

Academic Year: ( 2019 / 2020 )

Review date: 22-05-2019

Department assigned to the subject: Department of Thermal and Fluids Engineering

Coordinating teacher: LECUONA NEUMANN, ANTONIO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

**STUDENTS ARE EXPECTED TO HAVE COMPLETED**

Thermodynamics, Heat Transfer, Fluid Mechanics

**COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.**

Knowledge and abilities for the design and analysis of thermal machines and engines, their processes and performances

Knowledge and abilities for the design and analysis of heat and cold installations, their processes and performances

Knowledge and abilities that allow understand, analyze, exploit and manage the different sources of energy for thermal machines and engines, their sustainability characteristics and sustainability and pollution figures

**DESCRIPTION OF CONTENTS: PROGRAMME**

Cap 1.- Internal combustion engines and the associated machines. Principles and performances. Technology.

Cap 2.- Thermochemistry of combustion. Properties. Results and pollutants.

Cap 3.- Open cycles for internal combustion engines. Detailed processes. Turbocharging and intercooling. Thermal processes of industrial interest.

Cap. 4.- Thermal turbines and the associated machines. Enfriamiento.

Cap 5.- Turbomachines. Principles.

Cap. 6.- Cycles of gas turbines. Processes and performances.

Cap. 7.- Combustion in Internal Combustion engines. Processes and pollutants.

**LEARNING ACTIVITIES AND METHODOLOGY**

- Master classes/lectures where the knowledge to be acquired by the student will be exposed. There will be class notes available and basic textbooks will be recommended both for following the subject and to continue knowledge downstream.
- Problem and question solving by the students for self-evaluation and to acquire the abilities required.
- Exposure and discussion of resolving problems that are proposed to the students.
- Laboratory practicals and/or in computer halls, where the student can experiment on the concepts and results of the theory presented in the lectures.
- Direct observation of the technology of thermal machines and engines in the laboratory.

**ASSESSMENT SYSTEM**

The assessment includes continuous evaluation and evaluation in exams where the general knowledge, abilities, and capacities will be evaluated.

The beforehand indicated percentages can vary, depending on the extension and/or difficulties of the home works used for the evaluation within the ranges 40-70% for the continuous part and 60-30% for the final part in a written exam. basic scheme:

The laboratory practicals are 1/15 of the final mark.

A first partial exam will count as a number of theoretical sessions/14 of the theory mark.

A second partial will be performed at the final date counting as the remaining theoretical sessions/14. Repeating the first partial is possible to improve the mark.

Delivering homework and participating during the lectures can improve the mark after having passed the described marks (50% of the maximum).

**% end-of-term-examination:** 45

**% of continuous assessment (assignments, laboratory, practicals...):** 55

#### BASIC BIBLIOGRAPHY

- Heywood Internal Combustion Engine Fundamentals, McGraw-Hill, 1988
- Lecuona, A. et al. Motores Térmicos, OCW Universidad Carlos III de Madrid, 2014
- Moran; Shapiro Fundamentos de Termodinámica Técnica, Reverté, 2004

#### ADDITIONAL BIBLIOGRAPHY

- Payri F., Desantes, M. Motores Alternativos de Combustión Interna, Reverté, 2012

#### BASIC ELECTRONIC RESOURCES

- Lecuona et al. . Motores Térmicos: <http://ocw.uc3m.es/ingenieria-termica-y-de-fluidos/motores-termicos>