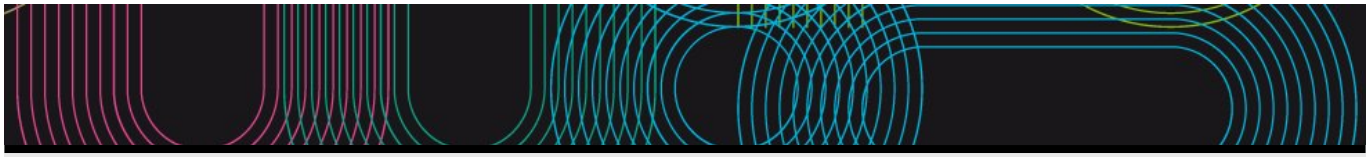

IDENTIFYING DATA				
(*)Métodos Matemáticos na Enxeñaría Industrial				
Subject	(*)Métodos Matemáticos na Enxeñaría Industrial			
Code	V04M146V01102			
Study programme	(*)Máster Universitario en Enxeñaría de Organización			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	1st	1st
Teaching language	Galician			
Department				
Coordinator	Area Carracedo, Iván Carlos			
Lecturers	Area Carracedo, Iván Carlos González Rodríguez, Ramón			
E-mail	area@uvigo.es			
Web				
General description	(*)The aims of this course are 1) that students know the basic theory of one complex variable and the applications in the field of engineering of Laplace, Fourier and Z transforms, 2) that the students learn how to use some numerical methods for solving equations and systems of nonlinear equations, as well as differential equations and systems of differential equations, 3) that the students will learn the basic theory of graphs and their applications to discrete optimization.			

Competencies	
Code	
A1	(*)Posuír e comprender coñecementos que acheguen unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, adoito nun contexto de investigación.
A2	(*)Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornos novos ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo.

Learning outcomes	
Expected results from this subject	Training and Learning Results
(*) Knowledge and application of numerical methods for nonlinear equations, systems of nonlinear equations, and differential equations.	A1 A2
(*) Understanding the basics of the theory of one complex variable	A1
(*)Knowledge of transform methods and their application in engineering	A1 A2
(*)Knowledge of the basics of graph theory and its application to solving problems of discrete optimization	A1 A2

Contents	
Topic	
Numerical methods for solving nonlinear equations and systems	Bisection and successive approximation methods. The Newton-Raphson method. Variants of Newton method for solving equations and systems of nonlinear equations. Algorithms for simultaneous approximation of all zeros of a given polynomial.

Numerical methods for solving equations and systems of differential equations	Numerical solution of initial value problems: one-step and multistep methods. Numerical solution of boundary value problems: finite difference method and shooting method.
Complex variable	Functions of one complex variable. Complex integration. Power series and Laurent series. Singularities, zeros and residues. Applications
Transforms for continuous and discrete systems.	Laplace transform. Z transform. Fourier transform. Discrete Fourier transform: FFT algorithm. Applications.
Graphs and discrete optimization	Graphs, digraphs and interconnecting nets. Trees. Spanning tree of minimal cost. Flows and connectivity. Applications.

Planning

	Class hours	Hours outside the classroom	Total hours
Practice in computer rooms	16	16	32
Master Session	14	35	49
Troubleshooting and / or exercises	14	42	56
Long answer tests and development	3	0	3
Troubleshooting and / or exercises	4	6	10

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

Methodologies

	Description
Practice in computer rooms	Informatics tools will be used to implement the numerical methods and solve exercises
Master Session	The teacher will present in the theoretical classes the contents of the subject.
Troubleshooting and / or exercises	The teacher will solve problems and exercises and the students will be requested to solve similar exercises.

Personalized attention

Methodologies	Description
Troubleshooting and / or exercises	Teachers will personally solve the doubts of students.
Practice in computer rooms	Teachers will personally solve the doubts of students.
Master Session	Teachers will personally solve the doubts of students.

Assessment

	Description	Qualification	Training and Learning Results
Practice in computer rooms	Several tests will be made in laboratory classes by using appropriate informatics tools.	30	A1 A2
Long answer tests and development	A final exam will be done on the contents of the subject	30	A1 A2
Troubleshooting and / or exercises	Various tests will be carried out and assignments will be scheduled.	40	A1 A2

Other comments on the Evaluation

Continuous assessment following the above criteria will take place.
The students who renounces the continuous assessment will be evaluated with a single exam on the contents of the subject. This exam will account for 70% of the final mark. The remaining 30% will be the mark obtained at laboratory lectures (including periodic tests).
The evaluation in second exam will be performed similarly to the case of waiver continuous assessment: 70% of the mark on a final exam and 30% of the mark corresponding to work done at laboratory lectures (including periodic tests).
Ethical commitment:
It is expected that students present an adequate ethical behavior. In the case of detecting a ethical inadequate behavior (copying, plagiarism, use of unauthorized electronic devices, for example) it shall be considered that the student does not meet the requirements for passing the subject.

Sources of information

J.W. Brown, R.V. Churchill, **Variable Compleja y Aplicaciones**, 7ª,
J. Glyn y otros, **Matemáticas Avanzadas para Ingeniería**, 2ª,
R.N. Bracewell, **The Fourier Transform and its Applications**, 3ª,
G. Chartrand, O.R. Oellermann, **Applied and Algorithmic Graph Theory**, 1ª,

R.L. Burden, J.D. Faires, **Análisis Numérico**, 9ª,
C.F. Gerald, P.O. Wheatley, **Análisis Numérico con Aplicaciones**, 6ª,
E. Kreyszig, **Advanced Engineering Mathematics**, 10ª,

Recommendations