		Teaching Guide			
	Identifying	Data		2023/24	
Subject (*)	Ship's Energy and auxiliary systems	Ship's Energy and auxiliary systems Code			
Study programme	Grao en Náutica e Transporte Marít	imo			
		Descriptors			
Cycle	Period	Year	Туре	Credits	
Graduate	1st four-month period	Second	Obligatory	6	
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Ciencias da Navegación e Enxeñarí	a Mariña			
Coordinador	Orosa Garcia, Jose Antonio	E-m	E-mail jose.antonio.orosa@udc.es		
Lecturers	Orosa Garcia, Jose Antonio	E-m	ail jose.antonio.or	jose.antonio.orosa@udc.es	
Web			'		
Seneral description					
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	Study programme competences		
Code	Study programme competences		
A57	RA4C-Collecting and interpreting relevant data		
A58	RA5C-Identify ship components.		
A59	RA6C-Identify critical situations and use available means in order to resolve them effectively.		
B31	RA9H-Effectively solve practical problems associated with the subject by applying the knowledge acquired.		
B33	RA11H-Develop both individual and group work		
B35	RA13H-Handle with ease the tools, techniques, equipment and/or material/instrumental of each subject.		
B53	RA50H?Operate the remote controls of propulsion installations and machine systems and services		
B61	RA62H?Contributing to the safe operation of tanker and chemical tanker cargoes		
B67	RA68H?To contribute to the safe operation of liquefied gas tankers.		
C15	RA17X-Communicating effectively in a work environment.		
C16	RA18X-Reviewing compliance with maritime legislative requirements		
C24	RA32X?Ensuring compliance with pollution prevention requirements		
C25	RA33X?Maintaining the seaworthiness of the ship		

Learning outcomes				
Learning outcomes		Study programme		
	CO	competences		
RA33X-Maintaining the seaworthiness of the ship			C25	
RA5C-Identify ship components.	A58			
RA4C-Collecting and interpreting relevant data	A57			
RA6C-Identify critical situations and use available means in order to resolve them effectively.	A59			
RA9H-Effectively solve practical problems associated with the subject by applying the knowledge acquired.		B31		
RA11H-Develop both individual and group work		B33		
RA13H-Handle with ease the tools, techniques, equipment and/or material/instrumental of each subject.		B35		
RA50H-Operate the remote controls of propulsion installations and machine systems and services		B53		
RA62H-Contributing to the safe operation of tanker and chemical tanker cargoes		B61		
RA17X-Communicating effectively in a work environment.			C15	
RA18X-Reviewing compliance with maritime legislative requirements			C16	
RA32X-Ensuring compliance with pollution prevention requirements			C24	
RA33X-Maintaining the seaworthiness of the ship			C25	
RA68H-To contribute to the safe operation of liquefied gas tankers.		B67		

Contents		
Topic	Sub-topic Sub-topic	
Introduction	Introduction. The ship.	
Naval Construction	Materials science. Properties. Classification. Test.	
Applied Thermodynamics	Principles of thermodynamics	
	irreversibility. entropy.	
	steam cycles	
	gas cycles	
	Psychrometric analysis of processes	
	Refrigeration and air conditioning technology	
Main Engine	Fundamental physical concepts on heat engines.	
	Internal combustion engines.	
	Steam turbines.	
	Gas Turbines.	
	Machine elements.	
	electric propulsion	
	Maintenance and inspection of equipment (oil analysis, water analysis)	
	Others: Outboard motors	
Auxiliary equipments	Generadores térmicos.	
	Sistemas hidráulicos y neumáticos	
	Maquinaria de cubierta	
	Tuberías	
	Bombas	
	Ventiladores y Compresores	
	Válvulas	
	Líneas de ejes	
	Otros equipos auxiliares	

Ship Systems	Hull services:
	Loading and unloading service,
	government service
	Mooring and anchoring service
	ballast service
	Drainage, flushing and fire fighting service
	Services of the propulsion installation:
	Fuel system
	Lubrication system
	Compressed air system
	Cooling sea water system
	fresh water service
	Engine room ventilation and exhaust system
	Boiler and steam feedwater system
	Electrical and electronic systems:
	Power generation system: Power plant of a ship
	Electronic and automatic systems (bridge equipment, introduction to sensorics,
	introduction to automatics)
	Other services:
	Oily water systems and incinerator
	Sewage treatment
	Greasing and lubrication
	Ventilation and air conditioning service (habilitation)
	Cooling system (Gambuza)
	LNG vessels; cargo containment system, BOG and Vapor control
	inert gas system
	gas washing system
Understanding of ship plans	Symbology
	Synoptic diagrams
	Plans of services in real ships
The development and overcoming of these contents, together	Table A-II/2 of the STCW Agreement.
with other matters that include the acquisition of specific	Specification of the minimum competency standards applicable to Captains and first
competencies of the degree, guarantor or knowledge,	deck officers of ships with a gross tonnage equal to or greater than 3000 GT.
understanding and sufficiency of the competencies collected	
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in chart AII/2, of the STCW Agreement, related to the level of	
in chart All/2, of the STCW Agreement, related to the level of	

Planning					
Methodologies / tests	Competencies	Ordinary class	Student?s personal	Total hours	
		hours	work hours		
Objective test	A57 A58 A59 B31	9	9	18	
	B67 C15				
Collaborative learning	A1 B2 B4 B33 B67	11	11	22	

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Guest lecture / keynote speech	A10 A9 A2 A1 A12	30	30	60
	A15 A22 A24 A25			
	A27 A30 A31 A32			
	A57 A58 A59 A62 B2			
	B4 B13 B40 B42 B53			
	B61 C15 C16 C24			
	C25 C27 C34			
Laboratory practice	A1 A10 A15 A22 A24	10	10	20
	A25 A27 A30 A32 B2			
	B4 B13 B31 B35 B40			
	B42 B53 B61 C16			
	C24 C25			
Personalized attention		30	0	30

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies		
Methodologies	Description	
Objective test	Evaluation of knowledge and understanding of the basic contents of the subject, considering the abilities and skills of the	
	student, their strategies and approaches in solving problems. The degree of evolution of the student and his ability to analyze,	
	prosecute and solve specific problems will be valued expressly, requiring a balanced theoretical-practical training.	
Collaborative learning	The most complex calculations will be solved in groups, during small group classes	
Guest lecture /	Explanation of theoretical contents for its later application to the reading of plans and laboratory practices	
keynote speech		
Laboratory practice	Workshop, special classrooms. Attendance and/or preparation of the memory/work sessions are mandatory	

Personalized attention		
Methodologies	Description	
Laboratory practice Analysis and individual recognition of each of the main and auxiliary energy systems of a ship. Interpretation of plan		
	Theoretical description of the components and the principle of operation of the energy and auxiliary systems of a ship.	

Assessment			
Competencies	Description	Qualification	
A1 A10 A15 A22 A24	Continuous evaluation, taking into account the attitude and participation of the student	10	
A25 A27 A30 A32 B2	and the degree of compliance reflected in the memory/report of the work carried out.		
B4 B13 B31 B35 B40	Participate in a final 10% wool grade for wool subject.		
B42 B53 B61 C16			
C24 C25			
A57 A58 A59 B31	Continuous evaluation based on objective tests throughout the course.	90	
B67 C15			
	In case of not following the continuous evaluation, an objective test will be carried out,		
	which will consist of an exam divided into two parts.		
	1- Theoretical part: 50% of the final grade.		
	2- Practical part: 40% gives a final mark.		
	To according onlyings it will be accompanied upon both most		
	A1 A10 A15 A22 A24 A25 A27 A30 A32 B2 B4 B13 B31 B35 B40 B42 B53 B61 C16 C24 C25 A57 A58 A59 B31	Competencies A1 A10 A15 A22 A24 A25 A27 A30 A32 B2 B4 B13 B31 B35 B40 B42 B53 B61 C16 C24 C25 A57 A58 A59 B31 B67 C15 Continuous evaluation, taking into account the attitude and participation of the student and the degree of compliance reflected in the memory/report of the work carried out. Participate in a final 10% wool grade for wool subject. Continuous evaluation based on objective tests throughout the course. In case of not following the continuous evaluation, an objective test will be carried out, which will consist of an exam divided into two parts. 1- Theoretical part: 50% of the final grade.	



Assessment comments

The evaluation criteria included in tables A-III/1 and A-III/3 of the STCW Code, and collected in the Quality Assurance System, will be taken into account when designing and carrying out the evaluation.

The students with recognition of part-time dedication and academic dispensation of attendance exemption, as established by the "RULE REGULATING THE STUDY REGIME FOR UNDERGRADUATE STUDENTS AT UDC (Arts. 2.3; 3.b; 4.3 and 7.5) (04/05/2017): You will have the right to take an objective test with the possibility of obtaining a 100% grade. On the other hand, the fraudulent performance of tests or assessment activities, once proven, will directly involve the grade of failure "0" in the subject in the corresponding call, thereby invalidating any qualification obtained in all assessment activities for the extraordinary call.

The fraudulent completion of tests or assessment activities, once proven, will directly result in a "0" failing grade in the subject in the corresponding call, leaving the grade obtained in all assessment activities for the extraordinary call without effect

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	Sources of information
Basic	 - José A. Orosa García y José A. Pérez Rodríguez (2008). Termodinámica Aplicada con EES. Tórculo - Ángel M. Costa Rial y José A. Orosa García (2019). Apuntes de Sistemas Energétcios y Auxiliares del Buque. UDC - José A. Orosa García, Ángel M. Costa Rial, Rebeca Bouzón Otero, Stefan Kluj (2019). Servicios del BUque. Simulador de Máquinas. Cartamar
Complementary	- Knack C. ((1990)). Diesel motor ships engines and machiney. Institute of Marine Engineers - McGeorge ((1995)). Marine auxiliary machinery. Oxford

-	McGeorge ((1995)). Marine auxiliary machinery. Oxford
	Recommendations
	Subjects that it is recommended to have taken before
Física/631211101	
Debuxo/631211102	
Matemáticas/631211104	
Química/631211110	
Phisics/631G01103	
Naval Construction/631G01105	
	Subjects that are recommended to be taken simultaneously
Electricity and Electronics/631G0	1206
Ship's Theory I/631G01208	
Maritime Technical English/631G	01275
	Subjects that continue the syllabus
Maritime Safety /631G01211	
Marine and atmospheric pollution	/631G01304
Tankers/631G01308	
Maritime Surveys/631G01314	
	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.