

30017 - Thermal Engineering

Syllabus Information

Academic year: 2023/24

Subject: 30017 - Thermal Engineering

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 436 - Bachelor's Degree in Industrial Engineering Technology

ECTS: 6.0

Year: 2

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The purpose of this subject is for the student to acquire the necessary knowledge to **understand the fundamentals of Thermal Engineering** and to analyze different thermal equipment and systems used in energy production, combustion and heat/cold production. **Extends the aspects of heat transfer** raised in previous subjects and learns to solve thermal problems.

These approaches and objectives are aligned with some of the Sustainable Development Goals (SDGs) of the Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>) and certain specific targets, such that the acquisition of the learning results of the subject will contribute to some extent to the achievement of **targets 7.3 of Goal 7 and 9.4 of Goal 9**.

2. Learning results

1. Know the energy sources and resources for the industry and its transformation processes.
2. Know the main technologies of heat, cold and work production in the field of thermal engineering with application to the industry
3. Have the ability and judgement to analyse, size and select equipment for the use, production and transformation of thermal and mechanical energy in the chemical industry.
4. Be able to perform energy analysis of energy production systems for the chemical industry.

3. Syllabus

Topic 1: Fundamentals of Heat Transfer. Basic laws: conduction, convection, radiation.

Topic 2: Fundamentals of driving Fourier's law.

Topic 3: Stationary one-dimensional conduction.

Topic 4: Stationary multidimensional conduction.

Topic 5: Transient conduction.

Topic 6: Fundamentals of convection.

Topic 7: External forced convection.

Topic 8: Indoor forced convection.

Topic 9: Natural convection.

Topic 10: Two-phase convection. Condensation. Boiling.

Unit 11: Unit Heat exchangers.

Topic 12: Radiation. Fundamental concepts.

Topic 13: Combustion.

Topic 14: Introduction to Thermal Equipment and Systems. Production of work, heat and cold.

4. Academic activities

Participatory lectures 30 hours

The contents of the subject will be presented with a practical orientation.

Problem solving and case studies: 15 hours

Practical thermal engineering problems will be solved.

Laboratory practices: 15 hours

Computer and/or laboratory simulation practices on concepts of the subject.

Study and personal work: 85 hours

Study of theory, problem solving, preparation of laboratory practices.

Assessment tests. 5 hours

5. Assessment system

The procedure consists of a set of tests that allow passing 100% of the subject.

Some of them, the practical ones, will be held during the teaching period, while the written exam will be held at during the exam period. The final grade will be calculated by weighting the grades of each of the parts, according to with the following weights:

Written exam (minimum required grade 5 points): The learning results will be evaluated with a weight of 80% in the final grade.

Practical activities (minimum required grade 5 points): They will be evaluated in the practices, of obligatory attendance, with a weight in the final grade of 20%.

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the subject by means of a global test in the two official exams.