have taken before</b>
Mathematics 1/730G05001 Physics 1/730G05002
<b>Subjects that are recommended to be taken simultaneously</b>
Physics 2/730G05006
<b>Subjects that continue the syllabus</b>
Differential equations/730G05011
<b>Other comments</b>



Homework of this course will attend to the following: Preferably, virtual homework will be used, when printing is not required. In the case that paper is needed, then: No plastic materials will be used. Printing will be done both sides. Recycled paper will be used as possible. Unnecessary printed drafts will be avoided. In general, a sustainable use of natural resources will be done. Moreover, ethic principles related to sustainability will be followed.

(\*)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.