Universidad Zaragoza

Academic Year/course: 2021/22

28622 - Installations II

Syllabus Information

Academic Year: 2021/22
Subject: 28622 - Installations II
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 422 - Bachelor's Degree in Building Engineering
ECTS: 6.0
Year: 3
Semester: First semester
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

To get the student to acquire basic and practical knowledge about regulations, schemes, layout, calculation and control of fire protection, electrical, ventilation, air conditioning, telecommunications and elevator facilities that are integrated into the building.

Starting from a basic knowledge of the philosophy of work and operation of the Revit architectural modeling tools, this course will allow you to acquire the basic knowledge and skills necessary to model the facilities of the building environment (air conditioning and electricity) using the specific MEP tools that REVIT makes available to us.

1.2. Context and importance of this course in the degree

This course is the extension of the subject Basics of Installations, in which the necessary foundations have been laid for the understanding of the phenomena related to installation design.

This subject, together with Installations I, intends to provide the necessary skills so that the student can plan and design the premises of a building.

This knowledge is complemented with other building courses so that the student can have a global vision of the elements that make up a building and how they are carried out.

Building Information Modeling (BIM) or Information modeling for buildings is a work format that covers all areas of the development of a construction project, including facilities, taking advantage of the work developed in a methodology that allows feedback from the rest of the areas.

Within the complexity of the development of a project, its facilities are always an important issue. The air conditioning, electrical, plumbing and special equipment installations sector requires a higher level of coordination. This coordination not only applies to the design of the project, in which all the pieces of the puzzle must fit together perfectly, but also extends to the construction phase where they have to be manufactured, built / assembled and then maintained.

1.3. Recommendations to take this course

This subject does not need any previous requirements or demand specific complementary knowledge.

Nevertheless, knowledge and strategies from subjects related to Technical Drawing, Computer Science, Physics, Chemistry and Mathematics will be an asset for the development of the subject Installations II.

2. Learning goals

2.1. Competences

Upon passing the subject, the student will be more competent to ...

- Organize and plan his work
- Solve problems related to installations
- Make decisions on his own

- Communicate orally and in writing in their native language
- Carry out analysis and synthesis of complex problems
- Manage information
- Teamwork
- Critical reasoning
- Work in an interdisciplinary team
- Working in an international context
- Improvise and adapt to new situations
- Leading a team
- Have a positive social attitude towards social and technological innovations
- Reason, discuss and present their ideas
- Communicate through words and images
- Search, analyze and select information
- Learn autonomously.
- Possess and understand knowledge in an area of ??study that starts from the general secondary education base, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that involve knowledge from the avant-garde from your field of study.
- Apply their knowledge to their job or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and problem solving within their area of ??study.
- Be able to collect and interpret relevant data (usually within their study area) to make judgments that include reflection on relevant issues of a social, scientific or ethical nature.
- Transmit information, ideas, problems and solutions to a specialized and non-specialized audience.
- Develop those learning skills necessary to undertake further studies with a high degree of autonomy.
- Apply the specific regulations on facilities to the building process.
- Constructively develop the facilities of the building, control and plan its execution and verify the service and reception tests, as well as their maintenance.
- Knowledge and application of the CTE Basic Document on Fire Safety, as well as the Regulation of fire protection installations and different UNE standards, for the design of the fire protection installation of any type of building.
- Application of the Low Voltage Electrotechnical Regulation for the design and calculation of the interior electrical installation in buildings.
- Knowledge and application of the HS3 Basic Health Document, Indoor Air Quality and the Regulation of Thermal Installations in buildings for the design and calculation of ventilation and air conditioning installations.
- Knowledge and application of the Common Telecommunications Infrastructure Regulation in buildings.
- Knowledge of the different types of elevators and selection of the most suitable type of elevator for each type of building.

2.2. Learning goals

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

- Organizational and planning skills capacity to solve problems.
- Ability to make decisions
- Aptitude for oral and written communication of the native language
- Capacity for analysis and synthesis
- Ability to manage information
- Capacity for teamwork
- Capacity for critical reasoning
- Ability to work in an interdisciplinary team
- Ability to work in an international context
- Improvisation and adaptation capacity to face new situations
- Leadership aptitude
- Positive social attitude towards social and technological innovations
- Ability to reason, discuss and present your own ideas
- Ability to communicate through words and images
- Ability to search, analyze and select information
- Capacity for independent learning
- Possess and understand knowledge in an area of study that starts from the general secondary education base, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that involve

knowledge from the avant-garde from your field of study

- Apply their knowledge to their job or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and problem solving within their area of study.
- Ability to collect and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant issues of a social, scientific or ethical nature.
- Transmit information, ideas, problems and solutions to a specialized and non-specialized audience.
- Develop those learning skills necessary to undertake further studies with a high degree of autonomy.
- Ability to apply specific regulations on facilities to the building process.
- Ability to constructively develop the facilities of the building, control and plan its execution and verify the service and reception tests, as well as their maintenance.
- Ability to design fire protection, electrical, ventilation, air conditioning and telecommunications installations in buildings.
- Knowledge and ability to select the right elevator according to the type of building

2.3. Importance of learning goals

This subject has a marked engineering character, that is, it offers training with applicated content and immediate development in the labor and professional market. Through the achievement of the relevant learning results, the necessary capacity is obtained to understand the operation of the facilities in the buildings, which will be absolutely essential for the execution of any construction or reform of those included within the scope of the Building.

At the end of the subject, the student will have the aptitude to apply the specific regulations on facilities to the building process. Likewise, it will have the capacity to prepare manuals and maintenance plans and manage its implementation in the building, to constructively develop the building's facilities, control and plan its execution and verify the service and reception tests, as well as their maintenance. And he will also know, conceive, design, define, detail and technically solve elements, processes and construction systems.

3. Assessment (1st and 2nd call)

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

The assessment will include two types of action:

- **Continuous assessment:**

It will take place throughout the entire learning period. Attention in class, completion of assigned tasks, resolution of questions and problems, active participation in the classroom, attendance at talks and visits, etc, will be taken into account. To be eligible for the Continuous Assessment system, you must attend at least 80% of the face-to-face activities (practices, technical visits, classes, etc.).

The qualifying and mandatory activities will be:

Written assessment tests: there will be two individual tests, one in November and the other in January at the end of the semester. They will include a theory part and a problem part. The final grade will be the arithmetic mean of the two tests, as long as there is no unit grade below 4 out of 10.

Test 1: Includes fire protection installations and low voltage electrical installations.

Test 2: Includes ventilation, air conditioning, telecommunications and elevator installations.

Practices: Practices corresponding to the first 4 topics of the course will be carried out, which will consist of a memory, calculations and plans of the installation. A delivery deadline will be established for each practice and the student must present the memory, calculations and plans for it on time. The final grade will be the arithmetic mean of the 4 practices, as long as there is no unit grade below 4 out of 10.

Making an oral presentation: there will be an oral presentation of one of the practices on the day established by the teacher.

In order to obtain the final passing grade, each of the activities on display must have a grade equal to or greater than 5.

The final qualification will be made according to the weighting table below:

Assessment	Weighing
Written assessment tests	30%
Practices - model	45%
Practices - memory and calculations	20%
Oral presentation	5%

Prior to the first call, the teacher will notify each student if they have passed or not the subject based on the use of the

continuous assessment system, based on the sum of the scores obtained in the different tasks carried out throughout the course. In case of not passing in this way, the student will have two additional calls to do so (global assessment system), on the other hand, the student who has passed the course through this dynamic, may also choose the final assessment, in the first call, to upload grade but never to download.

For those students who have suspended the continuous assessment system, but have passed some of the tasks, they may promote them to the global final evaluation test, and it may be the case that they only have to take the written exam. In the first call in January, the written exam will be divided into two parts (as in the continuous assessment) and the student who has not passed the continuous assessment will have the option of taking one or both of the two written tests.

- **Global assessment:**

The students must opt ??for this modality when, due to their personal situation, they cannot adapt to the rhythm of work required in the continuous assessment system or have suspended or want to increase their grade.

The global final evaluation test will have the following group of qualifying activities:

Written assessment tests:

It consists of solving theoretical and / or practical application exercises with similar characteristics to those solved during the conventional development of the subject, carried out over a period of three hours. This test will contribute 70% to the final grade for the course.

Practices: They can be carried out integrated in the continuous evaluation. If this is not possible, the student must submit the reports, calculations and plans one week before the global evaluation exam. They will contribute 30% of the final evaluation grade.

The final qualification will be made according to the weighting table below:

Assessment	Weighing
Written assessment tests	30%
Practices - model	50%
Practices - memory and calculations	20%

The course will have been passed, based on the sum of the scores obtained in the different activities carried out, each contributing a minimum of 50%.

All the activities included in the global final evaluation test, except for the written test, may be promoted to the next official call, within the same academic year.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

This course is organized as follows:

- **Lectures**: from the first day of the course, the student will begin to solve practical cases on facilities. In each case, the teacher will provide the plans of a building and through the application of rules and regulations, the students will design and calculate the installation suggested. The teacher will be a support to guide them in the application of the regulations and explain, at certain times, the part of the installation that is necessary. The teacher will have slides with graphic examples that will make it easier for students to understand the facilities being designed.
- **Computer practice sessions**: The contents will be studied through practical cases applied to different types of buildings.
- **Tutorials**: They can be online or on-site.

If classroom teaching were not posssible due to health reasons, it would be carried out on-line.

4.2. Learning tasks

The program offered to the student to help him achieve the expected results includes the following activities outlined above:

- Lectures
- Computer practice sessions
- Tutorials

4.3. Syllabus

This course will address the following topics:

Unit 1. Fire protection facilities.

1.1. The DB-SI.

1.2. Passive fire protection

1.3. Active fire protection: constituent elements of fire protection installations.

1.4. Practical cases:

- Installation in a residential building.
- Installation in other types of buildings.

Unit 2. Electrical installations

2.1. Low-voltage electrotechnical regulations

2.2. Application to both private housing and public building installations.

2.3. Interior lighting and the CTE-HE3

2.4. Calculations and sizing of installations:

- Calculation of wire sections for electrical installations
- Calculation of interior lighting

Unit 3. Ventilation installations.

3.1. Regulations: CTE HS3 and RITE.

3.2. Design and dimensioning of ventilation installations.

3.3. Practical cases of ventilation installations:

- Calculation of the housing ventilation system
- Calculation and design of the ventilation system in the garage, including pipeline calculations and extractor selection.
- Calculation and design of ventilation installation in storerooms.
- Calculation and design of ventilation installation in waste warehouses.
- Calculation and design of installation of ventilation in premises.

Unit 4. Air conditioning installations.

4.1. Regulations: Introduction to CTE HE1 and RITE.

4.2. Types of AC systems.

4.3. Air conditioning calculations:

- Calculation of thermal loads
- Equipment selection
- Calculation and design of duct networks

Unit 5. Telecommunication installations.

5.1. The regulation of common telecommunications infrastructures

5.2. Example of application in a residential building

Unit 6. Lifts in building

6.1. Applicable regulations

6.2. Types of lifts and typical elements.

6.3. Choice of left for different types of buildings.

Practice tasks of the course

The first four units discussed in the previous section have associated practice sessions. The student will be provided the plans of a building and must make memory, calculation and plans of the following facilities:

- Practice 1. Design and calculation of fire protection installation.
- Practice 2. Design and calculation of the electrical installation of a residential building.
- Practice 3. Design and calculation of the ventilation installation of a residential building including the garage.
- Practice 4. Design and calculation of the installation of the air conditioning of a house.

4.4. Course planning and calendar

The overall distribution of the subject will be as follows:

- 40 classroom hours to solve practical cases.
- 16 hours of practice tasks and supervised work, in 2-hour sessions.
- 4 hours of written tests (two hours per test)

- 40 hours of group work, over the 15 weeks of the semester.
- 50 hours of personal study, over the 15 weeks of the semester.

Class schedules will be published on the web:
https://eupla.unizar.es/asuntos-academicos/calendario-y-horarios

The dates of the final exams will be those officially published in:
http://www.eupla.unizar.es/asuntos-academicos/examenes

The written evaluation tests will be related to the following topics:

- Test 1: Units 1 and 2.
- Test 2: Units 3, 4, 5 and 6.

The building on which the practices will be carried out will be proposed in the first week, being the deadline at the end of each topic. Dates will be specified during the course.

Further information concerning the timetable, classroom, office hours, assessment dates (http://www.eupla.unizar.es/asuntos-academicos/examenes) and other details regarding this course will be provided on the first day of class or please refer to the Faculty of EUPLA website and Moodle.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28622

Resources

Material	
Theory of the syllabus Schedule slides Case Studies	Paper/Digital
Technical manuals and regulations.	Paper/repository Digital/Moodle