

29816 - Technical Thermodynamics and Heat Transfer Basics

Syllabus Information

Academic year: 2023/24

Subject: 29816 - Technical Thermodynamics and Heat Transfer Basics

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering

444 - Bachelor's Degree in Electronic and Automatic Engineering

ECTS: 6.0

Year: 2

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The objective of the subject is that the student learns to thermodynamically analyze equipment and cycles, as well as to calculate heat transfer systems related to the operation of electronic devices. For this purpose, the principles of thermodynamics applied to the analysis of power and cooling cycles will be studied at , and the calculation methods of the main heat transfer mechanisms in power and digital electronics applications will be learned , with special emphasis on the modeling of heatsinks for electronic components.

These approaches and objectives are aligned with some of the Sustainable Development Goals (SDGs) of the Agenda 2030 (<https://www.un.org/sustainabledevelopment/es>). Specifically, the learning activities foreseen in this subject will contribute to the achievement of targets 7.2 and 7.3 of Objective 7, target 9.4 of Goal 9, target 11.6 of Goal 11 and target 12.2 of Goal 12.

2. Learning results

- Know the thermophysical properties of substances of industrial interest and is able to select and use appropriate procedures and tools for their appropriate procedures and tools for their calculation.
- Know and apply the laws of thermodynamics in the energetic analysis of equipment and basic processes in engineering.
- Know how to analyze in a basic way the operation of thermodynamic cycles.
- Know and applies the basic mechanisms of heat transfer in the analysis of thermal equipment.
- Solve basic problems of technical thermodynamics and heat transfer applied to engineering.

3. Syllabus

A) Technical Thermodynamics

- Fundamentals of thermodynamics.
- Thermodynamic properties.
- First principle of thermodynamics.
- Second principle of thermodynamics.
- Power and cooling cycles.

B) Heat conduction

- Heat conduction equation.
- Resistors and thermal circuits.
- Expansion of stationary conduction.
- Cooling fins.
- Notions of transient conduction.

C) Heat convection

- Notions of heat convection.
- Forced convection.
- Notions of natural convection.

4. Academic activities

- Theory classes (30 hours).

- Problem classes and case resolution (15 hours).
- Simulation and laboratory practices (15 hours).
- Works (10 hours):
- Personal study (74 hours).
- Assessment tests (6 hours)

At EUPT, the course is taught in two different modalities: classroom and blended learning. For the presential modality all of the above applies. In the blended mode, lectures are replaced by asynchronous learning activities with adapted materials, with the support of the teacher as a guide and for the resolution of doubts through telematic tools. Students will carry out the work and simulation practices in an autonomous manner under the supervision of the professor in both synchronous and asynchronous computer environments.

5. Assessment system

Assessment throughout the semester.

- Practice note: 15%.
- Works mark: 15%.
- Final exam: 70%, broken down in two parts: Technical Thermodynamics (28%) and Heat Transmission (42%).

A mid-term exam on Technical Thermodynamics will be held at the middle of the term. Those who obtain a grade higher than 4.5 will not have to take this part of the final exam on the date established for the official exam.

In order to pass the subject, a minimum of 4 in the practicals and assignments, a minimum of 4.5 in each part of the exam, and an overall grade of 5 or higher will be required.

The marks of the practicals, papers and the partial exam of Technical Thermodynamics are kept for the 1st and 2nd call.

Global assessment:

- Practice exam: 20%.
- Final exam: 80%, broken down in two parts: Technical Thermodynamics (32%) and Heat Transmission (48%).

In order to pass the subject, a minimum of 4 in the practical exam and a minimum of 4.5 in each part of the final exam will be required, in addition to an overall grade equal or higher than 5.

The following aspects will be assessed in all evaluation activities: Proper performance of the tasks, correct approach to the resolution procedure, accuracy of the results, correctness and clarity in written communication, critical analysis of the results (coherence, relationship with other aspects of the subject, possibilities for improvement, etc.).

In addition, for the practical activities and tutored work, the following will also be assessed: Delivery within the stipulated deadline, as no reports will be accepted after the deadline, unless there is a duly justified cause. Delivered in the format and procedure indicated.