

## [MHK203] ENERGY TECHNOLOGY

### GENERAL INFORMATION

<b>Studies</b>	UNIVERSITY MASTER IN INDUSTRIAL ENGINEERING	<b>Subject</b>	?
<b>Semester</b>	2	<b>Course</b>	1
<b>Character</b>	COMPULSORY	<b>Mention / Field of specialisation</b>	
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face
<b>Credits</b>	3	<b>Hours/week</b>	1.94
		<b>Language</b>	CASTELLANO/EUSKARA
		<b>Total hours</b>	35 class hours + 40 non-class hours = <b>75 total hours</b>

### PROFESSORS

GONZALEZ JIMENEZ, DAVID
MARZO ELGUERO, IOSU

### REQUIRED PREVIOUS KNOWLEDGE

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

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>MHRA06</b> - To understand, analyze, exploit and manage the different energy sources		x		2,4
<b>MHRA27</b> - To demonstrate the ability to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social, health and safety, environmental, economic and industrial implications and responsibilities		x		0,12
<b>MHRA28</b> - To communicate your conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way			x	0,08
<b>MHRA30</b> - To work with people, involving and directing them in a dynamic aimed at a common objective that includes reflection on their ethical and social responsibility, with a global vision of the work to be carried out and the characteristics that it requires (quality, deadlines,...), assuming responsibility for the decisions made			x	0,08
<b>MHR125</b> - To possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context		x		0,16
<b>MHR126</b> - To apply the knowledge acquired and your problem-solving skills in new, little-known or changing environments within broader (or multidisciplinary) contexts related to your area of study		x		0,08
<b>MHR129</b> - To possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous		x		0,08
<b>Total:</b>				<b>3</b>

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

### ENAE LEARNING RESULTS

ENAE LEARNING RESULTS	ECTS
<b>ENA124</b> - Knowledge and comprehension: Deep knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree.	0,6
<b>ENA125</b> - Knowledge and comprehension: Critical Possession of avant-garde knowledge of their speciality.	0,6
<b>ENA130</b> - Analysis in engineering: Ability to identify, formulate and solve engineering problems in emerging areas of their speciality.	0,6
<b>ENA142</b> - Practical application of engineering: Knowledge and comprehension of the social, health and safety, environmental, economic and industrial implications of engineering practice.	0,6
<b>ENA144</b> - Preparation of judgements: Ability to integrate knowledge and handle complex concepts and formulate judgements with limited or incomplete information, including reflection on ethical and social responsibility related to the application of their knowledge and opinion.	0,6
<b>Total:</b>	<b>3</b>

### SECONDARY LEARNING RESULTS

**RMH134** [!] *Analiza las fuentes de energía tradicionales e identifica el proceso de transformación energética de cada una*

LEARNING ACTIVITIES	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		10 h.	10 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	5 h.		5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	7,5 h.		7,5 h.
Carrying out exercises and solving problems individually and/or in teams	5 h.	10 h.	15 h.

<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	15%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems
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	15%	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
Individual written and/or oral tests or individual coding/programming tests	70%	Individual written and/or oral tests or individual coding/programming tests

**CH - Class hours:** 17,5 h.  
**NCH - Non-class hours:** 20 h.  
**TH - Total hours:** 37,5 h.

**RMH135 [I] *Selecciona y dimensiona las diferentes fuentes de energía renovables***

<b>LEARNING ACTIVITIES</b>	<b>CH</b>	<b>NCH</b>	<b>TH</b>
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		10 h.	10 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	5 h.		5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	7,5 h.		7,5 h.
Carrying out exercises and solving problems individually and/or in teams	5 h.	10 h.	15 h.

  

<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>
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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	15%	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
Individual written and/or oral tests or individual coding/programming tests	70%	Individual written and/or oral tests or individual coding/programming tests

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**TH - Total hours:** 37,5 h.

## CONTENTS

The objective of this course is to provide an understanding of the current global and national energy framework, and to analyze various energy production technologies based on both fossil fuels and renewable resources. Although the energy transition focuses on "green" energy production technologies, it also addresses the importance of fossil fuel-based technologies in maintaining a balance in the power grid today.

The syllabus includes:

1. Introduction to energy (the current global and national energy context).
2. General information on the national electricity system (how it works, the price of electricity, the electricity bill, etc.).
3. Analysis of the electricity balance in Spain (installed power, annual generation, renewable and non-renewable resources).
4. Classic Thermal Power Plant (Basic concepts of the structure of a classic thermal power plant and analysis of the coal sector (global and national)).
5. Combined Cycle Thermal Power Plant (Basic concepts of the structure of a combined cycle power plant and analysis of the Natural Gas sector (Global and National))
6. Nuclear Energy (Basic concepts of Nuclear Fission and Nuclear Fusion, study of the components of a nuclear power plant and analysis of the nuclear sector (Global and National))
7. Cogeneration (Concept of cogeneration and trigeneration. Industrialization of the technology)
8. Solar Thermal Energy (Basic concepts of solar energy, study of solar thermal collection technology).
9. Photovoltaic Solar Energy (Analysis of the energy resource, study of photovoltaic solar collection technology).
10. Wind Energy (Basic concepts of wind energy, analysis of the energy resource and study of wind collection technology).

Multidisciplinary work: A multidisciplinary work will be carried out to put into practice the basic concepts analyzed in class, and some of them will be deepened.

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

Class presentations  
Subject notes  
Technical articles  
Moodle Platform  
Slides of the subject

### Bibliography

Wildi, T. Máquinas eléctricas y sistemas de potencia. Pearson Prentice Hall, 6. edizioa. 2016. ISBN 978-970-26-0814-7  
Carta González, J. A. Centrales de energías renovables. Prentice Hall. 2010. ISBN: 9788483226001  
Paul Breeze; Power Generation Technologies; Third edition. Kidlington, Oxford, United Kingdom : Newnes. 2019; ISBN 9780081026311