

Teaching Guide						
Identifying Data					2023/24	
Subject (*)	Mathematics II Code			Code	631G01106	
Study programme	Grao en Náutica e Transporte Marítimo					
		Descri	ptors			
Cycle	Period	Yea	ar	Туре	Credits	
Graduate	2nd four-month period First Basic training		Basic training	6		
Language	SpanishGalician					
Teaching method	Face-to-face					
Prerequisites						
Department	Matemáticas					
Coordinador	Arós Rodríguez, Angel Daniel E-mail angel.aros@udc.es					
Lecturers	Arós Rodríguez, Angel Daniel     E-mail     angel.aros@udc.es					
	Cao Rial, María Teresa teresa.cao@udc.es			es		
Web	www.nauticaymaquinas.es/					
General description	This course is devoted to the study o basic concepts of Planar and Spherical Trigonometry, two-dimensional and					
three-dimensional loci (in particular conic sections and quatric surfaces), Differential and Integral Calculus in several variables and Statistics. The studenst will learn to use these specific mathematical tools, but also they will improve their skills in developing to the studenst will be an even of the studenst wi				ntegral Calculus in several		
				their skills in developing new		
	methods and adquiring new techn	lolgies, to cons	ult bibliographic	references and online re	sources, to elaborate a memory	
	in a rigourous and sistematic man	nner, to give lec	tures to others a	and collaborate with other	colleagues, etc. In general they	
	will develop a sense of scientific a	and rational thin	king, capable to	adapt to unexpected situ	ations which may arise in their	
	future practice as an engineer.					

	Study programme competences / results
Code	Study programme competences / results
A54	RA1C-Write, explain and transmit the theoretical knowledge acquired both orally and in writing using scientific-technical language.
A55	RA2C-Identify and relate acquired knowledge to other disciplines
A57	RA4C-Collecting and interpreting relevant data
B30	RA7H-Applying critical, logical and creative thinking
B31	RA9H-Effectively solve practical problems associated with the subject by applying the knowledge acquired.
B32	RA10H-Know, analyse, synthesise and apply the contents, fundamental concepts and applications of the subject.
B33	RA11H-Develop both individual and group work
B34	RA12H-Handle bibliographic material and computer resources.
B35	RA13H-Handle with ease the tools, techniques, equipment and/or material/instrumental of each subject.
B36	RA14H-Use information and communication technology (ICT) tools necessary for the exercise of their profession and for lifelong learning.
C14	RA16X-Produce a report in a rigorous and systematic way.

Learning outcomes			
Learning outcomes	Study	y progra	mme
	con	npetenc	es /
		results	
RA1C-Write, explain and transmit the theoretical knowledge acquired both orally and in writing using scientific-technical	A54		
language.			
RA2C-Identify and relate acquired knowledge to other disciplines	A55		
RA4C-Collecting and interpreting relevant data	A57		
RA7H-Applying critical, logical and creative thinking		B30	
RA9H-Effectively solve practical problems associated with the subject by applying the knowledge acquired.		B31	
RA10H-Know, analyse, synthesise and apply the contents, fundamental concepts and applications of the subject.		B32	



RA11H-Develop both individual and group work	B33	
RA12H-Handle bibliographic material and computer resources.	B34	
RA13H-Handle with ease the tools, techniques, equipment and/or material/instrumental of each subject.	B35	
RA14H-Use information and communication technology (ICT) tools necessary for the exercise of their profession and for		
lifelong learning.		
RA16X-Produce a report in a rigorous and systematic way.		C14

TopicSub-topicLesson 1 Circular Functions. Formulas1.1. Basic definitions and relationships1.2. Graphical representations1.3. Usual formulas1.4. Inverse functions1.4. Inverse functions1.5. Trigonometric equationsLesson 2 Planar Trigonometry. Solving Triangles.Applications.2.1 Definitions2.2. Laws of sines and cosines. other formulas2.3. Solving Oblique Triangles2.4. Complements and applicationsLesson 3 Spherical triangles. General Properties.3.3. Spherical surface. Definitions3.4. Spherical Triangle. Associated trihedron3.5. Polar Spherical triangle. Properties3.6. Accessories
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Lesson 4Groups of Bessel?s formulas. Delambre and Neper 4.1. Bessel?s formulas
analogies. 4.2. Briggs' formulas
4.3. Delambre-Gauss' analogies
4.4. Neper?s analogies
Tema 5 Resolución de Triángulos Esféricos Oblicuángulos. 5.1. Análise de Casos
5.2. Complementos
Lesson 6 Solving Oblique Spherical Triangles.     6.1. Definitions
6.2. General case: navigating a maximum circumference
6.3. Navegating a parallel
6.4. Navegating a plane
6.5. Estima (estimate position)
Lesson 5 Solving Right-angled Spherical Triangles. 5.1. Definitions
5.2. Particular formulas. Napier?s nifty Rules
5.3. Particular propierties of the right triangles.
5.4. Solving right triangles.
5.5. Decomposition into right triangles. Perpendicular method.
Lesson 7 Loci in the Plane. Conic sections.7.1. Locus in the plane
7.2. Conic sections
7.2.1. Circle
7.2.2. Elipse
7.2.3. Hyperbola
7.2.4. Parabola



Lesson 9Loci in the space. Quadric surfaces.	9.1. Loci in the space
	9.1.1. Quadric surfaces of revolution
	9.1.3. Ruled surfaces
	9.2. Particular estudy of Quadric surfaces
	9.2.1. Sphere
	9.2.2. Ellipsoid
	9.2.3. Hyperboloids
	9.2.4. Paraboloids
	9.2.5. Degenerate quadric surfaces
	9.3. General equation of Quadric surfaces
	9.3.1. General equation
	9.3.2. Invariantes métricos
	9.3.3. Clasification
	9.4.4. Reduction to Canonical form
Lesson 10 Functions of several real variables. Limits and	10.1 General definitions
Continuity.	10.2 Limits
	10.3 Continuity
Lesson 11. Partial and Directional Derivatives. Taylor?s	11.1 Partial derivatives. Tangent plane
formula. Extrema.	11.2 Directional Derivatives.
	11.3 Higher order Derivatives
	11.4 Taylor?s polinomyal and theorem
	11.5 Relative extrema and conditioned extrema.
Lesson 12 Integrals in two and three variables. Calculus and	12.1 General definitions
applications	12.2 Properties
	12.3 Iterated Integrals. Fubini?s Theorem.
	12.4 Change of Variables
	12.5 Applications
The development and overcoming of these contents, together	Table A-II / 2 of the STCW Convention.
with those corresponding to other subjects that include the	
acquisition of specific competencies of the degree, guarantees	Mandatory minimum requirements for certification of masters and chief mates on chief
the knowledge, comprehension and sufficiency of the	on ships of 500 gross tonnage or more.
competencies contained in Table All / 2, of the STCW	
Convention, related to the level of management of chief mates	
of the Merchant Navy, on ships without gross tonnage	
limitation and Master up to a maximum of 500 GT.	

Planning					
Methodologies / tests	Competencies /	Teaching hours	Student?s personal	Total hours	
	Results	(in-person & virtual)	work hours		
Guest lecture / keynote speech	A55 A57 B30 B32	30	30	60	
Problem solving	A54 B36 B35 B33	24	36	60	
	B32 B31 B30				
Supervised projects	A57 A54 B36 B35	0	10	10	
	B34 B32 B31 B30				
	C14				
Seminar	A54 A55 B36 B35	0	10	10	
	B34 B33 B32 B31				
	B30				
Document analysis	A55 A57 B34 B35	0	3	3	
	B36				



Objective test	A54 B30 B31 B32	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 /	Exposition in the classroom of the fundamental concepts.	
keynote speech		
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
Supervised projects	The students are encouraged to attend in small groups or individually to the professors' office, or by TEAMS, to solve
Seminar	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).

		Assessment	
Methodologies	Competencies /	Description	Qualification
	Results		
Objective test	A54 B30 B31 B32	Proba individual de asimilación de coñecementos.	60
Guest lecture /	A55 A57 B30 B32	Resolución de cuestións teóricas ou prácticas breves relacionadas cos contidos da	10
keynote speech		sesión maxistral	
Supervised projects	A57 A54 B36 B35	Realización dos traballos propostos.	15
	B34 B32 B31 B30		
	C14		
Problem solving	A54 B36 B35 B33	Capacidade para resolver problemas.	15
	B32 B31 B30		
Others			
L	· ·		

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). A student who does not do at least one of hte partial exams or a final exam will be qualified as Not Presented.

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.

Both opportunities: Fraud in tests or evaluation activities, once verified, will directly imply failing the subject in which it has been committed: the student will be receive a final mark equal to 0, whether the commission of the fraud happens on the first opportunity or on the second. To do this, the qualification of the first opportunity will be modified, if necessary.

	Sources of information
Basic	- A. R. Arós, F. Blanco, M.J. Muiños (2012). TRIGONOMETRÍA PLANA Y ESFÉRICA CON APLICACIONES A LA
	NAVEGACIÓN. Paraninfo
	- M.T. Cao Rial, Á. D. Rodríguez Arós (2020). Problemas de Trrigonometría Esférica. Aplicaciones a la navegación.
	Universidade da Coruña
	- Larson-Hostetler-Edwards (). CÁLCULO (2) . Mac Graw Hill
	- D.G. Zill, W.S. Wright (). Cálculo de Varias Variables. McGraw Hill
	- Elizabeth Vargas, Luis A. Núñez (2020). Geometría III: geometría analítica plana y del espacio. UAPA
Complementary	- Vila Mitjá, A. (). ELEMENTOS DE TRIGONOMETRÍA ESFÉRICA. U.P.C.
	- Gutiérrez Gómez-García Castro (). GEOMETRÍA. Pirámide
	- Villa, A. de la (). PROBLEMAS DE ÁLGEBRA LINEAL. Glagsa
	- Swokowski-Kole (). TRIGONOMETRÍA. Thomson
	- Ayres, F. (). TRIGONOMETRÍA PLANA Y ESFÉRICA. Mac Graw Hill
	- James Stewart (). CALCULO MULTIVARIABLE. Thomson Editores

Recommendations	
Subjects that it is recommended to have taken before	
Mathematics I/631G01101	
Subjects that are recommended to be taken simultaneously	
	Subjects that continue the syllabus
Navigation I/631G01202	
Ship Manoeuvering I/631G01207	
Ship's Theory I/631G01208	
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.