

## 29636 - Air Conditioning

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 29636 - Air Conditioning

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 430 - Bachelor's Degree in Electrical Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

When planning the teaching objectives of the subject of climate control it is necessary to take into account that it is a subject in constant evolution, therefore, the student's learning should consider two complementary facets. The first of them know the equipment and facilities currently existing, but above this objective to acquire the ability to autonomous and lifelong learning. With this feature we will be able to have a good professional at the present time and also in the future. It is important to convey this approach to students and to make them aware that their professionalism must be linked to continuous training.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific goals, so that the acquisition of the learning results of the subject provides training and competence to the student to contribute to some extent to their achievement:

- Goal 7: Affordable and Clean Energy Targets 7.2 and 7.3
- Goal 9: Industry, Innovation and Infrastructure. Target 9.4 4
- Goal 11: Sustainable Cities and Communities Target 11.6
- Goal 12: Responsible Production and Consumption Target 12.2

### 2. Learning results

#### Generic competencies:

- Ability to conceive, design and develop electrical engineering projects (C1).
- Ability to combine basic and specialized knowledge of Electrical Engineering to generate innovative and competitive proposals in professional activity (C3).
- Ability to communicate and convey knowledge, skills and abilities in Spanish (C6)
- Ability to analyze and assess the social and environmental impact of technical solutions, acting ethically, professional responsibility and social commitment, always seeking quality and continuous improvement (C8)
- Ability to work in a multidisciplinary group and in a multilingual environment (C9)
- Ability to manage information, handling and application of technical specifications and legislation necessary for the practice of electrical engineering (C10).

#### Specific competencies:

- Ability to carry out measurements, calculations, valuations, appraisals, appraisals, surveys, studies, reports and work plans (C40).
- Ability to acquire the knowledge and understanding of the basic concepts and procedures to be applied, for the realization of engineering projects in the field of electrical engineering and electrical energy systems (C41).
- Ability to apply knowledge of applied thermodynamics and heat and cold transmission (C18).

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

- Knowledge of the behavior of humid air and its diffusion.
- Ability to calculate the energy needs (heating, cooling) of the building.
- Knowledge of the basic fundamentals, equipment and materials of air conditioning installations.
- Ability to choose the most appropriate type of climate control system.
- Knowledge of the specific regulations on climate control installations (heating, cooling and ventilation).
- Ability to design and calculate heating installations.
- Understand user and consumer needs in the selection of materials and equipment in the design of ancillary facilities.
- Be able to design in a reasoned way, climate control installations in the residential, tertiary or industrial sector, taking into account current legislation.
- Understand the principles of industrial maintenance, and have the ability to perform maintenance planning and management.

- Have the ability to identify, classify, describe and evaluate potential electrical hazards in an installation.
- Be able to calculate and design the necessary electrical safety installations in accordance with the technical specifications in technical specifications in force.
- Know and select the characteristics of materials and personal safety equipment, according to current regulations.
- Identify and consider the costs associated with the measurement, calculation and design of air conditioning installations

### Importance of learning results

The subject is a continuation of the Technical Thermodynamics and Fundamentals of Heat Transmission subject, which goes deeper into the technology and analysis of thermal installations. In this course the student will be able to check the practical usefulness of the knowledge acquired, applying it to the development of a climate control project.

### 3. Syllabus

1. Introduction
2. Regulations
3. Basic principles of heat transfer
4. Humid air
5. Estimation of thermal demand
6. Production equipment and systems (primary)
7. Distribution equipment and systems (secondary)
8. Energy savings in climate control

### 4. Academic activities

- Lectures
- Computer simulation and laboratory practices that are distributed throughout the term and whose valuation will be part of the final grade.
- Tutored work. A critical and non-dogmatic attitude will be encouraged, as well as making the student aware of the need for continuous training and autonomous learning, since technology is constantly advancing.
- Formulation of exercises, questions, and additional problems to those solved in class.
- Academic tutoring
- Visits to air conditioning installations in different types of buildings and visits to manufacturers within the scope of the subject.

The approach, methodology and evaluation of this guide is prepared to be the same in any teaching scenario.

They will be adjusted to the socio-sanitary conditions of each moment, as well as to the indications given by the competent authorities-

Since this is an elective subject, generally with a small number of students, student participation is encouraged in order to detect the degree of learning.

### 5. Assessment system

Students must demonstrate that they have achieved the intended learning results by means of the following assessment activities

**1st Call:** the assessment will consist of the following tests: Of a practical nature, to be carried out during the period teaching and will correspond to the attendance and delivery of scripts of practical activities of type 3 and type 6 (tutored work). The final grade will be calculated by weighting the grades of each of the parts, according to the following weights : 50 % tutored work, 25 % practical activities, 25 % completion of class exercises.

**2nd Call:** Following the regulations of the University of Zaragoza in this regard, in the subjects that have continuous or gradual evaluation systems, a global assessment test will also be scheduled for those students who decide to opt for this second system.