



		[GEG:	301] ELEC ⁻	TROTECHNI	CS			
		G	ENERAL INF	ORMATION				
Studies	DEGREE IN IND ENGINEERING	DUSTRIAL ELECTR	ONICS	Subject	ELECTRICAL TEC	HNOLOGY		
Semester	2	Course	2	Mention / Field of				
Character	COMPULSORY	Modality	Face-to-face		FUSKARA/CASTE			
Credits	6	Hours/week	3.97	Total hours	71.5 class hours +	78.5 non-cla	ass hours	s = <u>150 tota</u>
			2030 AGENI	DA GOALS				
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MATHEMATICS II	500	6013		[!]	Kilowieu	ye		
PHYSICS II				[!]				
????								
	II TS		LEARNING	RESULTS	К	: sk	AR	ECTS
GER212 - To know	v and use the prir	nciples of circuit theo	ory and electrical	machines		x		5,4
G-RTR1 - To devel	lop interdisciplina of respect for hun	ary projects specific	to their specialty	and of gradual com	olexity, - sessing the	x		0,36
impact of the prop	osed solutions of	n the SDGs - to acq	uire and/or apply	basic, advanced an	d/or			
with a high degree	onstrating the ab	linty to work in multic	isciplinary teams	s and/or undertake fi	urther studies			
G-RTR2 - To expre	ess information, in	deas and the argum	ents that suppor	t them in an orderly,	clear and from different	x		0,24
sources, using inc	clusive and non-d	liscriminatory langua	ige		nom unerent			
						Т	otal:	6
KC: Knowledge or Cor	ntent / SK: Skills / AB	: Abilities						
ENALE LEARNII	NG RESULTS	nension: Knowledge	and comprehen	sion of the engineeri	na disciplines of the	eir speciality	at the le	vel
necessary to acq	uire the rest of th	e competencies of t	he degree, includ	ding notions of the la	test advances.		, at the le	//01
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, ec	conomic and indu	istrial aspects, as we	ell as selecting a and apply codes (nd applying appropri	ate project method: security in their so	s. eciality		
ENATIO - Research and innovation. Ability to consult and apply codes of good practice and security in their speciality. ENA110 - Research and innovation: Capacity and ability to project and carry out experimental investigations, interpret results, and reach conclusions in their field of study.								
ENA111 - Practical application of engineering: Understanding of the applicable techniques and methods fr analysis, design and research and their limitations in the field of 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 - Commu engineering and v	inication and Tea with society in ge	neral. neral:	ectively commun	icate information, id	eas, problems and	solutions in t	the field o	of
and to cooperate	with both engine	ers and people from	other disciplines	S				
		SECO	NDARY LEA	RNING RESULT	TS			
2RGE292 (2 so	em)							





LEARNING ACTIVITIES			СН	NCH	тн
Carrying out/resolving projects/challenges/cases, etc. to pro interdisciplinary contexts, real and/or simulated, individually	ovide sol and/or i	utions to problems in n teams	1,5 h.	1,5 h.	3 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANI	SMS		
Observation (technical capacity, attitude and participation)	100%	Observation (technica Comments: Continou	Il capacity, at s assesment	titude and par	ticipation)
CH - Class hours: 1,5 h. NCH - Non-class hours: 1,5 h. IH - Total hours: 3 h.					

RGE2200 [!] Analiza máquinas de corriente alterna . Selecciona el motor y los componentes necesarios para implementar la maniobra eléctrica necesaria para la puesta en marcha del motor asíncrono

LEARNING ACTIVITIES	СН	NCH	ТН			
Conducting tests, giving presentations, presenting defend checkpoints	ces, takinę	g examinations and/or doing	2 h.	10 h.	12 h.	
Presentation by the teacher in the classroom, in participa procedures associated with the subjects	11 h.		11 h.			
Carrying out exercises and solving problems individually	and/or in	teams	3,5 h.	11,5 h.	15 h.	
Carrying out work experience in real environments and w	riting the	corresponding report	6 h.	4 h.	10 h.	
EVALUATION SYSTEM	MAKE-UP MECHANISM	IS				
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	tudies, 4% Individual written and/or ratory coding/programming tes			or individual		
Individual written and/or oral tests or individual 90% Comments: - Student retake the exam Fina			with less than a 5 at the control point must note of the control point: control point 25%			
Prototype / Product	and retake 75% In the p	and retake 75% In the project / PBL there will not be any retake of				
Comments: - Control point: minimum grade 5 PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.						
CH - Class hours: 22,5 h. NCH - Non-class hours: 25,5 h. TH - Total hours: 48 h.						

2RGE293 (2 sem)

LEARNING ACTIVITIES			СН	NCH	тн
Development and writing of records, reports, presentation projects/work experience/challenges/case studies/experir individually and/or in teams	ns, audiovi mental inve	sual material, etc. on estigations carried out	1,5 h.	1,5 h.	3 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANI	SMS		
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	Reports on the completexercises, simulation of projects, challenges a Comments: - Continut the document.	etion of exerc exercises, lat nd problems ous assessm	ises, case stu poratory exerci lent It may b	dies, computer ises, term e asked to redo
CH - Class hours: 1,5 h. NCH - Non-class hours: 1,5 h. TH - Total hours: 3 h.					





RGE223 [!] Resuelve circuitos eléctricos trifásicos. Analiza y dimensiona transformadores monofásicos, trifásicos, y transformadores de medida

LEARNING ACTIVITIES	СН	NCH	тн		
Conducting tests, giving presentations, presenting defend checkpoints	2 h.	13 h.	15 h.		
Presentation by the teacher in the classroom, in participa procedures associated with the subjects	13 h.		13 h.		
Carrying out exercises and solving problems individually	and/or in te	eams	3 h.	10 h.	13 h.
Practical work in workshops and/or laboratories, individua	ally and/or	in teams	2,5 h.	2,5 h.	5 h.
Carrying out work experience in real environments and w	riting the c	orresponding report	8 h.	6 h.	14 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISM	IS		
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems 17% Individual written and/or oral tests or individual 76%		Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems Individual written and/or oral tests or individual			
Prototype / Product	7%	Prototype / Product	15		
Comments: - Control point: minimum grade 5 Coursew minimum grade 5 PBL project grade: 30% product, 20% content of the report and 50% individual technical defense	vorks: technical	Comments: - Students we retake the exam Final me and retake 75% For the asked. The maximum man 5.0 In the project / PBL individual defense.	vith less th ote of the o coursewo k for the c there will n	an a 5 at the c control point: c rks, their corre orrected cours ot be any reta	control point must control point 25% action will be seworks will be ke of the
CH - Class hours: 28,5 h. NCH - Non-class hours: 31,5 h. TH - Total hours: 60 h.					

RGE229 [!] Analiza máquinas de corriente continua y selecciona la máquina apropiada para una aplicación real

LEARNING ACTIVITIES	СН	NCH	ТН		
Conducting tests, giving presentations, presenting defence checkpoints	1 h.	4 h.	5 h.		
Presentation by the teacher in the classroom, in participal procedures associated with the subjects	5 h.		5 h.		
Carrying out exercises and solving problems individually a	and/or in te	eams		6 h.	6 h.
Practical work in workshops and/or laboratories, individua	lly and/or	in teams	2,5 h.	2,5 h.	5 h.
Carrying out work experience in real environments and w	riting the c	orresponding report	4 h.	2 h.	6 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISM	IS		
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems 17% Individual written and/or oral tests or individual content of tests 76%		Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems Individual written and/or oral tests or individual coding/programming tests			
Prototype / Product	Prototype / Product				
Comments: - Control point: minimum grade 5 Coursew minimum grade 5 PBL project grade: 30% product, 20% for content of the report and 50% individual technical defense.	orks: technical	Comments: - Students w retake the exam Final m and retake 75% For the asked. The maximum mar 5.0 In the project / PBL t individual defense.	vith less th ote of the c coursewor k for the co there will n	an a 5 at the c control point: c ks, their corre prrected cours ot be any reta	control point must ontrol point 25% ction will be works will be ke of the
CH - Class hours: 12,5 h. NCH - Non-class hours: 14,5 h. TH - Total hours: 27 h.					





2RGE291 (2 sem) СН **NCH** ΤН LEARNING ACTIVITIES Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in 1,5 h. 1,5 h. 3 h. interdisciplinary contexts, real and/or simulated, individually and/or in teams **EVALUATION SYSTEM** w MAKE-UP MECHANISMS Observation (technical capacity, attitude and participation) 100% Observation (technical capacity, attitude and participation) Comments: Continuous assessment. CH - Class hours: 1,5 h. NCH - Non-class hours: 1,5 h. TH - Total hours: 3 h. 2RGE294 (2 sem) СН NCH тн LEARNING ACTIVITIES 2 h. 1 h. 3 h. Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams **EVALUATION SYSTEM** w MAKE-UP MECHANISMS Presentation and defence of exercises, case studies, 100% Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree term projects, end of degree project, master's thesis, challenges project, master's thesis, challenges and problems and problems Comments: - Continuous assessment. CH - Class hours: 2 h. NCH - Non-class hours: 1 h. TH - Total hours: 3 h. 2RGE290 (2 sem) СН NCH ΤН LEARNING ACTIVITIES 1,5 h. 1,5 h. 3 h. Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams w **EVALUATION SYSTEM** MAKE-UP MECHANISMS 100% Observation (technical capacity, attitude and participation) Observation (technical capacity, attitude and participation) Comments: Continuous assessment. CH - Class hours: 1,5 h. NCH - Non-class hours: 1,5 h. TH - Total hours: 3 h.

CONTENTS

1. THREE-PHASE NETWORK2. TRANSFORMERS 2.1. Single-phase transformer 2.2. Three-phase transformer 2. 3. Characterization of transformers3. DIRECT CURRENT MACHINES 3.1. Principle of operation 3.2. Types 3.3. Characterization 3.4. Steady state analysis4. SYNCHRONOUS ALTERNATORS 4.1. Prin of DC machines 4.3. Steady state analysis ciple of operation 4.2. Characterization 4.4. Alternators connected to t 4.5. Alternators operating in island mode5. ASYNCHRONOUS MACHINES he grid 5.1. Principle of operation





5.2. Types of machines 5.3. Characterization 5.4. Steady state analysis

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Moodle Platform	Chapman, S.J. Máquinas Eléctricas. MacGraw Hill. 1987
Lab practical training	Fraile Mora, Jesús. Máquinas Eléctricas. UPM. 1993
Slides of the subject	Epelde, Joxe. Potentziako Elektroteknia. Mondragon Unibertsitatea