Universidad Zaragoza

Academic Year/course: 2024/25

30012 - Engineering Thermodynamics and Heat Transfer Fundamentals

Syllabus Information

Academic year: 2024/25
Subject: 30012 - Engineering Thermodynamics and Heat Transfer Fundamentals
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 436 - Bachelor's Degree in Industrial Engineering Technology
ECTS: 6.0
Year: 2
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The subject provides, through thermodynamic analysis, the basic principles to understand energy transformations and to analyze, model and simulate thermal equipment and installations for the generation, transfer and use of energy: thermal power plants, gas turbines, MACI, refrigeration and air conditioning systems, etc. . The basics of the three heat transfer mechanisms are also introduced. This subject is essential to take Thermal Engineering (compulsory), Fluid Machines and Installations (compulsory) and the Energy Module (electives).

2. Learning results

Know the thermophysical properties of industrial interest and has the ability to use and select appropriate procedures and tools for their calculation.

Know and apply the laws of thermodynamics to the energy analysis of basic engineering equipment and processes.

Know the basic criteria for the analysis of thermodynamic cycles.

Know and apply the basic mechanisms of heat transfer to the analysis of thermal equipment.

Solve basic problems of technical thermodynamics and heat transfer applied to engineering in a reasoned manner.

3. Syllabus

Theoretical program

Topic 1: Introduction to Technical Thermodynamics.

Topic 2: Empirical behavior of matter.

Topic 3: First Principle.

Topic 4: Second Principle.

Topic 5: Gas Power Cycles.

Topic 6: Steam Power Cycles.

Topic 7: Refrigeration cycles.

Topic 8: Psychrometry and psychrometric processes.

Topic 9: Fundamentals of Heat Transfer.

Program of practical activities (indicative)

Thermodynamic properties of pure substances.

Energy balances to energy producing equipment and systems.

Entropy balance and 2nd principle analysis.

Gas or steam power cycle.

Refrigeration cycle.

Psychrometric processes.

4. Academic activities

Theoretical lectures: 30 hours.

Types of problems: 15 hours.

Simulation and laboratory practices: 15 hours.

Assessment tests: 4 hours.

Study, tutorials and personal work (Type TP7, TP6): 90 hours of non-attendance.

5. Assessment system

Continuous assessment

The final grade will be calculated by weighting the grades for each of the parts according to the following weights:

- 80 % exams throughout the term, in which the student must answer theoretical-practical questions and problems similar to those solved in class or to those posed in practical activities (minimum grade of 4 points out of 10 in each one of the exams to average between them and with the grade of the practical activities).
- 20 % practical laboratory and simulation activities (realization, delivery by the students of the report corresponding to each activity and objective evaluation; minimum grade of 5 points out of 10 to follow the continuous assessment)

Global assessment.

A global assessment test will be scheduled for those students who decide to opt for this second system or who do not pass with the continuous assessment modality.

Completion of a final test covering the contents and activities of the entire subject which covers all the syllabus and practices of the subject, in accordance with the official call established in the examination period set by the center.

6. Sustainable Development Goals

7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure
12 - Responsible Production and Consumption