UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				**2022/23**
Subject (*)	Mathematics 2		**Code**	610G01002
Study programme	Grao en Química			
Descriptors				
Cycle	**Period**	**Year**	**Type**	**Credits**
Graduate	2nd four-month period	First	Basic training	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
Coordinador	Otero Verea, Jose Luis		**E-mail**	luis.verea@udc.es
Lecturers	Calvo Garrido, María Del Carmen		**E-mail**	carmen.calvo.garrido@udc.es
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Web				
General description	This course aims to develope the necessary skills to obtain a critical knowledge in differential and integral calculus as well as a small introduction to linear algebra and differential equations.			

Study programme competences	
Code	**Study programme competences**
A15	Ability to recognise and analyse new problems and develop solution strategies
A16	Ability to source, assess and apply technical bibliographical information and data relating to chemistry
A20	Ability to interpret data resulting from laboratory observation and measurement
A24	Ability to explain chemical processes and phenomena clearly and simply
A25	Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life
A27	Ability to teach chemistry and related subjects at different academic levels
B1	Learning to learn
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B6	Ethical, responsible, civic-minded professionalism
C1	Ability to express oneself accurately in the official languages of Galicia (oral and in written)
C3	Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life
C6	Ability to assess critically the knowledge, technology and information available for problem solving

Learning outcomes			
Learning outcomes	**Study programme competences**		
The study, representation and interpretation of elementary functions of one and several variables	A15 A16 A20 A24 A25 A27	B1 B2 B3 B6	C1 C3 C6
Use skilfully the techniques of calculation of primitive and its applications.	A15 A16 A20 A24 A25 A27	B1 B2 B3 B6	C1 C3 C6

Set out and solve simple models that comport equations and systems of differential equations.	A15	B1	C1
	A16	B2	C3
	A20	B3	C6
	A24	B6	
	A25		
	A27		
Solve problems of basic statistical methods from the descriptive point of view	A15	B1	C1
	A16	B2	C3
	A20	B3	
	A24	B6	
	A25		
	A27		

Contents	
Topic	**Sub-topic**
Differentiation of functions of several variables	Functions of several variables.
	Topological notions. Flat curves and parametric equations. Surfaces in space. Polar, cylindrical and spherical coordinates. Real functions of several variables. Scalar and vector functions. Graphs and level sets. Concept of continuity.
	Differentiation of functions of several variables.
	Partial derivatives. Directional derivative. Differential of a function. Higher order partial derivatives. Jacobean Matrix. Chain rule. Taylor's theorem. Plane tangent to a surface. Function ends of two variables. Lagrange multipliers.
Integration of functions of several variables	Multiple integration. Integral line.
	Iterated integrals. Double integrals. Change of variables: polar coordinates. Triple integrals Change of variables: cylindrical and spherical coordinates. Applications. Line integrals of scalar and vector functions. Applications. Green and Stokes theorem.
Differential Equations	First order differential equations.
	Separable variables. Homogeneous equations.
	Exact equations
	Linear equations.
	Differential equations as mathematical models.
	Linear differential equations of order n.
	Homogeneous linear differential equations.
	Variation of parameters. Indeterminate coefficients.
	Linear systems of differential equations.
	Modeling with systems of differential equations.
Descriptive statistics	Statistical description of a variable
	Joint statistical description of several variables
	Regression curves: least squares.

Planning				
Methodologies / tests	**Competencies**	**Ordinary class hours**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	A15 A16 A24 A27 B1 B2 B3 B6	32	64	96
Problem solving	A20 A25 B2 B3 C1	8	18	26

Supervised projects	A15 A20 B1 B3 C1 C3 C6	8	16	24
Multiple-choice questions	B2 B3	3	0	3
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**
Guest lecture / keynote speech	concept development and problem solving
Problem solving	Questionnaires, bulletins and exams from other courses that will be periodically made available to students on different contents and that students will have to solve.
Supervised projects	Working on topics proposed by the teacher, a theoretical summary will be presented along with a bulletin of solved problems on the corresponding topic
Multiple-choice questions	Multiple answer test

Personalized attention	
Methodologies	**Description**
Supervised projects	The personalized attention described in relation to these methodologies is conceived as face-to-face moments of work for the students with the teacher, for which they imply a participation for the students; the form and the moment in which it will be carried out will be indicated in relation to each activity throughout the course according to the work plan of the subject. The specific personalized attention measures for or "Students with recognition of part-time dedication and academic exemption from attendance exemption" for the study of the subject, will be delivery of questionnaires, bulletins and exams of other courses that will be periodically made available to the students about different contents and that the student will have to solve.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Supervised projects	A15 A20 B1 B3 C1 C3 C6	Development of specific aspects with examples and solved problems. Competence B3 will be assessed.	10
Multiple-choice questions	B2 B3	Multiple-choice questions	70
Problem solving	A20 A25 B2 B3 C1	Delivery of exercises and solved exams. Competences A15, B2 and C3 will be assessed.	20

Assessment comments

To pass the course, it will be necessary to obtain, added the marks of all the activities, a minimum grade of 50% of the total and 50% of the multiple-choice test. To obtain the grade of not presented, it will be sufficient that the student does not participate in the multiple-choice test and has not been evaluated in the supervised Works in more than 50%. In the second chance test, the criterion to pass the subject will be the previous one. The teaching-learning process, including assessment, refers to one academic course, and therefore a new course would be restarted, including all assessment activities and procedures that were scheduled for that course; however, it is allowed to request to maintain the practical qualification of a previous course.

Students enrolled in part-time regime and academic exemption from attendance exemption, can be evaluated in a personalized way regarding the methodologies of Maxistral Session, Problem Solving and Tutored Jobs. Students enrolled in part-time regimen are required to sit the multiple-choice test, as well as the partial tests throughout the course. For the first and second opportunity, the evaluation criteria for this student body is the same as for the others and the attendance waiver percentage will be 80%.

Students at the first opportunity have priority in the granting of honors.

Fraud in tests or evaluation activities will

directly involve the implementation of the current rules in the Assessment, review and complaint regulation of the UDC

and the Student Statute of the UDC

Sources of information	
Basic	- LARSON (2006). CALCULO. McGrawHill
	- Jon Rogawski (). Cálculo varias variables. Reverté
	- Zill (). Ecuaciones diferenciales con aplicaciones de modelado. Thomson-Learning
	- CAO ABAD, R. y otros (2001). Introducción a la estadística y sus aplicaciones.
	- MILLER, J.C. Y MILLER, J.N. (2002). Estadística para Química Analítica. Addison-Wesley Iberoamericana
	- TOMEO PERUCHA V. y UÑA JUÁREZ I. (2003). Lecciones de Estadística Descriptiva. Paraninfo
	- W. Keith Nicholson (2019). Linear Algebra with Applications. Lyryx Learning Team
Complementary	- Alegre (). Problemas de funciones de varias variables. PPU
	- Alfonsa García (). Cálculo I. CLGSA
	- Alfonsa García (). Cálculo II. CLGSA
	- Rainville (). Ecuaciones diferenciales. Prentice Hall
	- Ayres (). Ecuaciones diferenciales. Mcgraw-Hill
	- Bradley (). Cálculo. Prentice Hall
	- Finney (). Cálculo. Addison-Wesley
	- Salas / Hille / Etgen (). Cálculus. Reverté
	- GARCÍA ÁLVAREZ-COQUE, C. Y RAMIS RAMOS, G. (2001). Quimiometría. Editorial Síntesis
	- GONICK, L. Y SMITH, W. (2001). A estatística ¡en caricaturas! . SGAPEIO
	- Quimiometría (2005). MONGAY FERNÁNDEZ, C.. PUV

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
It is convenient to have knowledges of mathematics of 2 bachillerato, if
it does not have them recommend do the course of nivelación.