

## [GFE005] Power Electronics

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN ENGINEERING PHYSICS APPLIED TO INDUSTRY		<b>Subject</b>	Industrial Electronics	
<b>Semester</b>	1	<b>Course</b>	4	<b>Mention / Field of specialisation</b>	???
<b>Character</b>	OPTIONAL		<b>Modality</b>	Face-to-face	
<b>Plan</b>	2022	<b>Hours/week</b>	0	<b>Language</b>	CASTELLANO
<b>Credits</b>	6	<b>Total hours</b>	30 class hours + 120 non-class hours = <b>150 total hours</b>		

### PROFESSORS

MARZO ELGUERO, IOSU

### REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
Electronics and Automation	(No previous knowledge required)

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GFR309 - Understanding and applying power electronics		x		6
<b>Total:</b>				<b>6</b>

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

### SECONDARY LEARNING RESULTS

**RGF422** [!] *Analiza y selecciona convertidores estáticos AC-DC, DC-DC y DC-AC y máquinas de corriente continua para una aplicación real*

#### 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		10 h.	10 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		26 h.	26 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	4 h.	4 h.	8 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.

#### EVALUATION SYSTEM

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Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	50%
Individual written and/or oral tests or individual coding/programming tests	50%

#### MAKE-UP MECHANISMS

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

CH - Class hours: 10 h.

NCH - Non-class hours: 40 h.

TH - Total hours: 50 h.

**RGF423** [!] *Diseña e implementa convertidores electrónicos de potencia*

#### 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		10 h.	10 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		26 h.	26 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	4 h.	4 h.	8 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects 6 h. 6 h.

**EVALUATION SYSTEM**

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems 50%

Individual written and/or oral tests or individual coding/programming tests 50%

**MAKE-UP MECHANISMS**

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

**CH - Class hours:** 10 h.  
**NCH - Non-class hours:** 40 h.  
**TH - Total hours:** 50 h.

**RGF424 [!]** *Calcula valores medios, eficaces, potencias y otros parámetros eléctricos en régimen no senoidal*

**LEARNING ACTIVITIES**

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
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		10 h.	10 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		26 h.	26 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	4 h.	4 h.	8 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.

**EVALUATION SYSTEM**

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems 50%

Individual written and/or oral tests or individual coding/programming tests 50%

**MAKE-UP MECHANISMS**

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

**CH - Class hours:** 10 h.  
**NCH - Non-class hours:** 40 h.  
**TH - Total hours:** 50 h.

**CONTENTS**

- 1. Power computations
  - RMS, THD, WTHD, &hellip;
  - Sinusoidal and non-sinusoidal waveforms
- 2. AC/DC converters
  - Single phase rectifiers
  - Three phase rectifiers
- 3. DC/DC converters
  - Choppers
  - Buck, Boost, Buck-Boost, Flyback
- 4. DC/AC converters
  - Single-phase inverters
  - » Half-bridge, full-bridge

• Three-phase inverters

• Modulations

» Square-wave, PWM

## LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	Hart, Daniel W. Power Electronics. McGraw Hill. New York. 2011. ISBN: 978-007-128930-6 Barrado, Andres; Lázaro, Antonio; Problemas de Electrónica de Potencia. Prentice Educación. Madrid, 2007. ISBN: 978-84-205-4652-0 Power Electronics: Converters, Applications, and Design, 3rd Edition (Ned Mohan, Tore M. Undeland, William P. Robbins). Fundamentals of Power electronics (Erickson, Robert W., Maksimovic, Dragan) Power Electronics: Devices, Drivers, Applications, and Passive Components (Prof Barry Wayne Williams).