

[GAI204] ELECTRIC POWER CONVERSION

GENERAL INFORMATION

| | | | |
|------------------|------------------------------|--|---|
| Studies | DEGREE IN ENERGY ENGINEERING | Subject | ? |
| Semester | 1 | Course | 3 |
| Character | COMPULSORY | Mention / Field of specialisation | |
| Plan | 2022 | Modality | Face-to-face |
| Credits | 6 | Language | ENGLISH |
| | | Total hours | 49 class hours + 101 non-class hours = 150 total hours |

PROFESSORS

AIZPURU LARRAÑAGA, IOSU

REQUIRED PREVIOUS KNOWLEDGE

| Subjects | Knowledge |
|--|---------------------------------------|
| (No specific previous subjects required) | Basics electronics Matlab/Simulink |

LEARNING RESULTS

| LEARNING RESULTS | KC | SK | AB | ECTS |
|--|----|----|----|----------|
| GAR304 - Applies power electronics to the design of direct and alternating current converters | | x | | 5,08 |
| 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

SECONDARY LEARNING RESULTS

RG390 [!] *Definir y gestionar los objetivos y la planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías específicas de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrate*

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

NCH

TH

4 h.

4 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

(No mechanisms)

Comments: Continuous assesment. The project is managed through the tutoring meetings and the meetings held with the experts, errors are corrected and the precise guidelines are given to overcome the project.

Comments: Assesment of the acquired transversal skills:

Followed methodology to solve the project: team work, decision making methods, conflict management... Project management: Definition of objectives, planning,... Written communication Oral communication

CH - Class hours: 0 h.

NCH - Non-class hours: 4 h.

TH - Total hours: 4 h.

RG391 [!] *Coordinar el equipo de trabajo, estimulando la cohesión y buen clima para lograr la integración de todas las personas y su contribución para alcanzar un rendimiento apropiado, tanto a nivel individual como grupal, para el desarrollo del proyecto en*

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.

4 h.

EVALUATION SYSTEM

W

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

100%

Comments: Assessment of the acquired transversal skills:

Followed methodology to solve the project: team work, decision making methods, conflict management... Project management: Definition of objectives, planning,... Written communication Oral communication

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assesment. The project is managed through the tutoring meetings and the meetings held with the experts, errors are corrected and the precise guidelines are given to overcome the project.

CH - Class hours: 0 h.

NCH - Non-class hours: 4 h.

TH - Total hours: 4 h.

RG392 [!] *Identificar y argumentar de forma precisa los ODS en los que incide el proyecto realizado, aportando posibles acciones para la mejora.*

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

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%

Comments: Assessment of the acquired transversal skills:

Followed methodology to solve the project: team work, decision making methods, conflict management... Project management: Definition of objectives, planning,... Written communication Oral communication

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assesment. The project is managed through the tutoring meetings and the meetings held with the experts, errors are corrected and the precise guidelines are given to overcome the project.

CH - Class hours: 0 h.

NCH - Non-class hours: 3 h.

TH - Total hours: 3 h.

RG393 [!] *Elabora la memoria del proyecto, aportando argumentos elaborados y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.*

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

6 h.

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%

Comments: Assessment of the acquired transversal skills:

Followed methodology to solve the project: team work, decision making methods, conflict management... Project management: Definition of objectives, planning,... Written communication Oral communication

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assesment. The project is managed through the tutoring meetings and the meetings held with the experts, errors are corrected and the precise guidelines are given to overcome the project.

CH - Class hours: 0 h.

NCH - Non-class hours: 6 h.

TH - Total hours: 6 h.

RGA394 [!] *Realiza una presentación oral del proyecto, justificando las soluciones propuestas con argumentos elaborados y precisos, y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.*

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

6 h.

6 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

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

100%

(No mechanisms)

Comments: Assessment of the acquired transversal skills:
Followed methodology to solve the project: team work, decision making methods, conflict management... Project management: Definition of objectives, planning,... Written communication Oral communication

Comments: Continuous assesment. The project is managed through the tutoring meetings and the meetings held with the experts, errors are corrected and the precise guidelines are given to overcome the project.

CH - Class hours: 0 h.

NCH - Non-class hours: 6 h.

TH - Total hours: 6 h.

RGA312 [!] *Analiza y dimensiona convertidores no controlados (AC-DC)*

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.

5 h.

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

2 h.

4 h.

6 h.

Computer simulation exercises, individually and/or in teams

2 h.

3 h.

5 h.

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

14 h.

1 h.

15 h.

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

2 h.

1 h.

3 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

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

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

25%

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

55%

Comments: Project evaluation. This will take into account: (a) Continuous assessment of performance, individual and group, during the development of the project; (b) The solution provided by the group of students at the end of the project, as well as the corresponding memory; (c) The oral defense of the project, taking into account the acquired knowledge and the quality of the presentation, the reasoned justification of the principles and the final causes that led to propose the chosen solution.

CH - Class hours: 20 h.

NCH - Non-class hours: 14 h.

TH - Total hours: 34 h.

RG313 [!] *Analiza y dimensiona convertidores controlados (DC-DC y DC-AC)*

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

32 h.

32 h.

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

4 h.

7 h.

11 h.

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

25 h.

25 h.

50 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

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

35%

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

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

10%

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

55%

Comments: Project evaluation. This will take into account: (a) Continuous assessment of performance, individual and group, during the development of the project; (b) The solution provided by the group of students at the end of the project, as well as the corresponding memory; (c) The oral defense of the project, taking into account the acquired knowledge and the quality of the presentation, the reasoned justification of the principles and the final causes that led to propose the chosen solution.

CH - Class hours: 29 h.

NCH - Non-class hours: 64 h.

TH - Total hours: 93 h.

CONTENTS

0. Introduction
1. Power analysis
1.1 DC and STEADY STATE
1.2 Single-phase and three-phase
1.2.1 Sinusoidal and non-sinusoidal
2. AC/DC converters
2.1 Not controlled
2.2 Single-phase and three-phase
3. DC/DC converters
3.1 Not isolated
3.2 Isolated
4. DC/AC converters
4.1 Single-phase and three-phase
4.2 Modulation techniques
SIMULATION WORK
ANALYSIS OF THE BEHAVIOR OF AN ELECTRIC OVEN IN A HOUSE WITH A DC GRID
LABORATORY WORK
ANALYSIS OF SINGLE-PHASE AND THREE-PHASE AC-DC CONVERTERS
ANALYSIS OF DC-DC BUCK AND BOOST CONVERTERS

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Bibliography

Subject notes

Moodle Platform

Class presentations

Programmes

Lab practical training

Slides of the subject

http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_Ink.pl?grupo=ENERGIA31&ejecuta=15