



## 1. General information

Course: ENERGY ENGINEERING  
Type: ELECTIVE  
Degree: 384 - MINING AND ENERGY ENGINEERING DEGREE  
Center: 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING  
Year: 4  
Main language: Spanish  
Use of additional languages:  
Web site:

Code: 19604  
ECTS credits: 6  
Academic year: 2023-24  
Group(s): 51  
Duration: First semester  
Second language: English  
English Friendly: Y  
Bilingual: N

Lecturer: **MARÍA DEL CARMEN MATA MONTES** - Group(s): 51

Building/Office	Department	Phone number	Email	Office hours
ELhuyar/3	MECÁNICA ADA. E ING. PROYECTOS	8042	maricarmen.mata@uclm.es	

## 2. Pre-Requisites

During the development of the subject, mathematical concepts and tools that are taught in subjects from previous courses will be used. To achieve the learning objectives described, students must possess the following skills and knowledge:

- Knowledge of basic numerical calculation and applied to engineering.
- Knowledge of programming and use of computer programs with application in engineering.
- Understanding and command of the basic concepts of the general laws of mechanics and thermodynamics and their application to solve engineering problems. Transfer of heat and matter, and thermal machines.
- Knowledge of the principles of fluid mechanics and hydraulics.

Likewise, it will be necessary to have a UCLM account, and basic knowledge of managing Moodle, to be able to consult Moodle on a regular basis, since possible variations in the programming of the subject will be conveniently communicated in the news forum of I

## 3. Justification in the curriculum, relation to other subjects and to the profession

The subject is located within the Energy Technology subject. The purpose of this subject is to provide adequate training in the knowledge and skills related to applied technologies and the processes necessary to carry out the energy transformations that allow obtain

## 4. Degree competences achieved in this course

Course competences	Description
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CT00	To promote respect and promotion of Human Rights as well as global access principles and design for everybody according to the 10th final order of the Law 51/2003 of December 2nd <sub>4</sub> about equal opportunities, non-discrimination and universal accessibility for people with disabilities.
CT02	To be acquainted with Information and Communication Technology ICT
F01	Capacity to know, understand and apply the principles of using, transforming and managing energy resources
F02	Capacity to know, understand and apply the principles of construction works, hydraulic installations, planning and management of hydraulic resources.
F03	Capacity to know, understand and apply the principles of generation industries, transport, transformation and management of thermal and electrical energy ..

## 5. Objectives or Learning Outcomes

Course learning outcomes
Description
Capacity to know, understand and use principles of exploitation, transformation and management of energy resources
Capacity to know, understand and use the principles of generation, transport, transformation and delivery of thermal and electrical energy industries.
Capacity to know, understand and use the principles of nuclear energy and radiological protection.
Capacity to know, understand and use the principles of hydraulic installations, building sites. Planning and management of hydraulic resources

## 6. Units / Contents

- Unit 1: The Energy and Power Resources of electric power generation**  
**Unit 2: Thermodynamic aspects of the cycles used in thermal power plants**  
**Unit 3: Conventional thermal power plants I**  
    Unit 3.1 Components of the Thermal Power Plants  
    Unit 3.2 Steam turbine thermal power plants  
    Unit 3.3 Gas turbine Thermal power plants  
**Unit 4: Conventional thermal power plants II**  
    Unit 4.1 ICE thermal power plants  
    Unit 4.2 Combined cycle power plants  
    Unit 4.3 Cogeneration  
    Unit 4.4 Nuclear power plants  
**Unit 5: Hydraulic power stations**

## 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB03 CB04 CT00 CT02 F01 F02 F03	0.96	24	N		Description in the classroom of the theoretical contents, using the method of the participatory lecture.
Problem solving and/or case studies [ON-SITE]	Project/Problem Based Learning (PBL)	CB03 CB04 CT00 CT02 F01 F02 F03	0.52	13	N		The teacher performs exercises and practical problems related to the corresponding topic.
Class Attendance (practical) [ON-SITE]	Case Studies	CB03 CB04 CT00 CT02 F01 F02 F03	0.28	7	Y	Y	Realization, individually or in small groups, of practical exercises and simulations of computer programs. It also includes the realization of 2 expository works by the students on contents related to those taught in the subject.
Group tutoring sessions [ON-SITE]	Group tutoring sessions	CB03 CB04 CT00 CT02 F01 F02 F03	0.4	10	N		The student will be attended in group to theoretical issues and problem solving.
Study and Exam Preparation [OFF-SITE]	Self-study	CB03 CB04 CT00 CT02 F01 F02 F03	3.6	90	N		Study and preparation of the subject carried out remotely, supported by the documentation in Moodle and the reference bibliography. It also includes the elaboration of reports of practices and exercises, preparation of presentations in PPT.
Mid-term test [ON-SITE]	Assessment tests	CB03 CB04 CT00 CT02 F01 F02 F03	0.24	6	Y	Y	Realization of tests related to aspects of theoretical-practical application of the subject.
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

## 8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Mid-term tests	60.00%	0.00%	General Line: It will consist of carrying out one or more written and/or oral tests with aspects of theoretical-practical application.  In the case of exams that have a theoretical part and a practical part, a minimum of 40% of the maximum grade that can be obtained in each part will be required in each part in order to make an average, in such a way that a grade is finally obtained, minimum of 5.
Projects	40.00%	40.00%	General line: The problems and/or works presented will be valued. The following will be taken into account: problem statement, use of terminology, choice of procedure, justification of the process used, results obtained, cleanliness and presentation of the document. In addition to the oral expression used in the presentation and the ability to answer questions from the teacher and the rest of the students.  Documents: All documents delivered must comply with the specific regulations for their delivery, which will be available to students on the Moodle platform. It will also be necessary to make one or more presentations in PowerPoint format in class or through Teams. The presentation will be made in small groups or individually.  Considerations: In order for the work(s) to be considered, it is necessary and essential that they be

			defended.
			Evaluation: In the group work and the delivered presentations, more than 40% of the maximum grade that can be obtained in this activity must be obtained. The student who, for different reasons, decides not to participate in this activity, must pass the same contents with the same methodology on another date after the ordinary final exam and before or equal to the date of the extraordinary final exam.
Final test	0.00%	60.00%	General Line: It will consist of carrying out one written and/or oral test with aspects of theoretical-practical application.  In the case of exams that have a theoretical part and a practical part, a minimum of 40% of the maximum grade that can be obtained in each part will be required in each part in order to make an average, in such a way that a grade is finally obtained a minimum of 5
<b>Total:</b>		<b>100.00%</b>	<b>100.00%</b>

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

The subject will be passed obtaining a score equal to or greater than 5.

##### CONSIDERATIONS IN CASE OF COPY

Those students who submit the copied assignments/practice scripts/exercises (that is, whose percentage of resemblance to other student(s), from their course or from previous ones, is greater than 80%), will be evaluated with a zero in this exercise. This means that they will have to take an exam for the copied activity in the extraordinary final exam.

##### Non-continuous evaluation:

Same considerations as in the case of the ordinary call. Those students who cannot make the exhibition of the work in class, will make it using Microsoft Teams.

#### Specifications for the resit/retake exam:

For those students who have not followed the continuous evaluation or who have not passed it, a test similar to the one carried out in the ordinary call will be carried out and tests that allow the recovery of the rest of the activities will also be included.

#### Specifications for the second resit / retake exam:

Final exam of all the contents and activities of the subject

### 9. Assignments, course calendar and important dates

#### Not related to the syllabus/contents

Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	24
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	13
Class Attendance (practical) [PRESENCIAL][Case Studies]	7
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Mid-term test [PRESENCIAL][Assessment tests]	6
<b>General comments about the planning:</b> The weekly planning may vary depending on the four-month period festivities in question. The possible variations in the programming of the subject will be conveniently communicated in the Moodle News forum and will be fully valid, so students are recommended to be aware of the modifications that may arise.	

#### Global activity

Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	24
Class Attendance (practical) [PRESENCIAL][Case Studies]	7
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	13
Mid-term test [PRESENCIAL][Assessment tests]	6
<b>Total horas: 150</b>	

### 10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Agüera Soriano, José	Mecánica de fluidos incompresibles y turbomáquinas hidráulic.	Ciencia 3		84-95391-01-05	2002	
Bathie, William W.	Fundamentals of gas turbines	John Wiley & Sons		0-471-31122-7	1996	
Fernández Herrero, Piedad	Cómo implantar un sistema de gestión de la energía según la	Fundación Confemetal,		978-84-15781-01-1	2013	
Kerrebrock, Jack L.	Aircraft engines and gas turbines	MIT Press		978-0-262-11162-1	1992	
Lacalle, Daniel (1967-)	La madre de todas las batallas : la energía, árbitro del nue	Deusto,		978-84-234-1932-6	2014	
Sancho García, José	Gestión de la energía /	Universidad Politécnica,		84-8363-003-6	2006	
	Diesel fuel and exhaust emissions	World Health Organization		92-4-157171-3	1996	
	Ejercicios resueltos de máquinas térmicas /	Universitat Politècnica,		978-84-8363-591-9	2010	
Madrid Cenzano, Javier	Manual técnico de la energía : con diagramas de flujo, tabla	AMV,		978-84-120954-9-4	2020	
Riva Romeva, Carles	Recursos energéticos y crisis : el fin de 200 años irrepitib	Octaedro,		978-84-9921-370-5	2012	
García Garrido, Santiago.	Operación y mantenimiento de centrales de ciclo combinado /	Díaz de Santos,		978-84-7978-842-1	2007	
Valero, Antonio (Valero Capilla) XX1595278	Exergy analysis of resources and processes	Prensas Universitarias de Zaragoza		978-84-92774-76-0	2010	
Usón, Sergio	Thermoeconomic diagnosis of energy systems /	Prensas Universitarias de Zaragoza,		9788415031864	2010	