

28813 - Thermodynamics and Thermal Technology

Syllabus Information

Academic year: 2023/24

Subject: 28813 - Thermodynamics and Thermal Technology

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia

Degree: 424 - Bachelor's Degree in Mechatronic Engineering

ECTS: 6.0

Year: 2

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The purpose of the subject is to provide students with a firm foundation in the fundamental concepts of THERMODYNAMICS and to prepare them to use TECHNICAL THERMODYNAMICS in professional practice, as well as thermal solar energy concepts.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), specifically, the learning activities planned in this subject will contribute to the achievement of target 4.4 of Goal 4, target 7.2 of Goal 7 and target 13.3 of Goal 13.

This subject does not have any normative prerequisite, although for its development it is necessary to bring knowledge and strategies coming from the chapters on Thermodynamics of the Physics I subject of the first year.

2. Learning results

1. Recognize fluid and thermal applications in mechanical systems.

3. Syllabus

1 THEORETICAL CONTENTS

Topic 1: Definitions and basic concepts.

Topic 2: First principle of thermodynamics for closed systems.

Topic 3: Thermodynamic properties of pure substances.

Topic 4: First law of thermodynamics for open systems.

Topic 5: The second principle of thermodynamics.

Topic 6: Steam cycles for work production.

Topic 7: Refrigeration and heat pump systems.

2 PRACTICAL CONTENTS

Each practical will be developed in the laboratory in groups of 3 students in sessions of 2 hours duration.

Practice 1: Heat pump.

Practice 2: Thermal insulation.

Practice 3: Thermohygroscopy.

3 SEMINAR CONTENTS

Solar thermal energy.

4. Academic activities

The written assessment tests will be related to the following topics:

Test 1. Topics 1, 2, 3, and 4, approximately week 7.

Test 2. Topics 5, 6 and 7, approximately week 15.

Laboratory practice: approximately in weeks 9, 10 and 11.

Seminars: approximately week 10.

1. Generic face-to-face activities:

- Theoretical classes.
- Practical classes.

- Laboratory practices.
- Seminars.

2. Generic non face-to-face activities:

- Study and assimilation of the theory presented in the lectures.
- Understanding and assimilating problems and case studies solved in practical classes.
- Preparation of seminars, resolution of proposed problems, etc.
- Preparation of the laboratory practices, elaboration of the corresponding scripts and reports.
- Preparation of written tests and final exams.

5. Assessment system

1. Split assessment system.

- Laboratory practices (20%): They will be carried out in the laboratory and a report will be prepared. Each practice will be scored from 0 to 10 points and never less than 5, otherwise it will be considered failed and will have to be repeated, correcting what is not correct. The final grade for the practices will be the arithmetic average of all of them. The completion of the practices **is mandatory** for all students, therefore the subject cannot be passed without the completion of the practice.

- Proposed work (20%): It will be proposed to carry out a **compulsory work** in a group of a maximum of two students.

They will be worked on in the seminars planned for this purpose. To pass this activity you must have a grade equal to or higher than 5.

- Written evaluation tests (60 %): They will include theoretical and practical questions on the different topics to be evaluated. Its total number will be two spread over the entire semester with a duration of two hours. The final grade of this activity will be given by the arithmetic average of these tests, provided that there is not a unit grade lower than 3 points, in which case the activity will be failed. The two tests will consist of two applied theory questions each, which will contribute 10% of the grade, and three problems which will contribute 80% of the grade.

All activities passed by split assessment are promoted for final assessment.

2. Global final assessment test.

Group of qualifying activities explained in detail above:

- Laboratory practices (20 %): They will be carried out within the timetable of the split assessment.
- Proposed work (20 %).
- Written exam (60%): This test will be unique.