

29927 - Thermal Technics

Syllabus Information

Academic year: 2023/24

Subject: 29927 - Thermal Technics

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 3

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

The subject is a continuation of the subject of technical thermodynamics and fundamentals of heat transfer, delving into the **phenomenology and basic principles of heat and cold generation and their transport mechanisms, and the production of work**. The student will become familiar with the **methodology of thermal engineering in order to approach, analyze, model and simulate important energy equipment and installations in the chemical industry** and at an economic and social level: boilers, heat exchangers, solar collectors, cogeneration systems, refrigeration and air conditioning systems, turbines, pumps, compressors, etc.

These approaches and goals are **aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda** () and certain specific targets, in particular Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>) and certain specific targets, in particular **objectives 7.1, 7.2 and 7.3 of goal 7, objective 9.4 of goal 9 and objective 13.3 of goal 13**.

2. Learning results

- Know the **energy sources and resources** for the chemical industry and its transformation processes.
- Know the main **technologies of heat, cold and work production** in the field of thermal engineering with application to the chemical industry
- 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.}
- Be able to perform **energy analysis of energy production systems** for the chemical industry.

3. Syllabus

Unit 1. Heat production: Fuels (composition, calorific value, adiabatic flame temperature). Thermochemistry of combustion. Matter and energy balances. Boiler yields.

Unit 2. Heat transfer: Driving, fins. Convection. Heat exchangers. Radiation.

Unit 3. Psychrometry: Properties of humid air. Air conditioning processes. Cooling towers evaporative.

Unit 4. Cold production: Compression technologies. Absorption and adsorption cycles. Special production systems of cold. Cryogenics.

Unit 5. Labor production: Internal combustion engines. Thermal turbomachines.

4. Academic activities

- **Master classes:** Sessions with the teacher where the syllabus will be explained and practical examples will be given 45 hours
- **Problem solving and case studies:** Practical sessions where problems related to the theoretical concepts are solved. 15 hours
- **Tutored work in small groups:** Solving a complex integrated industry case involving the majority of thermal systems studied during the term, 14 hours
- **Study and personal work:** Preparation of classes, exercises, personalized tutoring, etc. : 70 hours
- **Assessment tests:** 6 hours

5. Assessment system

There will be a single overall assessment procedure, which will consist of:

- **practical activity:** it will represent 20% of the subject, and will consist of the assessment of the delivery of the reports related to the tutored work, as well as its presentation and defense of the same.
- a **written test**, eminently practical in nature, to be taken during the official examination period. The final grade will be 80% of the total assessment, requiring a minimum of 4/10 in the test to pass the subject.

The grade of the practical activity is maintained during the registration, and otherwise in the written test there will be an additional test related to it with 20% of the total value.