

Course: 2024 / 2025 - Course planning



[GEC301] THERMAL AND FLUID ENGINEERING **GENERAL INFORMATION** Studies DEGREE IN INDUSTRIAL ELECTRONICS Subject MECHANICAL AND CHEMICAL ENGINEERING ENGINEERING OF MATERIALS Semester 1 Mention / Field of Course 2 specialisation Character COMPULSORY Plan 2022 Modality Face-to-face Language EUSKARA/CASTELLANO Credits 4,5 Hours/week 3.89 Total hours 70.02 class hours + 42.48 non-class hours = 112.5 total hours 2030 AGENDA GOALS PROFESSORS ABETE HUICI, JOSE MANUEL AIZPURU SULIS, JON UIRED PREVIOUS KNOWLEDGE Subjects Knowledge (No specific previous subjects required) (No previous knowledge required) LEARNING RESULTS LEARNING RESULTS кс sĸ AB ECTS GER201 - To know the basic principles of fluid mechanics. Calculation of pipes, channels and fluid x systems GER202 - To demonstrate knowledge of thermodynamics and heat transmission and its application to 2,02 solving problems in the field of engineering G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, x 0.32 becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and/or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy 0,16 G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language Total: 4,5 KC: Knowledge or Content / SK: Skills / AB: Abilities ENAEE LEARNING RESULTS ENA103 - Knowledge and comprehension: Awareness of the multidisciplinary context of engineering. ENA104 - Analysis in engineering: The ability to analyse complex products, processes and systems in their field of study; choose and apply relevant analytical, calculation and experimental methods in a suitable way; and correctly interpret the results of such analyses. ENA105 - Analysis in engineering: The ability to identify, formulate and solve engineering problems in their speciality; choose and apply adequately established analytical, calculation and experimental methods; and acknowledge the importance of social, health and safety, environmental, economic, and industrial restrictions. ENA106 - Engineering projects: Ability to project, design and develop complex products (parts, components, finished products, etc.), processes and systems of their speciality, which meet the established requirements, including awareness of the social, health and safety, environmental, economic and industrial aspects, as well as selecting and applying appropriate project methods. ENA109 - Research and innovation: Ability to consult and apply codes of good practice and security in their speciality. ENA113 - Practical application of engineering: Knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations in the field of their speciality. ENA118 - Preparation of judgements: Ability to manage complex technical or professional activities or projects of their speciality, taking responsibility for decision making. ENA119 - Communication and Teamwork: Ability to effectively communicate information, ideas, problems and solutions in the field of engineering and with society in general. ENA120 - Communication and Teamwork: Ability to operate effectively in domestic and international contexts, individually and as a team, and to cooperate with both engineers and people from other disciplines. SECONDARY LEARNING RESULTS 1RGE290 (1 sem) NCH ΤН LEARNING ACTIVITIES СН 2 h 1 h. 3 h. Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in



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					Escuela Politécnica Superior
interdisciplinary contexts, real and/or simulated, individually	y and/or ii	n teams			
EVALUATION SYSTEM	w	MAKE-UP MECHANIS	MS		
Observation (technical capacity, attitude and participation)	100%	Observation (technical Comments: Continuou	capacity, att s assessme	tude and part nt.	icipation)
CH - Class hours: 2 h. NCH - Non-class hours: 1 h. TH - Total hours: 3 h.					
1RGE294 (1 sem)					
LEARNING ACTIVITIES			СН	NCH	тн
Development and writing of records, reports, presentations projects/work experience/challenges/case studies/experime individually and/or in teams	, audiovis ental inve	ual material, etc. on stigations carried out	1,34 h.	,66 h.	2 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANIS	MS		
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems	100%	Presentation and defen practical work, simulation term projects, end of defended and problems Comments: - Continuo	ce of exercis on practical v egree project us assessm	es, case stuc vork, laborato , master's the ent.	lies, computer ry practical work, sis, challenges
CH - Class hours: 1,34 h. NCH - Non-class hours: ,66 h. TH - Total hours: 2 h.					
1RGE291 (1 sem)					
LEARNING ACTIVITIES			СН	NCH	ТН
Carrying out/resolving projects/challenges/cases, etc. to pr interdisciplinary contexts, real and/or simulated, individually	ovide solu / and/or in	utions to problems in teams	2 h.	1 h.	3 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANIS	MS		
Observation (technical capacity, attitude and participation)	100%	Observation (technical capacity, attitude and participation) Comments: Continuous assessment.			
CH - Class hours: 2 h. NCH - Non-class hours: 1 h. TH - Total hours: 3 h.					
RGE201 [!] Analiza sistemas hidraulicos básicos y apl bombeo,turbinas hidraúcas y eólicas	ica los pi	incipios de la mecánica	de fluidos a	a procesos d	'e

LEARNING ACTIVITIES			СН	NCH	тн
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints			2 h.	8 h.	10 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects			15 h.		15 h.
Carrying out exercises and solving problems individually and/or in teams			7 h.	7 h.	14 h.
Carrying out work experience in real environments and writing the corresponding report			7 h.	4 h.	11 h.
EVALUATION SYSTEM W MAKE-UP MECHANIS		NS			
Reports on the completion of exercises, case studies, 4% Individual written and/or		oral tests of	or individual		





computer exercises, simulation exercises, laboratory		coding/programming te	ests		
exercises, term projects, challenges and problems		Prototype / Product			
Individual written and/or oral tests or individual	89%	Comments: - Students	s with less th	an a 5 at the c	control point mus
coding/programming tests		retake the exam Final	mark of the	control point: I	Retake (75 %) +
Prototype / Product	7%	Control point (25 %) Ir	n the project	/ PBL there wi	ill not be any (
Comments: - Control point: minimum grade 5 PBL proj	ect	retake of the individual of	defense.		-
grade: 30% product, 20% technical content of the report an	d 50%				
individual technical defense.					
CH - Class hours: 31 h.					
NCH - Non-class hours: 19 h.					
TH - Total hours: 50 h.					
PCE202 [1] Aplica los mocanismos do transforoncia d	la color a	n al análisis dal compor	tomionto tór	mico do los a	ristomas
electrónicos Dimensiona el radiador utilizado en circui	tos do no	toncia lingalos	lannento ter		sistemas
	ios de po	lencia integies			
LEARNING ACTIVITIES			СН	NCH	TH
Carrying out work experience in real environments and w	riting the c	corresponding report	7 h.	4 h.	11 h.
EVALUATION SYSTEM	w	MAKE-UP MECHANIS	SMS		
Departs on the completion of everyings, appa studies	20%		JWIG		
computer exercises, simulation exercises, laboratory	2078	Prototype / Product		a a ra will path	a any ratalya of
evercises, term projects, challenges and problems		the individual defense		here will not b	e any relake of
Individual written and/ar aral tests or individual	50%	the individual defense.			
coding/programming tests	50 /8				
	000/				
Prototype / Product	30%				
Comments: - PBL project grade: 30% product, 20% tech	nical				
content of the report and 50% individual technical defense.					
CH - Class hours: 7 h.					
NCH - Non-class hours: 4 h.					
NCH - Non-class hours: 4 h. TH - Total hours: 11 h.					
NCH - Non-class hours: 4 h. TH - Total hours: 11 h.					
NCH - Non-class hours: 4 h. TH - Total hours: 11 h.					
NCH - Non-class hours: 4 h. TH - Total hours: 11 h.					
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NCH - Non-class hours: 4 h. TH - Total hours: 11 h. IRGE293 (1 sem)					
NCH - Non-class hours: 4 h. TH - Total hours: 11 h. 1RGE293 (1 sem)					
NCH - Non-class hours: 4 h. TH - Total hours: 11 h. 1RGE293 (1 sem)					
NCH - Non-class hours: 4 h. TH - Total hours: 11 h. 1RGE293 (1 sem)			СН	NCH	ТН
NCH - Non-class hours: 4 h. TH - Total hours: 11 h. 1RGE293 (1 sem) LEARNING ACTIVITIES			СН	лсн	тн
NCH - Non-class hours: 4 h. TH - Total hours: 11 h. IRGE293 (1 sem) LEARNING ACTIVITIES Development and writing of records, reports, presentation	is, audiovi	sual material, etc. on	<u>СН</u> 1,34 h.	NCH ,66 h.	TH 2 h.
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Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in 1,34 h. ,66 h. 2 h. interdisciplinary contexts, real and/or simulated, individually and/or in teams					
EVALUATION SYSTEM	W	MAKE-UP MECHANIS	SMS		
Observation (technical capacity, attitude and participation)	100%	Observation (technical Comments: Continuor	capacity, atti us assessmer	itude and par nt.	ticipation)
CH - Class hours: 1,34 h. NCH - Non-class hours: ,66 h. TH - Total hours: 2 h.					

RGE202 [!] Aplica los principios termodinámicos a motores térmicos y turbinas de vapor					
LEARNING ACTIVITIES			СН	NCH	тн
Conducting tests, giving presentations, presenting de checkpoints	fences, taking	examinations and/or doing	2 h.	8 h.	10 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects			14 h.		14 h.
Carrying out exercises and solving problems individually and/or in teams		8 h.	7,5 h.	15,5 h.	
EVALUATION SYSTEM	W	MAKE-UP MECHANISM	IS		

Individual written and/or oral tests or individual 100% coding/programming tests	Individual written and/or oral tests or individual coding/programming tests
Comments: - Control point: minimum grade 5 Courseworks: minimum grade 5.	Comments: - Students with less than a 5 at the control point must retake the exam Final mark of the control point: Retake (75 %) + Control point (25 %) For the courseworks, their correction will be asked. The maximum mark for the corrected courseworks will be 5.0.

CH - Class hours: 24 h. NCH - Non-class hours: 15,5 h. TH - Total hours: 39,5 h.

CONTENTS

1 FLUIDS

- 1.1 Fluid mechanics
- 1.2 Pumps

1.3 Hydraulic turbines

1.4 Wind generators

1.5 Modeling of hydraulic systems

- 2 THERMAL ENGINEERING 2.1 Ideal temperature and gases
- 2.2 Heat and first principle of thermodynamics
- 2.3 Second principle of temperature
- 2.4 Steam turbines
- 2.5 Heat transfer and calculation of radiator

2.6 Modeling of thermal systems

LEARNING RESOURCES AND BIBLIOGRAPHY				
Learning resources	Bibliography			
Moodle Platform Class presentations	A heat transfer textbook, John H. Lienhard IV and John H. Lienhard V, third edition, Cambridge MA, Phlogiston Press, 2004			
Slides of the subject	Heat Transfer A Practical Approach, Cengel, Yunus A and Cengel, Yunus, McGraw Hill Professional, 2003.			
	Fundamentals of heat and mass transfer, Incropera Frank, Dewitt			





David, Bergman Theodore, Lavine Adrienne, sixth edition, 2011