

Teaching Guide					
	Identifying Data 2022/23				
Subject (*)	Numerical Methods for Computing			Code	614G01064
Study programme	Grao en Enxeñaría Informática				
		Desc	riptors		
Cycle	Period Year Type Credits				Credits
Graduate	1st four-month period	Fourth Optional		6	
Language	Spanish				·
Teaching method	Face-to-face	Face-to-face			
Prerequisites					
Department	Department Matemáticas				
Coordinador	Arregui Alvarez, Iñigo E-mail inigo.arregui@udc.es				
Lecturers	Arregui Alvarez, Iñigo E-mail inigo.arregui@udc.es		c.es		
Web					
General description					

	Study programme competences / results
Code	Study programme competences / results
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.
A33	Capacidade de analizar e avaliar arquitecturas de computadores, incluíndo plataformas paralelas e distribuídas, así como desenvolver e
	optimizar sóftware para elas
A41	Capacidade para avaliar a complexidade computacional dun problema, coñecer estratexias algorítmicas que poidan conducir á súa
	resolución e recomendar, desenvolver e implementar aquela que garanta o mellor rendemento de acordo cos requisitos establecidos.
B3	Capacidade de análise e síntese

Learning outcomes			
Learning outcomes	Study programme		
	competences /		
	results		
Knowledge of the most representative models in science and engineering, specially in computing, formulated by mathematical	A1		
models and that need numerical methods			
Knowledge and comprehension of the numerical techniques better adapted for each one of the formulated models	A1	B3	
	A33		
	A41		
Implementation of software that develops the numerical techniques, or the use of software tools that develop them	A1	B3	
	A41		
Abord of problems that arise in the fields of computational science, covering from the understanding of the models to the	A1	B3	
practical and efficient implementation in computer	A41		

	Contents
Торіс	Sub-topic
Matrix numerical methods and applications	- Numerical resolution of large linear systems. Direct and iterative methods. Sparse
	matrices. Applications
	- Least-square problems. Applications
	- Power method for eigenvalues. Google page rank algorithm



Numerical methods for computer graphics	- Interpolation and piecewise interpolation
	- Spline interpolation
	- Introduction to B-splines and Bezier curves
	- Applictions in computer graphics
Numerical resolution of differential equations and partial	- Introduction to partial differential equations
differential equations. Applications	- Numerical methods for initial value problems
	- Finite difference methods
	- Applications in image processing
Numerical methods implementation	- Some MatLab and Python commands

	Plannin	g		
Methodologies / tests	Competencies /	Teaching hours	Student?s personal	Total hours
	Results	(in-person & virtual)	work hours	
Laboratory practice	A1 A33 A41 B3	14	28	42
Problem solving	A1 A41 B3	4	14	18
Mixed objective/subjective test	A1 B3	3	0	3
Guest lecture / keynote speech	A1 B3	21	60	81
Personalized attention		6	0	6
(*) The information in the planning table is far quidence only and does not take into account the betargeneity of the students				

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

	Methodologies
Methodologies	Description
Laboratory practice	Some applied problems will be posed, different techniques will be discussed and the chosen one will be implemented.
	In 2020/21, it will be transmitted by streaming; nevertheless, the attendance at the classroom will be suggested.
Problem solving	Applied problems will be posed and solved by the teacher in order to understand the different methods and techniques
	explained in the theoretical courses.
	In 2020/21, it will be transmitted by streaming; nevertheless, the attendance at the classroom will be suggested.
Mixed	The student will have to solve some theoretical questions and applied problems.
objective/subjective	If allowed by the normative, it will take place in the classroom. Only in case of confinement the students will do it by means of
test	telematic tools (Teams, Moodle).
Guest lecture /	In the session magistral the professor will expose the theoretical and practical contents. The contents will be issued from real
keynote speech	problems, the concepts and methods will be developed and some applied examples and exercises will be presented.
	In 2020/21, it will be transmitted by streaming; nevertheless, the attendance at the classroom will be suggested.

	Personalized attention
Methodologies	Description
Laboratory practice	- The teacher will supervise and discuss with the students their progress in their respective tasks.
Problem solving	- The teacher will expose the goals of the supervised project, and will discuss and overview the progress and the final results.
	- The teacher will attend the students in all their doubts about the theoretical concepts and practical application.
	- In 2020/21, it will be done by means of telematic tools.

		Assessment	
Methodologies	Competencies /	Description	Qualification
	Results		
Laboratory practice	A1 A33 A41 B3	The student will implement the adequate numerical methods in order to solve some	50
		proposed applied problems.	



Mixed	A1 B3	Theoretical-practical control about the contents of the subject.	50
objective/subjective			
test			

Assessment comments

To surpass the matter, the student will have to:

- do at leat the 75% of the proposed laboratory practices

- obtain at least a qualification of 4 in the mixed objective/subjective proof.

In the case of presencial activities, facilities will be given to part-time students.

The final exam will be -whenever the sanitary conditions allow it and following the indications of the authorities- face-to-face. Only in case of confinement it will be done by means of telematic tools.

	Sources of information
Basic	- R.L. Burden, J.D. Faires (2011). Análisis Numérico. Cengage Learning
	- D. Kincaid, W. Cheney (1994). Análisis numérico: las matemáticas del cálculo científico. Addison Wesley
	- J.H. Mathews, K.D. Fink. (2000). Métodos numéricos con MATLAB. Prentice-Hall
	- J. Kiusalaas (2005). Numerical Methods in Engineering with Python. Cambridge U.P.
	- (1996). Matlab, the language of scientific computing. Mathworks
	- (1996). Matlab, Partial differential equations toolbox. Mathworks
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Programming I/614G01001
Calculus/614G01003
Programming II/614G01006
Algebra/614G01010
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

(\*)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.