UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				**2021/22**
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	Galician			
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	
	Campo Cabana, Marco Antonio		marco.campo@udc.es	
Web	campusvirtual.udc.es/moodle			
General description	This course begins with an introduction to Diferential and Integral Calculus in several variables. The second part of the course treats parametrized curves and surfaces, including classical theorems as Green's Theorem for curves and Stokes and Divergence's Theorem for surfaces.			

Contingency plan	1. Modifications to the contents
	There are no changes in contents.
	2. Methodologies
	*Teaching methodologies that are maintained
	Teaching methodologies are the same.
	*Teaching methodologies that are modified
	The type of teaching methodologies is the same, except for the fact that it becomes completely online. Moreover, there are may be changes in the weight of the evaluation activities.
	3. Mechanisms for personalized attention to students
	Students will be attended preferably by:
	- Email: daily.
	- Moodle platform: daily, specially by means of the forums for questions and discussions of each of the topics of the subject.
	- Teams: for a direct interaction between students and profesor, in office hours or by appointment.
	4. Modifications in the evaluation
	The homework and exercise, that will be defended by Teams, will gain weight in a virtual teaching scenario.
	*Evaluation observations:
	The students with recognition of part-time dedication and academic exemption from attendance will be assessed through the objective tests in the same conditions as the rest of the students.
	The second opportunity will be graded following the same criteria than in the first one.
	5. Modifications to the bibliography or webgraphy
	The main bibliographyc sources are available via Moodle. Recommendations for references are unchanged, but use of sources available online will be prefered.

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	C4
To show the ability of using techniques of Linear Algebra, Geometry and Calculus to be applied in problem solving.	A1	B1 B2 B5 B6	C4

Contents	
Topic	**Sub-topic**
Sets and functions in 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**
Supervised projects	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. Office hours will be face-to-face if possible, otherwise they will be online. The students with recognition of part-time dedication and academic exemption from attendance can use the office hours as a reference in order to follow the course and the autonomous work.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Mixed objective/subjective test	A1 B1 B2 B5 B6 C4	Written exams to assess the knowledge of the subject by the students. The subject will consist on two parts and the final qualification of the subject will be the addition of the qualifications obtained at each of them. 1) The first part will be performed during the teaching period and will involve all the chapters studied until the celebration of the exam. If the student passes this exam, the qualification is retained until the end of the present course. This part will be recoverable in the final exam (second chance), to be held in July. 2) The second (and final) exam will be carried out in the period of final exams. It will involve the second part of the subject and a second chance to pass the first part. In case of passing any of these two parts, either in the partial exam or in the final exam of January, the qualification is retained for the present course until the exam of second opportunity. To pass the subject is compulsory to obtain at least 30% of the maximum grade in each part.	80
Supervised projects	A1 B1 B2 B5 B6 C4	Students must do an autonomous work related with the contents of the subject and following specific guidelines.	20

Assessment comments

The students with recognition of part-time dedication and academic

exemption from attendance will be assessed through the objective tests

in the same conditions as the rest of the students.

The second opportunity and the extraordinary exam in december will be graded following the same criteria than in the first one.

Fraudulent behaviour will result in a "0" qualification in the subject for the two opportunities.

Sources of information	
Basic	- Marsden, J., Tromba, A. (2004). Cálculo Vectorial. Addison-Wesley - Hwei P. Hsu (1987). Análisis Vectorial. Addison-Wesley - Larson, R., Hostetler, R., Edwards, B. (1999). Cálculo y Geometría Analítica, Vol. 2. McGraw-Hill - Gómez Bernúdez, C, Gómez Gratacos, F. (2018). Problemas de Cálculo. Andavira - Salas, L., Hille, E.,Etgen, G. (2013). Calculus, vol I-II. Reverté \
Complementary	Recoméndase recursos bibliográficos da páxina http://maxima.sourceforge.net/para o uso do programa Maxima, que servirá de apoio nesta materia.

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