UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2021/22
Subject (*)	Mathematics II		Code	631G03006
Study programme	Grao en Máquinas Navais			
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	Cao Rial, María Teresa	E-mail	teresa.cao@udc.es	
Lecturers	Calvo Garrido, María Del Carmen Cao Rial, María Teresa	E-mail	carmen.calvo.garrido@udc.es teresa.cao@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.			

Contingency plan	In this section, we collect the adaptations that will be carried out in teaching and evaluation, were we faced with a scenario of non-presence due to a new clash of the pandemic. 1. Modifications to the contents No changes will be made. 2. Methodologies *Teaching methodologies that are maintained Collaborative learning, Seminaries, Supervised projects, Document analysis. *Teaching methodologies that are modified Guest lecture/ keynote speech. they will be replaced by virtual videos and videoconferences with students through the Teams platform. They will be recorded in Stream. They will always be held at the official time set by the calendar's classroom. ? Solving problems. They will become virtual sessions about doubts in solving problems. 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 - E-mail: During working hours. To make brief questions and request virtual meetings to solve doubts during supervising hours. - Moodle: Daily. According to the needs 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: a) Methodology: supervised project 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 b)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.

*Evaluation observations: IF any online material was requested, oral defense might be necessary to prove authorship.

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
A73	CE73 - Modelizar situacións e resolver problemas con técnicas ou ferramentas físico-matemáticas.
A74	CE74 - Avaliar de forma cualitativa e cuantitativa os datos e resultados, así como a representación e interpretación matemáticas de resultados obtidos experimentalmente.
A75	CE75 - Interpretar e representar correctamente o espazo tridimensional, coñecendo os obxectivos e o emprego dos sistemas de representación gráfica.
B1	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 vangarda do seu campo de estudo
B3	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
B4	CB4 - Poder transmitir información, ideas, problemas e solucións a un público tanto especializado como non especializado.
B5	CB5 - Ter desenvolvido aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores con un alto grao de autonomía.
B6	CG01 - Capacidade para xestionar os propios coñecementos e utilizar de forma eficiente técnicas de traballo intelectual.
B7	CG02 - Resolver problemas de forma efectiva.
B8	CG03 - Comunicarse de maneira efectiva nunha contorna de traballo.
B9	CG04 - Traballar de forma autónoma con iniciativa.
B10	CG05 - Traballar de forma colaborativa.
B11	CG06 - Comportarse con ética e responsabilidade social como cidadán e como profesional.
B12	CG07 - Capacidade para interpretar, seleccionar e valorar conceptos adquiridos noutras disciplinas do ámbito mariño, mediante fundamentos físico-matemáticos.
B13	CG08 - Capacidade para a aprendizaxe de novos métodos e teorías, que lle doten dunha gran versatilidade para adaptarse a novas situacións.
B14	CG09 - Comunicar por escrito e oralmente os coñecementos procedentes da linguaxe científica.
B15	CG10 - Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razoamento crítico e de comunicar e transmitir coñecementos habilidades e destrezas.
B16	CG11 - Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
B17	CG12 - Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
B18	CG13 - Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.
C1	CT01 - Expresarse correctamente, tanto de forma oral como escrita, nas linguas oficiais da comunidade autónoma.
C3	CT03 - 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.
C7	CT07 - Desenvolver a capacidade de traballar en equipos interdisciplinares ou transdisciplinares, para ofrecer propostas que contribúan a un desenvolvemento sostible ambiental, económico, político e social.
C8	CT08 - Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.
C9	CT09 - Ter a capacidade de xestionar tempos e recursos: desenvolver plans, priorizar actividades, identificar as críticas, establecer prazos e cumprilos.

Learning outcomes			
Learning outcomes	Study programme competences		
	A73 A74 A75		

		B1 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18	
			C1 C3 C7 C8 C9

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

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.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A75 B3 B5 B6 B17 B18 C8 C9	28	28	56
Collaborative learning	B1 B3 B4 B5 B6 B7 B8 B9 B10 B11 B13 B17 C1 C8	16	32	48
Problem solving	A73 A74 A75 B3 B4 B5 B6 B7 B12	8	12	20
Supervised projects	A73 B1 B3 B4 B6 B8 B9 B10 B14 B15 B16 C3 C1	0	10	10
Seminar	B1 B3 B5 B6 B7 B8 B9 B10	0	10	10
Document analysis	B9 B10 B13 B16 C3 C7 C8 C9	0	3	3
Objective test	B1 B8 B11 B14 B15 C1 C9 C8	2	0	2
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Exposition in the classroom of the fundamental concepts.
Collaborative learning	Group work with presentation of the results when appropriate.
Problem solving	In each topic, exercises will be proposed to solve.
Supervised projects	Proposed individual and group projects.
Seminar	Individual and / or very small group tutorships.
Document analysis	Select books and web pages to use
Objective test	Knowledge assessment.

Personalized attention	
Methodologies	Description

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. Due to the health situation caused by COVID-19, and following the recommendations of the Center, the attention to students will preferably be held through computer hardware and the Internet (email and meetings by MS Teams), in order to avoid face-to-face interaction in office.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Collaborative learning	B1 B3 B4 B5 B6 B7 B8 B9 B10 B11 B13 B17 C1 C8	Participación en traballos grupais.	5
Objective test	B1 B8 B11 B14 B15 C1 C9 C8	Comprobación dos coñecementos e capacidade de resolución de problemas.	60
Problem solving	A73 A74 A75 B3 B4 B5 B6 B7 B12	Resolver problemas.	20
Supervised projects	A73 B1 B3 B4 B6 B8 B9 B10 B14 B15 B16 C3 C1	Realización dos traballos propostos.	15
Others			

Assessment comments
The students participants in the EHEA should attend a minimum of 80% of the lessons, being the continuous assessment of 40% of the final score. The other 60% 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 with an objective test that includes an individual test of assimilation of practical-theoretical knowledge and problem solving. 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 want to stay on the path of the EHEA and benefit from continuous assessment, must INDICATE SUCH CONDITION AT THE BEGINNING OF THE COURSE and attend at least 50% of the interactive lectures. In case of not being able to attend these sessions, they should attend tutorials at the proffesor office or by TEAMS, where they will perform equivalent tests.

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