

**COURSE DATA****DATA SUBJECT**

**Code:** 43819  
**Name:** Energy management  
**Cycle:** Master's Degree  
**ECTS Credits:** 3  
**Academic year:** 2025-26

**STUDY (S)**

Degree	Center	Acad. year	Period
2250 - Master's Degree in Environmental Engineering	Escola Tècnica Superior d'Enginyeria	2	First quarter

**SUBJECT-MATTER**

Degree	Subject-matter	Character
2250 - Master's Degree in Environmental Engineering	Gestión energética	ELECTIVES

**COORDINATION**

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**SUMMARY**

Energy Management is an optional subject of 3.0 ECTS that is taught in the first semester of the second year of the Master of Environmental Engineering. It aims to serve as an introduction to the knowledge and use of energy management instruments and renewable energy techniques available, analyzing it from an industrial point of view, especially in relation to the optimization of resource consumption, which is necessary to minimize the impact environmental of industrial production processes. This subject serves, together with other subjects of the degree, to complete the necessary training in relation to the reduction of polluting emissions and consumption of non-renewable resources that the professional of the area requires.

**PREVIOUS KNOWLEDGE****RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE**

There are no specified enrollment restrictions with other subjects of the curriculum.

**OTHER REQUIREMENTS**



No restrictions.

## COMPETENCES / LEARNING OUTCOMES

### 2250 - Master's Degree in Environmental Engineering

Apply tools for environmental assessment and management including environmental impact assessment and environmental risk assessment.

Design, calculate and select engineering solutions to environmental problems, comparing alternatives that include emerging technologies under criteria of technical, social, economic and environmental viability.

Develop environmental solutions under the principles of circular economy and the sustainable development goals.

Identify, formulate and solve complex environmental engineering problems by applying engineering, scientific and mathematical principles.

Implement measures for preventing pollution and recovering, protecting and improving environmental quality.

Learn and apply new knowledge, using appropriate learning strategies.

Prepare and draft technical reports and/or environmental engineering projects considering technical, economic, social, energy and/or environmental aspects.

Recognise the ethical and professional responsibilities of environmental engineering and make informed judgements considering the impact of engineering solutions in global, economic, environmental and social contexts.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.

Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.

Students should demonstrate self-directed learning skills for continued academic growth.

Students should possess and understand foundational knowledge that enables original thinking and research in the field.

## DESCRIPTION OF CONTENTS



## **1. Energy, Industry, Management and Environment**

- 1.1 Current and energy perspectives. Consumption and energy costs.
- 1.2 Energy management and policies
- 1.3 Energy management tools and techniques.

## **2. Energy Audit**

- 2.1 The role of the energy audit.
- 2.2 Energy data of the company: production process, consumption, costs, etc.
- 2.3 Comparative analysis: indicators, specific consumption of the sector, use of good practices, etc. Analysis of improvement opportunities.
- 2.4 Economic calculations: estimation of benefits.

## **3. Energy efficiency**

- 3.1 Concept of energy saving.
- 3.2 Energy saving techniques: recycling, insulation, process analysis. More efficient electrical and thermal systems.
- 3.3 Process integration. Pinch Technology

## **4. Cogeneration**

- 4.1 Concept. Benefits.
- 4.2 Types of systems: Gas turbine. Steam turbine. Alternative engine. Combined cycle.
- 4.3 Measurement of efficiency. Economic perspectives.

## **5. Renewable Energy Technologies**

- 5.1 Concept and types.
- 5.2 Solar: thermal, thermoelectric, photovoltaic.
- 5.3 Wind.
- 5.4 Fuel cells.



5.5 Minihydraulics. Geothermal. Tides

## 6. Biomass and biofuel

- 6.1 Methods of converting Biomass into energy
- 6.2 Thermal processes (combustion, pyrolysis),
- 6.3 Biological Processes (alcoholic and methane fermentation: Biogas).
- 6.4 Biofuels: types.

LEARNING OUTCOMES (RD 1393/2007): 1 Understanding and critical analysis of the current situation of energy, and its impact on the industry. 2 Understand what is and what an energy audit consists of. 3 Be able to perform energy audits for simple cases 4 Know the energy saving techniques and determine their possible applicability. 5 Perform calculations of energy savings, including economic evaluation. 6 Know the characteristics of the different renewable energies: applications, environmental and economic aspects, their current situation and perspectives. 7 Know the technological and economic aspects associated with cogeneration 8. Know how to apply methodologies for energy integration of processes.

### WORKLOAD

#### PRESENCIAL ACTIVITIES

Activity	Hours
Theory	16,00
Theoretical and practical classes	2,00
Seminar	2,00
Classroom practices	10,00
<b>Total hours</b>	<b>30,00</b>

#### NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	10,00
Independent study and work	20,00
Preparation of lessons	10,00
Preparation for assessment activities	5,00
Resolution of case studies	0,00
<b>Total hours</b>	<b>45,00</b>

### TEACHING METHODOLOGY

The training activities will be developed according to the following distribution:

- Theoretical activities.



Description: In the theoretical classes the topics will be developed providing a global and integrating vision, analyzing in greater detail the key aspects and of greater complexity, promoting, at all times, the participation of the student.

- Practical activities.

Description: They complement the theoretical activities with the aim of applying the basic concepts and expanding them with the knowledge and experience that they have, acquiring during the realization of the proposed works. They comprise the following types of face-to-face activities:

- Classes of problems and questions in the classroom
- Discussion and problem solving sessions and exercises previously worked by the students
- Oral presentations
- Programmed tutoring (individualized or in groups)
- Work • Personal work of the student.

Description: Realization (outside the classroom) of monographic works, directed bibliographic search, issues and problems, as well as the preparation of classes and exams (study). This task will be carried out individually and tries to promote autonomous work.

- Evaluation.

Description: Realization of individual evaluation questionnaires in the classroom with the presence of the teacher.

The e-learning platform (Virtual Classroom of the Universitat de València and / or PoliformaT of the Polytechnic University of Valencia) will be used as a communication support with the students. Through it you will have access to the didactic material used in class, as well as the problems and exercises to solve.

## EVALUATION

63% of the overall mark will be obtained from the evaluation of the acquired knowledge, by means of the realization of a final exam. An additional 30% will be obtained through the completion and presentation of the proposed Works. 7% of overall mark will correspond to the evaluation of the resolution of proposed problems.

In any case, the evaluation system will be governed by the provisions of the Regulation of Appraisal and Qualification of the Universitat de València per a títols de Grau i Màster (<http://links.uv.es/7S40pjF>).

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA ([ACGUV 123/2020](#)).

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## REFERENCES

- **Básica/Básica/Basic:**

- Vicente Bermúdez Tamarit, Tecnología Energética. Universidad Politécnica de Valencia, 2000.
- Manuales de energías renovables: Minicentrales hidroeléctricas, energía eólica, energía de la biomasa, incineración de residuos sólidos urbanos, energía solar térmica, energía solarfotovoltaica. Madrid: IDAE.
- Manuales de Eficiencia Energética y Auditorias Energéticas del CADEN.
- DOMÍNGUEZ GARRIDO, J. Energías renovables y medio ambiente. Universidad de Valladolid, 1994.
- La Energía en España 2007. Madrid 2007. Ministerio de Industria, Turismo y Comercio. - Lujan J.M., Peidró J.L., y Guardiola C. Problemas de Tecnología y Gestión Energéticas. Universidad Politécnica de Valencia 2003.
- Molina Igartua, Luis Alfonso, "Manual de eficiencia energética térmica en la industria", Bilbao Ente Vasco de la Energía 1993

- **Complementaria/Complementària/Additional:**

- M.J. MORAN y H.N. SHAPIRO Fundamentos de TERMODINÁMICA TÉCNICA. (2 TOMOS) Editorial Reverté, S.A., 1993.
- Manual de Auditorías Energéticas. Cámara Oficial de Comercio e Industria de Madrid y Comunidad de Madrid. Madrid 2003.
- Sala Lizarraga, José María, "Cogeneración aspectos termodinámicos, tecnológicos y económicos", Bilbao Universidad del País Vasco D.L. 1999 - Smith, Robin, Chemical Process. Design and Integration. Editorial Wiley, 2005.