

29913 - Technical Thermodynamics and Fundamentals of Heat Transfer

Syllabus Information

Academic year: 2023/24

Subject: 29913 - Technical Thermodynamics and Fundamentals of Heat Transfer

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 2

Semester: First semester

Subject type: Compulsory

Module:

1. General information

After passing the assessment, the student will be able to:

1. Calculate the thermophysical properties of a system.
2. Determine the mass-energy interactions during a given process.
3. Apply the laws of thermodynamics to the energy analysis of equipment and processes.
4. Analyze the performance of power and refrigeration cycles, vapor compression and gas turbine.
5. Apply the basic laws governing the three heat transfer mechanisms.
6. Operate with ease a computer tool for the simulation of thermal systems.

These approaches and goals are aligned with some of the Sustainable Development Goals, SDGs:

- GOAL 7. Affordable and Clean Energy
 - Objective 7.2.
 - Objective 7.3.
- GOAL 8. Decent Work and Economic Growth
 - Objective 8.4.
- GOAL 9. Industry, Innovation and Infrastructure.
 - Objective 9.4.
 - Objective 12.2.

2. Learning results

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

Unit 1 and 2: Introduction to Technical Thermodynamics.

Unit 3: Empirical behavior of matter.

Unit 4 and 5: First Principle.

Unit 6 and 7: Second Principle.

Unit 8: Gas Power Cycles.

Unit 9: Steam Power Cycles.

Unit 10: Refrigeration cycles.

Unit 11: Psychrometry and psychrometric processes.

Practical activities program

1. Thermodynamic properties of substances.
2. Energy balances to energy producing equipment and systems.
3. Gas or steam power cycle.
4. Refrigeration cycle.
5. Psychrometric processes.

4. Academic activities

1. Lectures, 45 hours: given to the whole group, in which the teacher will explain the basic principles of the subject and will solve some problems of application of the contents.
2. Computer simulation and laboratory practices, 15 hours.
3. 12 hours: students analyze and solve a problem in a small group (ideally in pairs) problem of the subject.
4. Additional exercises, questions and problems in addition to those solved in class. Autonomous work, studying the material and applying it to the resolution of the exercises. 75 hours.
5. Academic tutorials: the teacher will make available to the student certain procedures for raising and resolving doubts resolution of doubts.
6. Assessment tests, 3 hours.

5. Assessment system

Assessment criteria and levels of demand

The following will be valued:

- Own performance of the assignments: if plagiarism or copying of the work is detected, the grade will be zero.
- Correct approach to the resolution procedure.
- Accuracy of the result obtained.
- Correctness and clarity in written communication.
- Critical analysis of results.

Additionally:

- Delivery within the established deadlines.
- Delivery in the indicated format and procedure.

Assessment procedures

First Call:

- Continuous assessment: The final grade will be calculated by weighting the grades of each of the parts, according to with the following weights:

80 % exams (minimum required grade of 4.5 points out of 10 (3.6 points out of 8) to be averaged 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: Completion of a final test covering the contents and activities of the entire subject, in accordance with the official call established in the examination period set by the center.

Second call:

The procedure followed in this case is identical to that of the global assessment of the first call.