Teaching Guide				
Identifying Data				2016/17
Subject (*)	Matemáticas II		Code	631G02156
Study programme	Grao en Tecnoloxías Mariñas			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	FB	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Métodos Matemáticos e de Representación			
Coordinador	Rodriguez Aros, Angel Daniel	E-mail	angel.aros@udc.es	
Lecturers	Rodriguez Aros, Angel Daniel	E-mail	angel.aros@udc.es	
Web	www.nauticaymaquinas.es/			
General description	The studenst will learn to use these specific mathematical tools, but also they will improve their skills in developing new methods and adquiring new technlolgies, to consult bibliographic references and online resources, to elaborate a memory in a rigourous and sistematic manner, to give lectures to others and collaborate with other colleagues, etc. In general they will develop a sense of scientific and rational thinking, capable to adapt to unexpected situations which may arise in their future practice as an engineer.			

Study programme competences	
Code	Study programme competences
A12	CE12 - Interpretar e representar correctamente o espazo tridimensional, coñecendo os obxectivos e o emprego dos sistemas de representación gráfica.
A14	CE14 - Avaliación cualitativa e cuantitativa de datos e resultados, así como a representación e interpretación matemáticas de resultados obtidos experimentalmente.
A17	CE17 - Modelizar situacións e resolver problemas con técnicas ou ferramentas físico-matemáticas.
B1	CT1 - Capacidad para gestionar los propios conocimientos y utilizar de forma eficiente técnicas de trabajo intelectual
B2	CT2 - Resolver problemas de forma efectiva.
B3	CT3 - Comunicarse de xeito efectivo nun ámbito de traballo.
B4	CT4 - Traballar de forma autónoma con iniciativa.
B5	CT5 - Traballar de forma colaboradora.
B6	CT6 - Comportarse con ética e responsabilidade social como cidadán e como profesional.
B7	CT7 - Capacidade para interpretar, seleccionar e valorar conceptos adquiridos noutras disciplinas do ámbito marítimo, mediante fundamentos físico-matemáticos.
B8	CT8 - Versatilidade.
B9	CT9 - Capacidade para a aprendizaxe de novos métodos e teorías, que lle doten dunha gran versatilidade para adaptarse a novas situacións.
B10	CT10 - Comunicar por escrito e oralmente os coñecementos procedentes da linguaxe científica.
B11	CT11 - Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razoamento crítico e de comunicar e transmitir coñecementos habilidades e destrezas.
C1	C1 - Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C3	C3 - Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C6	C6 - Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	C7 - Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	C8 - Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

C9	CB1 - Demostrar que posúen e comprenden coñecementos na área de estudo que parte da base da educación secundaria xeneral, e que inclúe coñecementos procedentes da vanguardia do seu campo de estudo
C10	CB2 - Aplicar os coñecementos no seu traballo ou vocación dunha forma profesional e poseer competencias demostrables por medio da elaboración e defensa de argumentos e resolución de problemas dentro da área dos seus estudos
C11	CB3 - Ter a capacidade de reunir e interpretar datos relevantes para emitir xuicios que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética
C12	CB4 - Poder transmitir información, ideas, problemas e solucións a un público tanto especializado como non especializado.
C13	CB5 - Ter desenvolvido aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores con un alto grao de autonomía.

Learning outcomes			
Learning outcomes	Study programme competences		
	A12 A14 A17		
		B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11	
			C1 C3 C6 C7 C8 C9 C10 C11 C12 C13

Contents	
Topic	Sub-topic
Lesson 1.- Bilinear forms. Quadratic forms.	1.1.- Bilinear forms. Associated Matrix 1.2.- Symmetrical bilinear forms 1.3.- Quadratic forms 1.4.- Canonical Quadratic form. Reduction to the Canonical Form 1.5.- Classification of the Quadratic Forms

Lesson 2.- Loci in the Plane. Conic sections	2.1.- Loci in the plane 2.2-. Circumference 2.3.- Elipse 2.4.- Hyperbola. Equilateral hyperbola. 2.5.- Parabola 2.6.- Conic sections.
Lesson 3.- General Equation of a Conic Section. Canonical Form	3.1.- General equation 3.2.- Invariants 3.3.- Classification 3.4.- Reduction to the Canonical Form 3.5.- Obtention of Relevant Elements: Centre, Axes, Asymptotes, Focus, Vertices 3.6.- Graphic representation
Lesson 4.- Loci in the space. Quadric surfaces	4.1.- Loci in the Space 4.2.- Ruled surfaces. Surfaces of Revolution 4.3.- Spherical surface 4.4.- Ellipsoid 4.5.- Hyperboloids 4.6.- Paraboloids 4.7.- Cylindrical surfaces 4.8- Conical Surfaces
Lesson 5.- Functions of several real variables. Limits and Continuity. 10.1.- General definitions	5.1.- General definitions 5.2.- Limits 5.3.- Continuity
Lesson 6.- Partial and Directional Derivatives	6.1.- Partial Derivatives. Tangent Plane 6.2.- Directional Derivatives 6.3.- On Partial Derivatives, Directional Derivatives and Continuity 6.4.- Higher Order Partial derivatives.
Lesson 7.- Differentiation	7.1.- General definitions 7.2.- Differentiability, Continuity and Partial Derivatives 7.3.- Chain Rules. Implicit Differentiation 7.4.- Higher order Differentiation
Lesson 8. Taylor's Theorem. Optimization	8.1.- Taylor?s polinomyal and theorem 8.2.- Relative extrema 8.3.- Conditioned extrema. Lagrange Multipliers.
Lesson 9.- Multiple Integrals. Applications	9.1.- General definitions and Properties 9.2.- Iterated Integrals. Fubini's Theorem. 9.3.- Change of Variables 9.4.- Applications
Lesson 10.- Line Integral and Surface Integral	10.1.- Introduction 10.2.- Line Integral 10.3.- Green's Theorem 10.4.- Surface Integral 10.5.- Surface Integral in Curvilinear Coordinates 10.6.- Stoke's Theorem. Gauss-Ostrogradski's Theorem

Lesson 11.- Ordinary Differential Equations of First Order	11.1.- General definitions 11.2.- Ordinary Differential Equations of First Order 11.3.- Main Types of ODE of First Order
Lesson 12.- Higher Order Ordinary Differential Equations	12.1.- Homogeneous and Nonhomogeneous Second Order ODE?s 12.2.- Second Order Linear ODE with constant coefficients 12.3.- Higher order Nonhomogeneous ODE of n-th Order
Lesson 13.- Systems of Ordinary Differential Equations	13.1.- Systems of Ordinary Differential Equations 13.2.- Systems of Linear Differential Equations with Constant Coefficients
Lesson 14.- Laplace Transform. Integraton by Series	14.1.- Laplace Transform 14.2.- Applications of the Laplace Transform 14.3.- Integration of Ordinary Differential Equations by Series

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Collaborative learning	A12 A14 A17 B2 B3 B5 B6 B8 B9 B10 B11 C1 C3 C6 C7 C8 C9 C10 C11 C12 C13	6	6	12
Diagramming	A17 B1 B2 B3 B4 B7 B10 C1 C3 C6	2	4	6
Objective test	A12 A14 A17 B1 B2 B3 B4 B6 B7 B8 B10 B11 C1 C3 C6 C8	4	0	4
Guest lecture / keynote speech	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B9 B10 B11 C1 C3 C6 C7 C8	27	27	54
Problem solving	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C3 C6 C7 C8	9	27	36
Supervised projects	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C1 C3 C6 C7 C8	4	20	24
Document analysis	A12 A14 A17 B1 B4 B5 B7 B8 B9 B10 B11 C3 C6 C8	0	2	2
Online discussion	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C1 C3 C6 C7 C8	0	6	6
Directed discussion	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C1 C3 C6 C7 C8	2	0	2
Personalized attention		4	0	4
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	**Description**
Collaborative learning	Resolver cuestións propostas en grupo e plantexar dudas.
Diagramming	Resumir os conceptos máis importantes de cada tema.
Objective test	Resolver de forma individual un test de coñecementos teóricos e prácticos.
Guest lecture / keynote speech	Exposición dos temas.
Problem solving	Resolución de exercicios tipo e proposta de outros a resolver por os estudantes.
Supervised projects	Seguimento e corrección de traballos propostos.
Document analysis	Seleccionar libros e páxinas web a utilizar
Online discussion	Plantexar e resolver dudas en Moodle
Directed discussion	Discusión na aula do plantexado previamente en Moodle.

Personalized attention	
Methodologies	**Description**
Collaborative learning Problem solving Supervised projects	The students are encouraged to attend in small groups or individually to the professors' office to solve questions that may arise, thus obtaining a more specific guidance, acoording to their specific difficulties.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Directed discussion	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C1 C3 C6 C7 C8	Participación nos debates na aula. Se avaliarán as competencias A12, A14, A17, B1, B2, B3, B5, B6, B7, B8, B9, B10, B11, C1, C3, C5, C6, C7 y C8.	5
Collaborative learning	A12 A14 A17 B2 B3 B5 B6 B8 B9 B10 B11 C1 C3 C6 C7 C8 C9 C10 C11 C12 C13	Participación en traballos grupais. Se avaliarán as competencias A12, A14, A17, B1, B2, B5, B6, B7, B8, B9, B10, B11, C1, C6, C7 y C8.	5
Objective test	A12 A14 A17 B1 B2 B3 B4 B6 B7 B8 B10 B11 C1 C3 C6 C8	Proba individual de asimilación de coñecementos teórico-prácticos. Se avaliarán as competencias A12, A14, A17, B1, B2, B5, B6, B7, B8, B9, B10, B11, C1, C6, C7 y C8.	70
Problem solving	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C3 C6 C7 C8	Capacidade para resolver problemas. Se avaliarán as competencias A12, A14, A17, B1, B2, B4, B5, B6, B8, B9, B10, B11, C1, C3, C6, C7 y C8.	10
Supervised projects	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C1 C3 C6 C7 C8	Realización dos traballos propostos. Se avaliarán as competencias A12, A14, A17, B1, B2, B4, B6, B7, B8, B9, B10, B11, C1, C5, C6, C7 y C8.	10
Others			

Assessment comments

The students that do not participate in the EEES will be evaluated through an Objective Proof that will constitute 100% of the evaluation. The course is divided in two parts: Part 1 (lessons 1-4) and part 2 (lessons 5-14). To pass it, it will be necessary to reach in each part a minimum of 3,5 points and afterwards obtain an average of, at least, 5 points following the formula (part 1+2*part 2)/3. In the unlikely case to reach an arithmetic average of 5 but not having, at least, 3,5 points in each one of the parts, the result of the evaluation will be of fail and the final qualification will be calculated with a suitable geometric average. The criteria of evaluation contemplated in the framewor A-III/1 and A-III/2 of the Code STCW and his amendments related with this matter have been taken into account for the design of this qualification methodology.

Sources of information	
Basic	- García García-López Pellicer (). ALGEBRA LINEAL Y GEOMETRÍA. Marfil - Granero, F. (). ALGEBRA LINEAL Y GEOMETRÍA. Mac Graw Hill - Fernández Viña, J.A. (). ANÁLISIS MATEMÁTICO II . Tecnos - Larson-Hostetler-Edwards (). CÁLCULO (2) . Mac Graw Hill - García, Alfonsa y otros (). CÁLCULO II . Librería ICAI - James Stewart (). CALCULO MULTIVARIABLE. Thomson - Martínez Sagarzazu (). ECUACIONES DIFERENCIALES. APLICACIONES Y EJERCICIOS. Universidad del País Vasco - Fernández Viña, J.A (). EJERCICIOS Y COMPLEMENTOS DE ANÁLISIS MATEMÁTICO II. Tecnos - Gutiérrez Gómez-García Castro (). GEOMETRÍA. Pirámide - Villa, A. de la (). PROBLEMAS DE ÁLGEBRA LINEAL. Glagsa
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Matemáticas 1/631G02151
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.