



## Teaching Guide

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Mathematics		Code	610G02003
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	SpanishEnglish			
Teaching method	Hybrid			
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	campusvirtual.udc.gal (Moodle), Microsoft Teams			
General description	This subject aims to develop competencies that allow students to develop a critical knowledge of differential and integral calculation as well as a reduced introduction to linear algebra and differential equations.			

## Study programme competences

Code	Study programme competences
A21	Deseñar modelos de procesos biolóxicos.
B1	Aprender a aprender.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
B5	Traballar en colaboración.
B6	Organizar e planificar o traballo.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B8	Sintetizar a información.
B9	Formarse unha opinión propia.
B10	Exercer a crítica científica.
B12	Adaptarse a novas situacións.
B13	Comportarse con ética e responsabilidade social como cidadán e como profesional.

## Learning outcomes

Learning outcomes	Study programme competences		
The study, representation and interpretation of elementary functions of one and several variables	A21	B1 B2 B3 B4	
Integration and applications	A21	B1 B2 B3 B5 B6 B7	



Skillful use of primitive calculation techniques and their applications	A21	B1 B2 B3 B8 B9 B10	
Solve systems of linear equations and operate with matrix calculus	A21	B1 B2 B3 B12	
State and solve simple models involving equations and systems of differential equations.	A21	B1 B2 B3 B13	
Differentiation and applications	A21	B1 B2 B3	
Linear algebra and applications	A21	B1 B2 B3	
Differential equations and applications	A21	B1 B2 B3	

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 Differentiation techniques.</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>
? 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-Hamilton theorem.</li> </ul>
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Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Guest lecture / keynote speech	A21 B1 B2 B3	32	64	96
Problem solving	A21 B1 B2 B3 B4 B5 B6	8	18	26
Supervised projects	A21 B1 B2 B3 B4 B7 B8 B9	8	16	24
Multiple-choice questions	B2 B3 B4 B10 B12 B13	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	A variety of problems (from textbooks and exams of past academic years) will be periodically made available to students on different topics of this course. The students will have to solve them to acquire the required skills to pass this course.
Supervised projects	Working on topics proposed by the teacher, a theoretical summary will be presented along with a collection of problems resolved on the corresponding topic.
Multiple-choice questions	Mathematical solution of questions and problems related to the topics of this course.

Personalized attention	
Methodologies	Description



Supervised projects	<p>The personalized attention (described in relation to these methodologies) is planned by means of face-to-face meetings between the students and the teachers, which require an active participation of the students.</p> <p>The course of these personalized activities will be indicated specifically for each type of academic activity, and they will be fixed in the semester schedule.</p> <p>The personalized attention for those students with a recognized part-time enrollment, will consist in the solution of exercises (from textbooks and exams of other academic years), which will be periodically available according to the schedule of this course.</p>
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Assessment			
Methodologies	Competencies	Description	Qualification
Supervised projects	A21 B1 B2 B3 B4 B7 B8 B9	Development of specific aspects with examples and solved problems. Competence B3 will be assessed.	10
Problem solving	A21 B1 B2 B3 B4 B5 B6	Delivery of exercises and solved exams. Competences A15, B2 and C3 will be assessed.	20
Multiple-choice questions	B2 B3 B4 B10 B12 B13	Multiple-choice questions	60
Guest lecture / keynote speech	A21 B1 B2 B3	Questions to the students.	10

Assessment comments
<p>To pass this course it will be necessary to obtain (after adding the qualifications of all the activities) a minimum mark of 50% of the total and 50% of the multiple-choice test. To obtain the mark "not presented", it will be sufficient that the students do not participate in the multiple-choice test and have not been evaluated in more than 50% of the problem solving and supervised works.</p> <p>To pass the course in the second opportunity, either the above criterion is fulfilled or a mark higher than 50% in the multiple choice test is obtained. Final marks are not kept from successive academic years.</p> <p>However, it is possible to keep the marks of the supervised works of the previous academic year, if the teacher agrees to this, having the student previously demanded it. The students which are part-time enrolled (and so they are granted with an attendance exemption), can be evaluated in a personalized way regarding the methodologies of the lectures, problem solving and supervised works. For those students which are part-time enrolled, it is compulsory to make the multiple-choice test, as well as the partial test along the course. For the first and second opportunity the criteria of evaluation for these students is the same as the criterion for full-time enrolled students (where the attendance waiver will be of 80%). The priority for obtaining qualifications "with honors" will be for the students that achieve this mark in the first opportunity.</p> <p>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</p>



## 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>- Rogawski (2014). Cálculo, una variable. Reverté</li><li>- Finney (). Cálculo. Addison-Wesley</li><li>- Salas / Hille / Etgen (). Cálculus. Reverté</li><li>- Bradley (). Cálculo. Prentice Hall</li><li>- NEUHAUSER (2004 ). MATEMÁTICAS PARA CIENCIAS . Pearson</li><li>- Alfonsa García (). Cálculo I. CLGSA</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 studied a mathematics course in the last academic year at high school. For those students who have not, the leveling course offered by the Faculty of Science is strongly recommended.

(\*)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.