UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2016/17
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	Optativa	6
Language	Spanish			
Teaching method	Face-to-face			
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				

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		
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	B3	
Implementation of software that develops the numerical techniques, or the use of software tools that develop them	A1	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	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 and applications to image processing	- Introduction to partial differential equations - Finite difference methods - Applications in image processing
Numerical methods implementation	- Some MatLab and Python commands - MatLab partial differential equation toolbox

Planning

Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Laboratory practice	A1 B3	14	28	42
Problem solving	A1 B3	7	14	21
Supervised projects	A1 B3	3	12	15
Mixed objective/subjective test	A1 B3	3	0	3
Guest lecture / keynote speech	A1 B3	21	42	63
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.
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.
Supervised projects	The student will develop a subject, consulting bibliography and resolving a concrete problem.
Mixed objective/subjective test	The student will have to solve some theoretical questions and applied problems.
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.

Personalized attention	
Methodologies	Description
Supervised projects 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.

Assessment			
Methodologies	Competencies	Description	**Qualification**
Supervised projects	A1 B3	The student will develop a subject, with the aid of bibliographical references, and wil solve a proposed problem.	10
Laboratory practice	A1 B3	The student will implement the adequate numerical methods in order to solve some proposed applied problems.	30
Mixed objective/subjective test	A1 B3	Theoretical-practical control about the contents of the subject.	60

Assessment comments
To surpass the matter, the student will have to obtain at least a qualification of 4 in the mixed objective/subjective proof. In case of not to evaluate the works tutelados, the practices of laboratory will have a weight of 40%. In the case of classroom activities, facilities will be given to part-time students.

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.