



Teaching Guide

Teaching Guide				
Identifying Data			2022/23	
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	Cao Rial, María Teresa	E-mail	teresa.cao@udc.es	
Lecturers	Calvo Garrido, María Del Carmen	E-mail	carmen.calvo.garrido@udc.es	
	Cao Rial, María Teresa		teresa.cao@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.			

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.
C5	C5 - Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras.
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 vangardia 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 xuícios 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	
Escribir e transmitir coñecementos correctamente.		A12 A14 A17	B2 B7 B9 B10 C1
Realizar eficazmente as tarefas asignadas como parte dun grupo.			B1 B3 B4 B5 B8 B11 C3 C6 C9 C10
Será capaz de resolver e analizar os resultados dos problemas matemáticos que poidan plantexarse na enxeñaría.			B6 C7 C8 C11 C12 C13
Usar os modelos matemáticos e identificar o caso no que deben aplicarse.		A17	B1 B2 B7 B9
Coñecer os conceptos fundamentais de Xeometría, Análise de Funcións Reais de Varias Variables Reais e Ecuacións Diferenciais.		A12 A14 A17	B1 B2 B7 B9 B11 C9 C11 C12
Mellorar habilidades na aprendizaxe e desenvolvemento de novos métodos e tecnoloxías necesarias para continuar a súa formación.		A12 A14 A17	B6 B8 C3 C5 C6 C7 C8 C13
Traballar con material bibliográfico e recursos informáticos.			C3 C6 C13



Elaborar unha memoria/informe de modo rigoroso e sistemático.

A14

B2

C1

B3

B4

B7

B10

Contents	
Topic	Sub-topic
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. 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	A12 A14 A17 B1 B2 B3 B6 B7 B9 C6 C8	28	28	56
Problem solving	A12 A17 B2 B4 B6 B7 B8 B9 B10 B11 C1 C3 C9 C10 C11 C12 C13	24	36	60
Supervised projects	A12 A17 B2 B3 B4 B7 B9 B10 C1 C9 C10 C12	0	10	10
Seminar	A12 A14 A17 B2 C1 C3 C5 C6 C7 C8 C9 C10 C11 C12 C13	0	10	10
Document analysis	A12 A17 B1 B3 B4 B5 B7 B8 B9 B11 C3	0	3	3



Introductory activities	A12 B3 B4 B6 B7 B8 B9 B10 C1	2	2	4
Objective test	A12 A14 A17 B1 B2 B3 B4 B6 B7 B10 B11 C1 C9	2	0	2
Personalized attention		5	0	5

(*)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.
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
Introductory activities	Introducción á materia
Objective test	Knowledge assessment.

Personalized attention	
Methodologies	Description
Supervised projects Problem solving	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. 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
Objective test	A12 A14 A17 B1 B2 B3 B4 B6 B7 B10 B11 C1 C9	Comprobación dos coñecementos e capacidade de resolución de problemas.	60
Supervised projects	A12 A17 B2 B3 B4 B7 B9 B10 C1 C9 C10 C12	Realización dos traballos propostos.	15
Guest lecture / keynote speech	A12 A14 A17 B1 B2 B3 B6 B7 B9 C6 C8	Coñecementos teóricos	10
Problem solving	A12 A17 B2 B4 B6 B7 B8 B9 B10 B11 C1 C3 C9 C10 C11 C12 C13	Resolver problemas.	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 professor office or by TEAMS, where they will perform equivalent tests.

Fraudulent conduct in tests or activities, once verified, will cause a final mark of 0, invalidating any mark obtained in the in previous activities, as established in the current academic regulations at UDC.

Sources of information

Basic	- Larson-Hostetler-Edwards (). CÁLCULO (2) . Mac Graw Hill - James Stewart (). CALCULO MULTIVARIABLE. Thomson - Martínez Sagarzazu (). ECUACIONES DIFERENCIALES. APLICACIONES Y EJERCICIOS. Universidad del País Vasco - 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 - Elizabeth Vargas, Luis A. Núñez (2020). Geometría III: geometría analítica plana y del espacio. UAPA
Complementary	- Fernández Viña, J. A. (). EJERCICIOS Y COMPLEMENTOS DE ANÁLISIS MATEMÁTICO II. Tecnos - Fernández Viña, J. A. (). ANÁLISIS MATEMÁTICO II. Tecnos - García, Alfonso y otros (). CÁLCULO ii. Librería ICAI - Gutiérrez Gómez-García Castro (). GEOMETRÍA. Pirámide - Granero, F. (). ÁLGEBRA LINEAL Y GEOMETRÍA. Mac Graw Hill - García García-López Pellicer (). ÁLGEBRA LINEAL Y GEOMETRÍA. Marfil

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.