30738 - Conditioning and Services 3

Información del Plan Docente

Academic Year	2018/19
Subject	30738 - Conditioning and Services 3
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	470 - Bachelor's Degree in Architecture Studies
ECTS	6.0
Year	5
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Aims of the course

The student through the study of this subject should learn to:

1. Recognize the different heating systems and choose the appropriate system in each case.
2. Know the behavior of humid air and its application in air conditioners.
3. Calculate the energy demand of a building.
4. Predimension heating and ACS systems.
5. Pre-dimension solar thermal energy systems applied to the production of ACS.
6. Know the different air diffusion systems.
7. Provide for space reservation necessary for the installation of air conditioning.
8. Know the current regulations in the field of air conditioning.
9. Comply with the regulations in force in each case.

1.2.Context and importance of this course in the degree

Conditioning and services 3 addresses the heating installations applicable to the building in general.
This subject is the third of the subject Conditioning and Services, each one with 6 ECTS credits.
The other subjects of this subject address the environmental conditioning of the building and the service facilities in residential buildings.

1.3.Recommendations to take this course

Basic knowledge of Conditioning and Services and of Construction in Architecture are recommended. This knowledge is covered in the subjects Conditioning and services 1 and 2 and Construction 3 of the Degree in Architecture Studies by the University of Zaragoza

2.Learning goals

2.1.Competences

Upon passing the subject, the student will be more competent for the following specific competences:

- C.E. 12.OB Ability to: Apply technical and constructive standards.
- C.E. 19.OB Ability to conceive, calculate, design, integrate into buildings and urban complexes and execute: Water supply, treatment and evacuation, heating and air-conditioning installations.
- C.E. 22.OB Capacity to: Preserve facilities.
- C.E. 51.OB Adequate knowledge of: The ecology, sustainability and conservation principles of energy and environmental resources

2.2.Learning goals

The student, to overcome this subject, must demonstrate the following results:

- Knowledge of the specific regulation on heating installations and their application in the building.
- Knowledge of the basic fundamentals, equipment and materials of the heating installations.
- Ability to choose the type of heating installation most appropriate and integrate it correctly in the project.
- Knowledge of the behavior of moist air and its diffusion.
- Capacity to calculate the energy needs (heating, ACS) of the building.
- Capacity to foresee the reservation of spaces of heating installations.
- Ability to solve schematics, layout and registrability.
- Capacity to design, calculate or pre-dimension heating and ACS installations, and make corresponding project plans.
- Suitability for the installation of heating installations

2.3.Importance of learning goals

This subject deals with the heating installations applicable to the building in general and the residential building in particular.
It is oriented to achieve the optimum conditions of thermal comfort in the projects of residential building, with the anticipation of spaces and registrability by means of the dimensioning or dimensioning of the installations.
This knowledge in their professional life can be implemented directly in their architectural projects.

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that he has achieved the expected learning outcomes through the following assessment activities:
The student is evaluated through a theoretical practical exam at the end of the semester and the assessment of a practical exercise carried out throughout the course. The assessment of each part in the final grade will be:

- Theoretical practical test: 50%
- Initial pre-delivery of the practical exercise: 5%
- Final delivery of the practical exercise: 45%

The conditions to approve the subject are:

1. Present the practices
2. Make all pre-deliveries, delivery and public exposure of the practical exercises on the announced dates.
3. Get at least 5 in the final delivery of the practical exercise.
4. Obtain at least a 5 in the theoretical-practical test.
5. Obtain at least a 5 overall grade in the subject. The grade shall be calculated from the following equation:

$$A = 0.5 * Ptp + 0.45 * EpF + 0.05 * EpI$$

Where:

- A is the note in minutes about 10 (or overall grade in the subject)
- Ptp is the note of the theoretical-practical test on 10
- EpF is the note of the final delivery of the practical exercise on 10
- EpI is the note of the initial delivery of the practical exercise on 10

If the grade of A is less than 5, the notes of EpF andEpI will be saved for the calls of the same academic year.
If a student does not approve the final delivery of the practical exercise or does not make all deliveries, pre-deliveries and / or public exhibitions on the agreed dates, he / she must take a practical test, in addition to the theoretical-practical test at the end of the semester

In this case the conditions to approve the subject are:

1. Get at least a 5 in the practice test.
2. Get at least a 5 in the theoretical-practical test.
3. Obtain at least a 5 of global grade in the subject. The grade shall be calculated from the following equation:

A = 0.5 * Ptp + 0.5 * Pp
Where:

- A is the note in minutes about 10 (or overall grade in the subject)
- Pt is the note of the theoretical-practical test on 10
- Pp is the practical test grade on 10

No exam notes are saved for subsequent calls.
Examination dates will be established by the official EINA calendar (https://eina.unizar.es/)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning process that is designed for this subject is based on the following:
The course consists of a theoretical part which is mainly introduced the basics of HVAC, while applications of learning will be developed in practical classes for immediate exercise or practical work application.
The practical classes consist of activities aimed at carrying out the work of the subject by students in addition to introducing the heating will allow the development of the HVAC project.

4.2.Learning tasks

The program that the student is offered to help you achieve the expected results includes the following activities ...

1. HVAC.
2. Psychometry
3. Building energy demand
4. Heating projects.
5. HVAC projects.

In the practical classes the development of the fundamental parts of a heating project will take place:

- HE Energy Saving.
- Calculation of demand heating.
- Calculating a heating by gas boiler and radiators
- Calculation of a heating by gas boiler and underfloor heating
- Calculation of a heating by electric underfloor
- Calculation of a solar thermal energy for hot water

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4.3.Syllabus

0.- HVAC Projects
1.- HVAC systems
1.1.- Schemes of principle
1.2.-Production of cold / heat. Primary
1.3.- Cold / heat distribution. Secondary
2.- Air conditioners
2.1.- Humid air. Psychometry. Introduction and Definitions
2.2.- Psychometric Processes
2.3.- Introduction and definitions
2.4.- Sections of an air conditioner
3.- Energy demand in the building
3.1.- Thermal loads
3.2.- Internal conditions
3.3.- External conditions
3.4.- Estimation of heating demand
4.- Heating projects
4.1.- Production systems
4.2.- Distribution systems
5.- Calculation and selection of terminal elements
5.1.- Radiant hot water emitters
5.2.- Radiating floor
5.3.- Electric heating
5.4.- Fancoils
5.5.- Inductors
6.- Hot Water
6.1.- Introduction
6.2.- Systems and components
6.3.- Production
6.4.- Schemes of facilities
6.5.- Calculation examples
7.- Thermal solar energy.
7.1.- Solar energy
7.2.- Components
7.3.- HE4
8.- Air diffusion systems
8.1.- Mixing diffusion systems
8.2.- Displacement diffusion systems
9.- Architectural integration

4.4.Course planning and calendar

Schedule sessions and presentation of works

1. Theoretical classes: 2 hours per week according to the EINA schedule.
2. Practical classes: 2 hours per week according to the EINA schedule.

The schedule will be defined by EINA, but the time scheduled for initial distribution classes according to the agenda is as follows:

1. Air conditioning systems (4 hours theoretical)
2. Air conditioning and humid air. Psychometry (2 theoretical hours + 2 practical hours)
3. Heating projects (6 theoretical hours + 4 practical hours)
4. Energy demand in building (2 theoretical hours + 6 practical hours)
5. ACS (2 theoretical hours + 4 practical hours)

6. Thermal solar energy. (4 theoretical hours + 4 practical hours)
7. Air diffusion systems (2 theoretical hours + 2 practical hours)
8. Air conditioning projects (4 hours practical)
9. Architectural integration (4 hours theoretical)

The exam will be held on the date indicated in the EINA web.

The course is taught in theoretical sessions (2 hours a week) and practical (2 hours a week) throughout the course and is evaluated with a project of heating installations for housing developed during the course, the scripts presented and a theoretical-practical test at the end of the course.

4.5.Bibliography and recommended resources