UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: THERMAL ENGINEERING
Code: 56326
Type: CORE COURSE
ECTS credits: 6
Degree: 421 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING
Academic year: 2022-23
Center: 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL
Group(s): 20
Year: 3
Duration: C2
Main language: Spanish
Second language: English
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **ANGEL RAMOS DIEZMA** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
Politécnico/2C14	MECÁNICA ADA. E ING. PROYECTOS	926051978	Angel.Ramos@uclm.es	To guarantee the correct individualized attention of the student, the tutoring schedule will be arranged with the interested party by email

2. Pre-Requisites

The subject requires that students have certain prior knowledge to achieve the objectives of it. Among these previous acknowledgments, we can highlight, mainly, those related to the principles of thermodynamics and modes of heat transmission, both taught in the previous subject of Technical Thermodynamics. Students must also master aspects related to solving mathematics in engineering and basic concepts of fluid mechanics and general chemistry. Consequently, it is recommended that students have consolidated the knowledge taught in Fluid Physics, Physics and Chemistry.

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

The value that the Thermal Engineering subject has in the professional future of students is undeniable. The vast majority of the mechanical and electrical energy consumed is obtained through thermo-mechanical transformations, starting from the chemical energy contained in fuels, whether solid, liquid or gaseous, and using a combustion process. In addition, it also addresses this energy transformation in another direction, thus including the processes that occur in refrigeration and air conditioning installations. The characteristics of the equipment in which those transformations take place, of undoubted practical application for the future graduate, are also described.

4. Degree competences achieved in this course

Course competences

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
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.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEM03	Applied knowledge of thermal engineering.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
CG06	Ability to handle specifications, regulations and mandatory standards.
CG07	Ability to analyse and assess the social and environmental impact of technical solutions.
CT01	Knowledge of a second language.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Knowldege of the theoretical foundations of processes, substances used, available elements and the basic principles of operation of the main technologies for the production and use of thermal energy.

6. Units / Contents

Unit 1: Basic concepts in thermal engineering

Unit 2: Heat exchangers. Classification and design
Unit 3: Combustion and fuels
Unit 4: Mechanical energy generation and power plants
Unit 5: Air conditioning and industrial cooling

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	CB01 CB02 CB03 CB04 CB05 CEM03 CG03 CG04 CG06 CG07 CT01 CT02 CT03	1.2	30	N	-	In classroom with slides and students participation
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB04 CB05 CEM03 CG03 CG04 CG06 CT03	0.4	10	Y	Y	Three practical sessions in laboratory and elaborating a document of the session
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEM03 CG03 CG04 CG06 CG07 CT01 CT02 CT03	3.6	90	N	-	Self-study
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CEM03 CG03 CG04 CG06 CG07 CT02 CT03	0.2	5	Y	Y	Middle session and final exams
Problem solving and/or case studies [ON-SITE]	Combination of methods	CB01 CB02 CB03 CB04 CB05 CEM03 CG04 CG06 CT01 CT02 CT03	0.6	15	N	-	In classroom with students participation
		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
Laboratory sessions	30.00%	30.00%	Continuous evaluation: Three practical sessions of compulsory assistance and delivery of report. A grade higher than 4 is necessary in the practices to be able to do average with the rest of the subject. Non-continuous evaluation: a test will be carried out on the day of the official call, evaluating the skills of the laboratory practices. A grade equal to or greater than 4 will be necessary to make an average with the rest of the subject.
Mid-term tests	70.00%	0.00%	Continuous evaluation: The course is divided into two parts of which the student is assessed through a written test. The first part is evaluated in the middle of the course and a minimum grade of 4 is necessary to be able to release contents, compensating with the rest of the evaluation. The second part is evaluated on the day of the official ordinary call.
Final test	0.00%	70.00%	Non-continuous evaluation: an exam with the content of the subject.
Total:	**100.00%**	**100.00%**	

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 evaluation is divided into a practical part and another consisting of written exam. To pass the subject it is necessary to obtain a weighted grade greater than or equal to 5 and greater than or equal to 4 in both tests (parts 1 and 2) and laboratory practices.
Written exam: A partial test will be carried out, in the middle of the agenda, which will allow material to be eliminated until the extraordinary call in cases in which the grade is greater than or equal to 4.
Laboratory practices: the memory delivered (50%) will be evaluated and questions related to the practices (50%) will be asked, coinciding with the dates scheduled for the written tests.

Non-continuous evaluation:

The evaluation is divided into a practical part and another consisting of a written exam. To pass the subject it is necessary to obtain a weighted grade greater than or equal to 5 and greater than or equal to 4 in the test and the laboratory practices.
Written exam: A final test will be carried out with the content of the subject.
Laboratory practices: it will be evaluated through a practice exam coinciding with the dates scheduled for the written tests.

Specifications for the resit/retake exam:

The same as the final exam

Specifications for the second resit / retake exam:

The same as the final exam

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	5
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	15

Global activity

Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Formative Assessment [PRESENCIAL][Assessment tests]	5
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	10
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
INCROPERA, FRANK P.	Fundamentos de transferencia de calor /	Prentice hall,		970-17-0170-4	1999	
FERGUSON, COLIN R.	Internal combustion engines : applied thermosciences /	John Wiley & Sons,		978-1-118-53331-4	2016	
DESANTES, J.M.; LAPUERTA, M	Fundamentos de combustión	Serv. Publ. UPV			1991	
ELVERS, B	Handbook of Fuels	Wiley-VCH			2008	
GLASSMAN, I	Combustion	Academic Press			2008	
GOSSE, J	Technical Guide to Thermal Processes	Cambridge University Press			1986	
GUPTA, J.P	Working with Heat Exchangers. Questions and answers	Hemisphere			1990	
HERNÁNDEZ, J.J., RODRÍGUEZ, J., SANZ, J	Trasmisión de Calor para Ingenieros	Ediciones de la Universidad de Castilla-La Mancha			2010	
KREITH, F.	The CRC Handbook of Thermal Engineering	Springer-Verlag			2000	
LAPUERTA, M. ARMAS, O	Frío Industrial y Aire Acondicionado	Servicio de Publicaciones de la E.T.S.I. Industriales de Ciudad Real			2010	
LAPUERTA, M., HERNANDEZ, J.J	Tecnologías de la combustión	Ed. Universidad de Castilla-La Mancha			1998	