



## IDENTIFYING DATA

### (\*)Motores Térmicos

Subject	(*)Motores Térmicos			
Code	V04M141V01341			
Study programme	(*)Máster Universitario en Enxeñaría Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	4.5	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Porteiro Fresco, Jacobo			
Lecturers	Porteiro Fresco, Jacobo			
E-mail	porteur@uvigo.es			
Web				
General description				

## Competencies

Code	
C16	CTI5. Knowledge and skills for the design and analysis of thermal machines and engines, hydraulic machines and facilities for heat and industrial refrigeration
D1	ABET-a. An ability to apply knowledge of mathematics, science, and engineering.
D3	ABET-c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
D5	ABET-e. An ability to identify, formulate, and solve engineering problems.
D11	ABET-k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## Learning outcomes

Expected results from this subject	Training and Learning Results
- Know the technological basis on which the most recent developments rely on combustion engines	C16
- Know the types, operation and applications and thermal machines and engines	D1
- Ability to solve problems inherent in thermal machines, both mechanical, and pollutant emissions	D3
- Ability to perform experimental analysis to assess the operating characteristic curves of combustion engines in different charge states.	D5
- Know how to make designs, calculations and tests justifying their results, drawing conclusions	D11

## Contents

Topic	
1. Introduction to the power plant	1.1 Definition 1.2 Classification
2. Theoretical cycles	2.1 Introduction 2.2 Cycle of cold air-standard 2.3 Cycle MEP 2.4 Cycle MEC 2.5 Cycle air-fuel
3. Real cycle	3.1 Differences of the real cycle front the theoretical cycle 3.2 Peculiarities of the MEP 3.3 Peculiarities of the MEC

4. Renewal of the load in the engines of 4T	4.1 Introduction 4.2 volumetric Performance 4.3 Factors that affect to the volumetric performance 4.4 Technology of the renewal of the load of the 4T 4.5 State of the art and tendencies
5. Renewal of the load in the engines of 2T	5.1 Introduction 5.2 Definitions 5.3 Technology of the renewal of the load of the 2T 5.4 State of the art and tendencies
6. Supercharging	6.1 Introduction 6.2 Types 6.3 Advantages and problems 6.4 mechanical Supercharging 6.5 Turbosupercharging 6.6 State of the art and tendencies
7. Requirements of the mix in the MEP	7.1 Introduction 7.2 optimum Mix 7.3 Systems of dosage 7.4 State of the art and tendencies
8. Combustion in the MEP	8.1 Introduction to the premixed combustion 8.2 Stages of the combustion 8.3 Advance of lit 8.4 Pathologies of the combustion MEP 8.5 Load stratified 8.6 New technicians in MEP
9. Combustion in the MEC	9.1 Introduction to the combustion by diffusion 9.2 Stages of the combustion 9.3 direct Injection vs indirect 9.4 Systems of injection MEC 9.5 New technicians in MEC
10. Losses of heat and system of refrigeration	10.1 Introduction 10.2 Losses of heat 10.3 Components of the system of refrigeration
11. Mechanical losses and system of lubrication	11.1 Introduction 11.2 Regimes of lubrication 11.3 mechanical Losses 11.4 Components of the system of lubrication
12. Similarity and design of engines	12.1 Introduction 12.2 Similarity applied to the thermal engine 12.3 Criteria of design and selection of engines 12.4 Application to practical cases 12.5 State of the art and tendencies

## Planning

	Class hours	Hours outside the classroom	Total hours
Practice in computer rooms	6	0	6
Laboratory practises	6	0	6
Master Session	24	0	24
Long answer tests and development	0	36.5	36.5
Jobs and projects	0	40	40

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

## Methodologies

	Description
Practice in computer rooms	Computer-aided practical classes in groups of 20 students
Laboratory practises	Practical classes in groups of 20 students in the laboratory of the subject
Master Session	Lectures in classroom

## Personalized attention

Methodologies	Description
Master Session	The tutorings will attend in the office 120
Practice in computer rooms	The tutorings will attend in the office 120
Laboratory practises	The tutorings will attend in the office 120

<b>Assessment</b>				
	Description	Qualification	Training and Learning Results	
Long answer tests and development	Proof written that it will be able to consist of: theoretical questions, practical questions, resolution of exercises/problems, subject to develop, etc. (minimum Punctuation...)	70	C16	D1 D3 D5 D11
Jobs and projects	Works in which the student will employ the knowledges and tools purchased during the course. (Punctuation until...)	30	C16	D1 D3 D5 D11

#### **Other comments on the Evaluation**

By agreement of the Standing committee of the School of Industrial Engineering, celebrated on June 12, 2015:

Ethical commitment: It is expected an adequate ethical behaviour of the student. In case of detecting unethical behaviour (copying, plagiarism, unauthorized use of electronic devices, etc.) shall be deemed that the student does not meet the requirements for passing the subject. In this case, the overall rating in the current academic year will be Fail (0.0).

#### **Sources of information**

Payri, F. y Desantes, J.M., **MOTORES DE COMBUSTIÓN INTERNA ALTERNATIVOS**,

Heywood, John B, **INTERNAL COMBUSTION ENGINES FUNDAMENTALS**, Ed. Mc Graw Hill,

Muñoz, Manuel, **TURBOMÁQUINAS TÉRMICAS: Fundamentos de diseño termodinámico**, Universidad Politécnica de Madrid,

Charles F. Taylor, **THE INTERNAL COMBUSTION ENGINE IN THEORY AND PRACTICE**,

#### **Recommendations**

#### **Other comments**

By agreement of the Standing committee of the School of Industrial Engineering, celebrated on June 12, 2015:

Requirements: To register for this module the student must have passed or be registered for all the modules of the previous year.