UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: THERMAL MACHINES
Code: 56367
Type: ELECTIVE
ECTS credits: 6
Degree: 353 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING (CR)
Academic year: 2021-22
Center: 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL
Group(s): 20 21
Year: 4
Duration: C2
Main language: Spanish
Second language: English
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **MAGIN LAPUERTA AMIGO** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
Politécnico/2-D17	MECÁNICA ADA. E ING. PROYECTOS	926295431	magin.lapuerta@uclm.es	

2. Pre-Requisites

Previous knowledge on Thermodynamics, Heat transfer, Fluid mechanics, chemistry and basic mathematical tools for engineers

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

Basic knowledge on the most widely used power plants (reciprocating internal combustion engines and turbomachinery) will likely be applied in the the professional exercise of both Mechanical and Energy intensifications

4. Degree competences achieved in this course

Course competences

Code	Description
A02	To know how to apply knowledge to work or vocation in a professional manner and possess the competences that are usually demonstrated by the formulation and defence of arguments and the resolution of problems in the field of study.
A03	To have the capability to gather and interpret relevant data (normally within the area of study) to make judgements that include a reflection on themes of a social, scientific or ethical nature.
A04	To be able to transmit information, ideas, problems and solutions to a specialized audience.
A08	Appropriate level of oral and written communication.
A12	Knowledge of basic materials and technologies that assist the learning of new methods and theories and enable versatility to adapt to new situations.
A16	Ability to analyse and evaluate the social and environmental impact of technical solutions.
C10	Basic knowledge and application of environmental technologies and sustainability.
F14	

5. Objectives or Learning Outcomes

Course learning outcomes

Not established.

Additional outcomes

Theoretical and practical knowledge on reciprocating internal combustion engines and turbomachinery

6. Units / Contents

Unit 1: General characteristics and thermodynamic cycles in reciprocating internal combustion engines
Unit 2: Parameters in reciprocating internal combustion engines
Unit 3: Gas exchange processes in 4-stroke and 2-stroke engines
Unit 4: Mechanical losses
Unit 5: Heat losses
Unit 6: Mixing, ingnition and combustion in spark ignition engines
Unit 7: Mixing, autoignition and combustion in compression ignition engines
Unit 8: Pollutant emissions
Unit 9: Introduction to turbomachinery
Unit 10: Reaction engines
Unit 11: Euler equation applied to turbomachines

7. Activities, Units/Modules and Methodology

		Related Competences					

Training Activity	Methodology	(only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures		1.76	44	N	-	
Laboratory practice or sessions [ON-SITE]	Combination of methods		0.48	12	Y	Y	
Progress test [ON-SITE]	Assessment tests		0.08	2	Y	N	
Final test [ON-SITE]	Assessment tests		0.08	2	Y	Y	
Study and Exam Preparation [OFF-SITE]			3.6	90	N	-	
		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
Progress Tests	90.00%	100.00%	Two progress tests, both scoring 50% of the final score. Compensation between them is only possible from a score of 4 out of 10.
Laboratory sessions	10.00%	0.00%	
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:

Two progress tests, both scoring 50% of the final score.
Compensation between them is only possible from a score of 4 out of 10.

Non-continuous evaluation:

A single test will include questions about the whole course, including laboratory

Specifications for the resit/retake exam:

Any part of the final exam (ordinary) can be passed in the second resit, whose structure will be similar to the progress tests and to the final exam

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	**hours**
Progress test [PRESENCIAL][Assessment tests]	2
Final test [PRESENCIAL][Assessment tests]	2
Unit 1 (de 11): General characteristics and thermodynamic cycles in reciprocating internal combustion engines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	6
Study and Exam Preparation [AUTÓNOMA][]	8
Unit 2 (de 11): Parameters in reciprocating internal combustion engines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	3
Study and Exam Preparation [AUTÓNOMA][]	8
Unit 3 (de 11): Gas exchange processes in 4-stroke and 2-stroke engines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	3
Study and Exam Preparation [AUTÓNOMA][]	10
Unit 4 (de 11): Mechanical losses	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][]	8
Unit 5 (de 11): Heat losses	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][]	9
Unit 6 (de 11): Mixing, ingnition and combustion in spark ignition engines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Study and Exam Preparation [AUTÓNOMA][]	9

Unit 7 (de 11): Mixing, autoignition and combustion in compression ignition engines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Study and Exam Preparation [AUTÓNOMA][]	9
Unit 8 (de 11): Pollutant emissions	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Study and Exam Preparation [AUTÓNOMA][]	7
Unit 9 (de 11): Introduction to turbomachinery	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][]	3
Unit 10 (de 11): Reaction engines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][]	9
Unit 11 (de 11): Euler equation applied to turbomachines	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][]	10
Global activity	
Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	44
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	12
Progress test [PRESENCIAL][Assessment tests]	2
Final test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][]	90
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
F. PAYRI, J.M. DESANTES	MOTORES DE COMBUSTION INTERNA ALTERNATIVOS	REVERTE-UPV		978-84-291-4802--2	2011	
J.K. MATTINGLY	ELEMENTS OF GAS TURBINE PROPULSION	MCGRAW-HILL		0-07-912196-9	1996	
M. MUÑOZ	PROBLEMAS RESUELTOS DE MOTORES TÉRMICOS Y TURBOMÁQUINAS TÉRMICAS	UNED		978-84-362-5564-5	2009	
S.J. FYGUEROA, J.O. ARAQUE	PROBLEMAS DE MOTORES DE COMBUSTION INTERNA	SPUA		980-11-0658-1	2003	
C. MATAIX	TURBOMÁQUINAS TÉRMICAS: TURBINAS A VAPOR, TURBINAS DE GAS,	DOSSAT 2000		84-237-0727-X	1999	