

[GEK302] ELECTRONIC EQUIPMENT DESIGN

GENERAL INFORMATION

Studies	DEGREE IN INDUSTRIAL ELECTRONICS ENGINEERING		Subject	?
Semester	1	Course	3	Mention / Field of specialisation
Character	COMPULSORY		Language	EUSKARA/CASTELLANO/ENGLISH
Plan	2022	Modality	Face-to-face	Total hours 99 class hours + 51 non-class hours = 150 total hours
Credits	6	Hours/week	5.5	

2030 AGENDA GOALS



PROFESSORS

GARRIDO DIEZ, DAVID

BARRENETXEA IÑARRA, MANEX

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
(No specific previous subjects required)	(No previous knowledge required)

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GER304 - To know about the fundamentals and applications of analog electronics		x		2,56
GER305 - To design analogical, digital and power electronic systems		x		2,52
G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - 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		x		0,44
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		x		0,48
Total:				6

KC: Knowledge or Content / SK: Skills / AB: Abilities

ENAE LEARNING RESULTS

ENA102 - Knowledge and comprehension: Knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree, including notions of the latest advances.

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.

ENA107 - Engineering projects: Project capacity some state-of-the-art knowledge of their engineering speciality.

ENA108 - Research and innovation: Ability to carry out bibliographic searches and consult and use databases and other information sources with discretion, in order to carry out simulation and analysis with the aim of conducting research on technical topics of their speciality.

ENA109 - 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 for analysis, design and research and their limitations in the field of their speciality.

ENA112 - Practical application of engineering: Practical competency to solve complex problems, carry out complex engineering projects, and conduct investigations specific to 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.

ENA115 - Practical application of engineering: Knowledge of the social, health and safety, environmental, economic and industrial implications of engineering practice.

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.

ENA121 - Continued training: Ability to acknowledge the need for their own continued training and to undertake this activity throughout their professional life independently.

ENA122 - Continued training: Ability to stay up to date on science and technology innovations.

SECONDARY LEARNING RESULTS

RGE312 **[I]** *Analiza las pérdidas en conducción y en conmutación de los interruptores estáticos y es capaz de dimensionar el sistema de evacuación de calor*

LEARNING ACTIVITIES

	CH	NCH	TH
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	5 h.	6 h.	11 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.	3 h.	4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	5 h.		5 h.
Practical work in workshops and/or laboratories, individually and/or in teams	5 h.	1 h.	6 h.

Comments: *Practices are carried out that include cutting-edge silicon devices as well as state-of-the-art drivers. Students link what they see in theory with the latest developments in the industry.

EVALUATION SYSTEM

Individual written and/or oral tests or individual coding/programming tests

Comments: - Control point: minimum grade 5.

W

100%

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

Comments: - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%.

CH - Class hours: 16 h.

NCH - Non-class hours: 10 h.

TH - Total hours: 26 h.

1RGE390 (1 sem)

LEARNING ACTIVITIES

	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	4 h.		4 h.

EVALUATION SYSTEM

Observation (technical capacity, attitude and participation)

W

100%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

Comments: Continuous assessment.

CH - Class hours: 4 h.

NCH - Non-class hours: 0 h.

TH - Total hours: 4 h.

1RGE394 (1 sem)

LEARNING ACTIVITIES

	CH	NCH	TH
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	4 h.	2 h.	6 h.

EVALUATION SYSTEM

Presentation and defence of exercises, case studies, computer practical work, simulation practical work,

W

100%

MAKE-UP MECHANISMS

Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work,

laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems

term projects, end of degree project, master's thesis, challenges and problems

Comments: - Continuous assessment.

CH - Class hours: 4 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 6 h.

RGE311 [!] *Conoce los circuitos driver básicos en su funcionamiento y dimensionado así como la circuiteria requerida para la ayuda a la conmutación*

LEARNING ACTIVITIES

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

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

Practical work in workshops and/or laboratories, individually and/or in teams

CH

6 h.

NCH

4 h.

TH

10 h.

1 h.

4,5 h.

5,5 h.

6 h.

6 h.

4 h.

1 h.

5 h.

Comments: *Practices are carried out that include cutting-edge silicon devices as well as state-of-the-art drivers. Students link what they see in theory with the latest developments in the industry.

EVALUATION SYSTEM

W

Individual written and/or oral tests or individual coding/programming tests

Comments: - Control point: minimum grade 5.

100%

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

Comments: - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%.

CH - Class hours: 17 h.

NCH - Non-class hours: 9,5 h.

TH - Total hours: 26,5 h.

1RGE391 (1 sem)

LEARNING ACTIVITIES

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

CH

4 h.

NCH

TH

4 h.

EVALUATION SYSTEM

W

Observation (technical capacity, attitude and participation)

100%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

Comments: Continuous assessment.

CH - Class hours: 4 h.

NCH - Non-class hours: 0 h.

TH - Total hours: 4 h.

1RGE393 (1 sem)

LEARNING ACTIVITIES

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

CH

4 h.

NCH

2 h.

TH

6 h.

EVALUATION SYSTEM
W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

100%

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

Comments: - Continuous assessment. - It may be asked to redo the document.

CH - Class hours: 4 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 6 h.

RGE313 [!] *Evalua y comprende los requerimientos de la aplicación para una selección oportuna de sus componentes.*
LEARNING ACTIVITIES
CH
NCH
TH

Carrying out work experience in real environments and writing the corresponding report

23 h.

14 h.

37 h.

EVALUATION SYSTEM
W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

20%

Individual written and/or oral tests or individual coding/programming tests

50%

Prototype / Product

30%

Comments: - PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.

MAKE-UP MECHANISMS

Prototype / Product

Comments: - There will not be any retake of the individual defense.

CH - Class hours: 23 h.

NCH - Non-class hours: 14 h.

TH - Total hours: 37 h.

1RGE392 (1 sem)

LEARNING ACTIVITIES
CH
NCH
TH

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

3 h.

3 h.

EVALUATION SYSTEM
W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

100%

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

Comments: - Continuous assessment. - It may be asked to redo the document.

CH - Class hours: 3 h.

NCH - Non-class hours: 0 h.

TH - Total hours: 3 h.

RGE310 [!] *Conece los interruptores estáticos, su características estructurales, límites funcionales, características estáticas y dinámicas y su uso según la aplicación.*
LEARNING ACTIVITIES
CH
NCH
TH

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

1 h.

12,5 h.

13,5 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and

13 h.

13 h.

procedures associated with the subjects

Practical work in workshops and/or laboratories, individually and/or in teams

10 h.

1 h.

11 h.

Comments: *Practices are carried out that include cutting-edge silicon devices as well as state-of-the-art drivers. Students link what they see in theory with the latest developments in the industry.

EVALUATION SYSTEM

W

Individual written and/or oral tests or individual coding/programming tests

100%

Comments: - Control point: minimum grade 5.

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

Comments: - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%.

CH - Class hours: 24 h.

NCH - Non-class hours: 13,5 h.

TH - Total hours: 37,5 h.

CONTENTS

1. Characteristics of switching semiconductors. 2. Load considerations and estimation of semiconductor device losses. 3. Drivers and protections for semiconductor devices. 4. Calculation of cooling systems.

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Lab practical training
Subject notes
Moodle Platform
Specific Master Software
Technical articles

Bibliography

[1] B. W. Williams, Power Electronics: Devices, Drivers, Applications and Passive Components. 2006.