UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Calculus		Code	614G01003
Study programme	Grao en Enxeñaría Informática			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
Coordinador	Hervella Nieto, Luis Maria	E-mail	luis.hervella@udc.es	
Lecturers	Arregui Alvarez, Iñigo Cendan Verdes, Jose Jesus García Rodríguez, José Antonio Gonzalez Taboada, Maria Hervella Nieto, Luis Maria López Salas, José Germán Pájaro Diéguez, Manuel Varela Rodríguez, Hiram	E-mail	inigo.arregui@udc.es jesus.cendan.verdes@udc.es jose.garcia.rodriguez@udc.es maria.gonzalez.taboada@udc.es luis.hervella@udc.es jose.lsalas@udc.es manuel.pajaro@udc.es hiram.varela@udc.es	
Web	campusvirtual.udc.gal/			
General description	In this subject we explain concepts of the analysis of real functions of a real variable (continuity, derivative, integration, ...), with applications in real problems of optimisation and approximation of functions.			

Study programme competences	
Code	Study programme competences
A1	Capacidade para a resolución dos problemas matemáticos que se poden presentar na enxeñaría. Aptitude para aplicar os coñecementos sobre: álxebra linear; cálculo diferencial e integral; métodos numéricos; algorítmica numérica; estatística e optimización.
B3	Capacidade de análise e síntese

Learning outcomes			
Learning outcomes	Study programme competences		
Being able to analyze functions of a real variable: - Limits , continuity, differentiation, optimization and graphical representation - Definite and indefinite integration and its application to the calculation of areas and volumes , as well as solving differential equations.	A1		
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Being able to use a computer application of symbolic and computational calculus for the development of the contents of the subject	A1	B3	
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Contents	
Topic	Sub-topic

Real valued functions of one real variable	- Important sets of numbers - Real valued functions of one real variable - Elementary functions - Limit of a function at one point - Continuity - Bisection method - Lagrange interpolation
Differential calculus of real valued functions of one real variable	- Differentiability - Derivative of elementary functions - Newton-Raphson's Method - Relative and absolute extrema - Theorems of differential calculus - Immediate applications of derivatives - Higher order derivatives - Taylor's theorem - Implicit and logarithmic differentiation
Integral calculus of real valued functions of one variable	- The Riemann integral - Elementary methods for the calculus of primitives - Improper integrals - Applications of the integral - Numerical integration - Introduction to differential equations

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1	30	60	90
Laboratory practice	A1 B3	18	18	36
Seminar	A1 B3	9	9	18
Objective test	A1 B3	0	3	3
Personalized attention		3	0	3
(*)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	- Presentations in .pdf format (previously provided to students) containing the basic notes to follow the development of the subject, will be maid using a projector - Theory will be presented using the blackboard and providing clarifying examples - Short videos will be used to illustrate some key points in the development of the subject, both in the theoretical and practical parts.
Laboratory practice	- The use of the software package Octave, which will be used in the subject for symbolic and numerical computation, will be taught . - Problems related to the subject will be solved using Octave
Seminar	- In small groups tutories (TGR), which are called 'Seminars' in this guide, doubts of students will be solved, as well as exercises of the problems sets -available on beforehand- or other problems proposed by the teacher or the students. - In some seminars students can do, voluntarily, a project related with the Sustainable Development Goals (SDG). In this educational task, the student will associate the contents of this subject with some of the SGD.
Objective test	- A quiz consisting of a collection of theoretical and/or practical questions will be done

Personalized attention	
Methodologies	**Description**
Seminar Laboratory practice	- The diversity of the students and their background recomends giving an orientation, that should be carried out in the framework of a personalized tutorial action. - In the laboratory sessions the teacher, who will be present in the clasroom, will guide and help students to develop the practises, teaching them in the use of a software package, helping them to understand some theoretical and practical aspects of the subject. - During the seminars (TGR) the teacher will help the students in the resolution of theoretical and applied exercises. - Tutorials will be held through the Teams platform to students who request it.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Guest lecture / keynote speech	A1	There will be no evaluation practices during these sessions.	0
Objective test	A1 B3	The final exam, with a value between 40 and 60% (depending on the grade obtained in the seminar part) will consist of taking a written test.	40
Seminar	A1 B3	Throughout the course there will be two test-type tests with a maximum grade, each one, of 10% of the grade. Those students who do not reach the maximum grade in these written tests will be able to recover the remaining part by taking the mixed test. Eventually and with prior agreement with the teacher, the student will be able to obtain this 20% of the grade by completing a project linked to the Sustainable Development Goals (SDGs).	60
Laboratory practice	A1 B3	Up to 4 assessment tests will be carried out during the laboratory classes that will account for 40% of the final grade. Only students enrolled part-time who have not been evaluated in the laboratory practical part will be able to take a specific test to recover 40% of the mark corresponding to this part.	0

Assessment comments
The student will finish the class period with a maximum of 60% of the grade, which will be obtained through two written controls (10% each) and the laboratory practice evaluation tests (40%). On the dates established by the Faculty Board, the student will perform, in writing, the final exam of the subject. The mark obtained in the final exam will be rescaled so that the student has the opportunity to make up the lost part of 20% of the grade corresponding to the written controls carried out during the seminars. The grade corresponding to the evaluation of the laboratory practices cannot be recovered. In this way, the maximum grade for the final exam will be between 4 and 6 points out of 10. The evaluation of the Seminars and the laboratory practices of the students with part-time enrollment may be carried out taking into account, as far as possible, their particular circumstances. Regarding the special call for December, the evaluation process will include: a) an objective test that will score a maximum of six points, b) an exam to evaluate the knowledge acquired in the laboratory practices, which will score a maximum of four points.

Sources of information

Basic	Bibliografía básica:G. Strang, E. Herman. Cálculo (Volume 1). Openstax: http://openstax.org/books/cálculo-volumen-1/G. Strang, E. Herman. Cálculo (Volume 2). Openstax: https://openstax.org/books/cálculo-volumen-2/R. Larson, B.H. Edwards, Cálculo 1, 10ª edición. Ed. McGraw-Hill, 2016.R.T. Smith, R.B. Minton. Cálculo 1, 2ª edición. Ed. McGraw-Hill, 2003. R. Johansson. Numerical Python. Ed. Apress, 2019.J. Kiusalaas. Numerical methods in engineering with Python, 3ª edición. Ed. Cambridge, 2013.
Complementary	Bibliografía complementaria:Blog "existelimite" de Luis Hervella, Universidade da Coruña: https://existelimite.blogspot.com/Curso "Cálculo I". Domingo Pestana, José Manuel Rodríguez, Universidad Carlos III: https://ocw.uc3m.es/course/view.php?id=239Curso "Cálculo de funciones de 1 variable" de Miguel Martín Suárez, Universidad de Granada: https://www.ugr.es/~mmartins/material.htm

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Numerical Methods for Computing/614G01064
Other comments
Daily work is recommended for getting optimal profit from the seminars (TGR) and laboratory practices. Also assistance to the master classes is recommended