Teaching Guide				
Identifying Data				2020/21
Subject (*)	Numerical Methods for Computing		Code	614G01064
Study programme	Grao en Enxeñaría Informática			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	Fourth	Optional	6
Language	Spanish			
Teaching method	Hybrid			
Prerequisites				
Department	Matemáticas			
Coordinador	Arregui Alvarez, Iñigo	E-mail	inigo.arregui@udc.es	
Lecturers	Arregui Alvarez, Iñigo	E-mail	inigo.arregui@udc.es	
Web				
General description				
Contingency plan	1. Modifications to the contents 2. Methodologies *Teaching methodologies that are maintained *Teaching methodologies that are modified 3. Mechanisms for personalized attention to students 4. Modifications in the evaluation *Evaluation observations: 5. Modifications to the bibliography or webgraphy			

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.
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		
Knowledge of the most representative models in science and engineering, specially in computing, formulated by mathematical models and that need numerical methods	A1		
Knowledge and comprehension of the numerical techniques better adapted for each one of the formulated models	A1 A33 A41	B3	

Implementation of software that develops the numerical techniques, or the use of software tools that develop them	A1 A41	B3	
Abord of problems that arise in the fields of computational science, covering from the understanding of the models to the practical and efficient implementation in computer	A1 A41	B3	

Contents	
Topic	**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 partial differential equations. Applications	- Introduction to partial differential equations - Finite difference methods - Applications in image processing
Numerical methods implementation	- Some MatLab and Python commands

Planning				
Methodologies / tests	**Competencies**	**Ordinary class hours**	**Student?s personal work hours**	**Total 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 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 objective/subjective test	The student will have to solve some theoretical questions and applied problems. 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 telematic tools (Teams, Moodle).
Guest lecture / keynote speech	In the session magistral the professor will expose the theoretical and practical contents. The contents will be issued from real 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 Problem solving	- The teacher will supervise and discuss with the students their progress in their respective tasks. - 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**
Laboratory practice	A1 A33 A41 B3	The student will implement the adequate numerical methods in order to solve some proposed applied problems.	50
Mixed objective/subjective test	A1 B3	Theoretical-practical control about the contents of the subject.	50

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.