Teaching Guide				
Identifying Data				2021/22
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	González Rueda, Ángel Manuel Jacome Pumar, Maria Amalia Otero Verea, Jose Luis Varela Rodríguez, Hiram	E-mail	angel.manuel.rueda@udc.es maria.amalia.jacome@udc.es luis.verea@udc.es hiram.varela@udc.es	
Web				
General description	Esta asignatura pretende o desenrolo de competencias que permitan ao alumnado obterr un conocimento critico do calculo diferencial e integral así como unha pequena introducción ao alxebra lineal e as ecuacions diferenciais.			

Contingency plan	ADJUSTMENTS IN CASE OF ONLINE TEACHING MODALITY 1. Modifications to the contents. No changes will be made. 2. Methodologies * Teaching methodologies that are maintained Tutored works Personalized attention * Change of teaching methodologies Master session: face-to-face assistance is replaced by material (PDF, explanatory videos) available at moodle.udc.es. and team video conferencing Problem solving: calculate in assessment. Attendance is replaced by material (PDF, explanatory videos) available at moodle.udc.es and group videoconference on computers Multiple choice test: calculate in the assessment. The following changes will be made: (a) The test related to the practical part of Statistics is replaced by practical work to be carried out in groups of two students. (b) The tests related to the practical part of Mathematics will be carried out through online tests at moodle.udc.es (c) The tests related to the theoretical part of the subject will be done through online tests at moodle.udc.es 3. Mechanisms for personalized attention to students. Email: every day, to make inquiries, request virtual meetings to answer questions and follow up on supervised work. Moodle: Daily, according to the needs of the students. They have thematic forums associated with the modules of the subject, to formulate the necessary queries. Teams: a weekly session in large groups to advance the theoretical content and supervised assignments at the time assigned to the subject on the faculty classroom calendar. There may also be weekly sessions or as requested by students in small groups, for monitoring and support in doing supervised work. This dynamic allows a standardized and adjusted monitoring of the student's learning needs to develop the work of the subject. 4. Modifications in the evaluation. Math Part (75%): No change in grade weights: 16% Theory multiple choice test in theory part, 54% Practice multiple choice test (or supervised work in case of non-attendance) . Part of the statistics (25%). There are no changes in the weights of the grades: 16% Multiple choice test of the theory part, 9% Multiple choice test of the practice (or supervised work in case of non-attendance). * Evaluation comments: They remain the same as in the teaching guide. REQUIREMENTS TO EXCEED THE THEME: 1. Regularly attend and participate in class activities. 2. Submit supervised work by the date indicated. 3. Obtain a minimum grade of 50% in the objective test and a minimum final grade of 50% plus the marks of all the activities. 4. The July opportunity will be subject to the same criteria as the June opportunity.

5. "Part of the statistics (25%). There are no changes in the weights of the grades: 16% Multiple-choice test for the theory part, 9% Practical test if it can be done in person, or supervised work in opposite case. "

6. "Part of Mathematics (75%). There are no changes in the weights of the grades: 54% Multiple-choice test of the theory part, 16% Practical test in case it can be done in person, or supervised work otherwise ".

5. Modifications to the bibliography or webography.
No changes will be made. They already have all the work materials digitized in Moodle.

(II) MODIFICATION IN CASE THE CAPACITY OF THE CLASSROOM ASIGNED FOR THE SUBJECT IS EXCEEDED
In case problems in the capacity of the spaces designated for the face-to-face activities, additional spaces will be booked where the students can follow the activities using the TEAMS platform. In the case of practical activities, the groups will be split to match the capacity of the laboratory

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 A16 A20 A24 A25 A27	B1 B2 B3 B6	C1 C3 C6
Solve problems of basic statistical methods from the descriptive point of view	A15 A16 A20 A24 A25 A27	B1 B2 B3 B6	C1 C3

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 Contingency plan (due to Covid19): * Teaching methodologies that change. Master Session: Presence is replaced by material (PDF, explanatory videos) available at moodle.udc.es. and team video conferencing

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. Contingency plan (because of Covid19). * Teaching methodologies that change. Problem solving: Compute in the assessment. Attendance is replaced by material (PDF, explanatory videos) available on moodle.udc.es and group video conferences on Teams
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 Contingency plan (because of Covid19): * Teaching methodologies that are maintained Tutored works
Multiple-choice questions	Multiple answer test Contingency plan (because of Covid19): * Teaching methodologies that change Multiple choice test: Compute in the assessment. The following changes will be made: (a) The test relating to the practical part of Statistics is replaced by practical work to be carried out in groups of two students. (b) The tests related to the practical part of Mathematics will be done through online tests at moodle.udc.es (c) The tests related to the theoretical part of the subject will be done through online tests at moodle.udc.es

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. Contingency plan (by mor do Covid19) ?Email: Daily. Of use to make consultations, request virtual meetings to resolve doubts and follow up on supervised work. ?Moodle: Daily to formulate the necessary queries. ?Teams: weekly sessions in the time slot assigned to the subject in the faculty classroom calendar.

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 or to obtain a grade of not less than 50% in the multiple choice test. With regard to successive academic courses, 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. Contingency plan (due to Covid19):Mathematics part (75%): There are no changes in the weights of the grades: 54% Multiple-choice test of the theory part, 21% Multiple-choice test of the practice (or supervised work in case of non-attendance). Part of the statistic (25%). There are no changes in the weights of the grades: 16% Multiple choice test of the theory part, 9% Multiple choice test of the practice (or supervised work in case of non-attendance). 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 *Evaluation observations: They remain the same as above. REQUIREMENTS TO PASS THE SUBJECT:1. Regularly attend and participate in class activities. 2. Submit supervised work by the date indicated. 3. Obtain a minimum grade of 50% in the objective test and a minimum final grade of 50% plus the marks of all the activities. 4. The July opportunity will be subject to the same criteria as the June opportunity.

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 Plan de continxencia (por mor do Covid19):Modificacións da bibliografía ou webgrafíaNon se realizarán cambios. Xa dispoñen de todos os materiais de traballo da maneira dixitalizada en Moodle.
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.

(*)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.