



## Teaching Guide

Identifying Data					2022/23
Subject (*)	Mathematics 1	Code	610G01001		
Study programme	Grao en Química				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	1st four-month period	First	Basic training	6	
Language	SpanishEnglish				
Teaching method	Face-to-face				
Prerequisites					
Department	Matemáticas				
Coordinador	Otero Vereá, Jose Luis	E-mail	luis.verea@udc.es		
Lecturers	Calvo Garrido, María Del Carmen Otero Vereá, Jose Luis Suarez Taboada, Maria	E-mail	carmen.calvo.garrido@udc.es luis.verea@udc.es maria.suarez3@udc.es		
Web					
General description	This course aims to develop 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 / results

Code	Study programme competences / results
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 / results		
The study, representation and interpretation of elementary functions of one and several variables	A15	B2 B3	C6
Skillful use of primitive calculation techniques and their applications	A15	B2 B3	C6
Solve systems of linear equations and operate with matrix calculus	A15	B2 B3	C6



State and solve simple models involving equations and systems of differential equations.	A15	B1	C1
	A16	B2	C3
	A20	B3	C6
	A24	B6	
	A25		
	A27		

Contents	
Topic	Sub-topic
? Differentiation	<ul style="list-style-type: none"> <li>o Basic Rules of Differentiation.</li> <li>o The Chain Rule.</li> <li>o Techniques Differentiation.</li> <li>o L'Hôpital's Rule. Taylor's Theorem.</li> <li>o Applications of Differentiation.</li> <li>o Maxima and Minima.</li> <li>o Optimisation Problems.</li> <li>o The Newton-Raphson Method.</li> </ul>
? Integration	<ul style="list-style-type: none"> <li>o Integration as Summation.</li> <li>o Fundamental Theorem of Calculus.</li> <li>o Some Basic Integrals.</li> <li>o Integration by Substitution.</li> <li>o Integration by Parts.</li> <li>o Integration of Rational Functions.</li> <li>o Geometrical Applications of Integration.</li> <li>o Numerical Integration. Simpson's Rule.</li> <li>o Improper Integrals.</li> </ul> <p>Integración numérica: método de Simpson.</p> <p>Integrales impropias.</p>
? Ordinary Differential Equations.	<ul style="list-style-type: none"> <li>o First Order Differential Equations.</li> <li>o Separable First Order Differential Equations.</li> <li>o Linear First Order Differential Equations.</li> <li>o Applications of First Order Differential Equations.</li> <li>o Second Order Linear Differential Equations with Constant Coefficients.</li> <li>o Homogeneous Linear Systems with Constant Coefficients.</li> </ul>
? Linear Algebra	<ul style="list-style-type: none"> <li>o Systems of Linear Equations</li> <li>o Elementary operations.</li> <li>o The Algebra of Matrices.</li> <li>o Determinants. Basic properties.</li> <li>o The determinant rank.</li> <li>o Eigenvalues and Eigenvectors.</li> <li>o Normal forms for matrices.</li> <li>o Cayley-Halmiton theorem.</li> </ul>

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Guest lecture / keynote speech	A15 B2 B3 C6	32	64	96



Problem solving	A15 B2 B3 C6	8	18	26
Supervised projects	A15 B2 B3 C6	8	16	24
Multiple-choice questions	A15 A16 A20 A24 A25 A27 B1 B2 B3 B6 C1 C3 C6	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 of other courses that will be periodically made available to students on different content and that students will have to solve.
Supervised projects	Work on topics proposed by the teacher, a theoretical summary will be presented along with a bulletin of problems solved on the corresponding topic
Multiple-choice questions	Multiple choice 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 / Results	Description	Qualification
Multiple-choice questions	A15 A16 A20 A24 A25 A27 B1 B2 B3 B6 C1 C3 C6	Multiple-choice questions	60
Problem solving	A15 B2 B3 C6	Delivery of exercises and solved exams. Competences A15, B2 and C3 will be assessed.	20
Supervised projects	A15 B2 B3 C6	Development of specific aspects with examples and solved problems. Competence B3 will be assessed.	10
Guest lecture / keynote speech	A15 B2 B3 C6	Questions to the students.	10

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. 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. 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.

The fraudulent performance of tests or assessment activities will directly imply a qualification failure of '0' in the corresponding call, invalidating the qualification obtained in all the assessment activities for the extraordinary call.

### Sources of information

<b>Basic</b>	<ul style="list-style-type: none"> <li>- LARSON (2006). CALCULO. McGrawHill</li> <li>- W. Keith Nicholson (2019). Linear Algebra with Applications. Lyryx Learning Team</li> </ul>
<b>Complementary</b>	<ul style="list-style-type: none"> <li>- Alfonsa García (). Cálculo I. CLGSA</li> <li>- NEUHAUSER (2004 ). MATEMÁTICAS PARA CIENCIAS . Pearson</li> <li>- Bradley (). Cálculo. Prentice Hall</li> <li>- Salas / Hille / Etgen (). Cálculus. Reverté</li> <li>- Finney (). Cálculo. Addison-Wesley</li> <li>- Rogawski (2014). Cálculo, una variable. Reverté</li> </ul>

### 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 the second year of High School. In other situations is important to attend the "Level 0 course" which is organized at the beginning of the term. Daily studying of the contents taught in every session which should be completed with the recommended bibliography.

Green Campus Programme of the Faculty of Sciences

In order to achieve an immediate sustainable environment and to comply with the 6th point of the "Declaración Ambiental da Facultade de Ciencias (2020)", the documentary works to develop in this subject:

a. Will be mostly asked to develop in virtual format and computer support.

b. If it is done on paper:

- Plastics will be not used.
- Prints will be made in double-sided.
- Recycled paper will be used.
- Draft works will be avoided.

**(\*)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.**