



Teaching Guide				
Identifying Data			2020/21	
Subject (*)	Mathematics II		Code	631G02156
Study programme	Grao en Tecnoloxías Mariñas			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	Basic training	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Matemáticas			
Coordinador	Calvo Garrido, María Del Carmen	E-mail	carmen.calvo.garrido@udc.es	
Lecturers	Calvo Garrido, María Del Carmen	E-mail	carmen.calvo.garrido@udc.es	
Web	www.nauticaymaquinas.es/			
General description	The student will learn to use these specific mathematical tools, but also they will improve their skills in developing new methods and acquiring new technologies, to consult bibliographic references and online resources, to elaborate a memory in a rigorous and systematic 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.			



Contingency plan

1. Modifications to the contents

No changes will be made.

2. Methodologies

*Teaching methodologies that are maintained

Collaborative learning, Schemes, Tutored works, Analysis of documentary sources, Virtual debate, Guided discussion, Initial activities.

*Teaching methodologies that are modified

Master session. They will become virtual videos and videoconferences with students through the Teams platform. They are recorded in Stream. They will always be held at the official time set by the School Board.

? Problem solving. They will become virtual sessions of doubts in solving problems and collections of solved exercises made available to students in OneNote. They will always be held at the official time set by the School Board.

? Objective test. If it cannot be done in person, the objective test will be carried out with the online assessment tools that the University makes available to the community.

3. Mechanisms for personalized attention to students

Email: During working hours. To make brief questions and request virtual meetings to solve doubts during tutoring hours.

- Moodle: Daily. According to the need of the students. They have thematic forums associated with the modules of the subject, to formulate the necessary queries.

- Teams: Weekly single group sessions and interactive teaching groups for the advancement of theoretical and practical content in the time slot assigned to the subject in the faculty classroom calendar.

This dynamic allows a standardized follow-up and adjusted to the learning needs of the students to develop the works of the subject.

4. Modifications in the evaluation

Two possible itineraries are established:

1) Students who have carried out continuous assessment during the course:

1a) Methodology: supervised work and problem solving

Qualification weight: 50%

Description: Students who take the continuous assessment tests during the course (face-to-face and / or virtual) will be qualified with the weighted average mark they obtained

1b) Methodology: objective test

Qualification weight: 50%

Description: Individual test of assimilation of theoretical-practical knowledge and problem solving, with the possibility of oral defense of any of the proposed problems.

2) Students who did not carry out continuous assessment during the course or renounce to it.

2a) Methodology: objective test

Qualification weight: 50%

Description: Individual test of assimilation of theoretical-practical knowledge.

2b) Methodology: Solving exercises.

Qualification weight: 50%

Description: Resolution of practical problems with the possibility of oral defense of any of the proposed problems.

*Evaluation observations:

Students who take the second itinerary (without continuous evaluation) will be examined in the entire subject and must achieve a minimum of 35% in the objective test to be able to do the problem solving part.

5. Modifications to the bibliography or webgraphy

No changes will be made. They already have all the materials for the subject

Digitized in Moodle as well as various links to electronic books available through the UDC Library to facilitate access to the bibliography for students.



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 vangardía 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.- Ellipse 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 polynomial 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. Integration by Series	14.1.- Laplace Transform 14.2.- Applications of the Laplace Transform 14.3.- Integration of Ordinary Differential Equations by Series



The development and overcoming of these contents, together with those corresponding to other subjects that include the acquisition of specific competencies of the degree, guarantees the knowledge, comprehension and sufficiency of the competencies contained in Table AIII / 2, of the STCW Convention, related to the level of management of First Engineer Officer of the Merchant Navy, on ships without power limitation of the main propulsion machinery and Chief Engineer officer of the Merchant Navy up to a maximum of 3000 kW.	Table A-III / 2 of the STCW Convention. Specification of the minimum standard of competence for Chief Engineer Officers and First Engineer Officers on ships powered by main propulsion machinery of 3000 kW or more.
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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 dadas.
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 dadas 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, according 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	Comprobación dos coñecementos e capacidade de resolución de problemas. Se avaliarán as competencias A12, A14, A17, B1, B2, B5, B6, B7, B8, B9, B10, B11, C1, C6, C7 y C8.	50
Problem solving	A12 A14 A17 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 C3 C6 C7 C8	Resolver problemas. Se avaliarán as competencias A12, A14, A17, B1, B2, B4, B5, B6, B8, B9, B10, B11, C1, C3, C6, C7 y C8.	20
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.	20
Others			

Assessment comments



The students participants in the EHEA should attend a minimum of 80% of the lessons, being the continuous assessment of 50% of the final score.

The other 50% of the score will be obtained from the partial tests that will take place throughout the term.

The students who have followed the continuous assessment but have not reached the 50% of the score through the partial tests will have a chance to reach it through a final test. This final test will include all topics of the term (the partial tests do not exclude topics)

The students who decide to not take part in the EHEA will be evaluated as follows: 1) an objective test that includes an individual test of assimilation of practical-theoretical knowledge and 2) a problem solving test. Each test will be 50% of the final score.

Those students with recognition of part-time dedication and academic exemption of attendance, as established by the norm that regulates the regime of dedication to the study of undergraduate students in the UDC (Arts 2.3, 3.b, 4.3 e 7.5) (04/05/2017), and stay on the path and benefit from continuous assessment must attend at least 50% of the course. They are exempt from attending the theoretical classes in case they are not able to attend. If they are not able to attend the practical test neither, they should attend tutorials at the professor office, where they will be asked to perform equivalent (similar) tests.

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, Alfonso 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 - D.G. Zill, W.S. Wright, J. Ibarra (). Matemáticas 3. Cálculo de Varias Variables. McGraw Hill
Complementary	

Recommendations

Subjects that it is recommended to have taken before

Mathematics I/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.