Universidad Zaragoza

Academic Year/course: 2023/24

26922 - Thermodynamics

Syllabus Information

Academic year: 2023/24
Subject: 26922 - Thermodynamics
Faculty / School: 100 - Facultad de Ciencias
Degree: 447 - Degree in Physics
ECTS: 6.0
Year: 3
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The main objective of thermodynamics is the knowledge of the general laws that govern the behaviour of matter as a system made up of a large number of particles, such as atoms or molecules, from which thermal phenomena, which are those in which there is absorption or emission of heat, arise.

It starts from some fundamental postulates whose foundation was established historically in the 19th century by observation, but it is mentioned that Statistical Physics will be able to demonstrate them from the laws of Mechanics and statistical averages among many particles.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement. SDG 4: Quality education.

2. Learning results

The student, in order to pass this subject, must demonstrate the following results...

- Calculate equilibrium parameters for different walls or ligatures.
- Obtain fundamental relations from the equations of state and vice versa.
- Calculate the performances of various thermodynamic devices.
- Obtain thermodynamic potentials of different systems.
- Obtain thermodynamic expressions from Maxwell's relations.
- Obtain the basic characteristics of a discontinuous phase transition.

3. Syllabus

- Historical Introduction to Thermodynamics.
- Postulates of Thermodynamics
- Equilibrium conditions.
- Formal relationships and example systems.
- Processes and Maximum Work Theorem.
- Thermal Engines and Motors.
- Alternative formulations.
- Thermodynamic Potentials.
- Maxwell Relationships.
- Stability. Phase transitions.
- Applications in magnetism, chemistry and materials.
- Introduction to non-equilibrium thermodynamics.

4. Academic activities

They are organized in lectures (about 40 teaching hours), problem-solving classes (about 15 teaching hours) and a laboratory practice session (about four hours), plus the evaluation session (exam). Participatory methodologies are sought for students, especially in problem-solving classes. The rest of the hours associated with the credits of the subject are non-face-to-face, including the completion of problems and practice reports (see evaluation) and study.

The tutoring schedule will be agreed with the students at the beginning of the term.

5. Assessment system

The student must demonstrate that they has achieved the intended learning results through the following assessment activities:

Continuous evaluation (30%): It will consist of two parts.

1. Completion and delivery of problems proposed by the teacher throughout the term: 15% of the total grade.

2. Report of the laboratory practices performed: 15% of the total grade.

Written exam (70%):

In principle it will be done in writing and without the help of books, and will consist of answering a set of questions about problems, practical issues and theory, which will have an impact on the expected learning results.

This test will be evaluated on a maximum of 7 points, which added to the result of the continuous evaluation will give the final grade out of 10. In order to pass the subject the student must obtain a minimum grade of 2.8 points in the written exam and 5 in the final grade.

This is without prejudice to the student's right to request to be evaluated by means of a single global test. It will be considered that students opt for this option if they do not make a substantial part of the deliveries associated with the continuous evaluation.