310015 - Installations II

Coordinating unit: 310 - EPSEB - Barcelona School of Building Construction
Teaching unit: 753 - TA - Department of Architectural Technology
Academic year: 2017
Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2015). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN BUILDING CONSTRUCTION SCIENCE AND TECHNOLOGY (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: ENRIQUE CAPDEVILA GASENI
Others: ENRIQUE CAPDEVILA GASENI - LUIS FERNANDEZ GARCIA-ESCUDERO - CRISTIAN ALAMO PLAZAS - ALEJANDRO FALCONES DE SIERRA - JUSTO HERNANZ HERNANZ - SUSANA LEAL SALVADOR

Degree competences to which the subject contributes

Transversal:
1. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
2. ENTREPRENEURSHIP AND INNOVATION - Level 2. Taking initiatives that give rise to opportunities and to new products and solutions, doing so with a vision of process implementation and market understanding, and involving others in projects that have to be carried out.

Teaching methodology

The directed learning hours consist on the one hand in teaching theoretical classes where the professor does a brief exposition for introducing the general learning objectives related with the basic concepts of the subject. Afterwards and by means of practical exercises the professor tries to motivate and involve the students so that they can participate actively in their learning.

It is used support material in detailed educational plan format, by ATENEA. Learning objectives by contents, concepts, examples, evaluation activities and directed learning schedule and bibliography. Generally, after each session out of class works are proposed. The students must do these works, which are the basis of the directed activities. There also have to be considered the other autonomous learning hours like the ones dedicated to the guided readings, the resolution of the proposed problems or the questionnaires of the different contents by virtual campus ATENEA.

Learning objectives of the subject

At the end of the subject Instal.lacions II, the students should be able to:
To have achieved the basic design, regulations, schemes, plan drawings, pre-dimensioning and control knowledge, of the diferent electromechanical facilities which are integrated in construction.
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 36h 24.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 9h 6.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group: 0h 0.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>15h 10.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>90h 60.00%</td>
</tr>
</tbody>
</table>
(ENG) C1: ELECTRICITY, LOW VOLTAGE, LIGHTING, LIGHTNING ROD AND LIFTS

Description:
1.2. Distribution networks. Connection with the companies service. Aerial and subterranean connections. Wiring and placing mode.
1.4. Transformer stations. Facilities conditions. Space needs. Location possibilities.
1.5. Supplementary technical instructions (ITC MIE BT) of the REBT. Instructions contents.
1.7. Individual branch circuits. General control and safety panel. Protection of the facilities. Electrical contacts. Protection for ICP, ID and PIA.
1.8. Interior facilities. Circuits.
1.9. Used materials of the facilities. Wire and tube types.
1.10. Grounding of the facilities. Types.
1.11. Sizing of the facilities. Workload estimate.
1.13. Sizing of the facilities. Protection conductives and grounding calculation.
1.15. Execution of the facilities. Contraction execution of the different elements.
1.16. Trials and tests according to the REBT. Facilities imperfections. Classification of the facilities.
1.18. Use criteria of the different light types.

Related activities:
Theoretical class.
Activity 1. Design practice of the B.T electrical facility.
Activity 2. Calculation practice of the B.T electrical facility.
Activity 3. Individual tests by Atenea.
Activity 13. Final exam.
**C2: HEATING FACILITIES**

<table>
<thead>
<tr>
<th>Learning time: 39h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 9h</td>
</tr>
<tr>
<td>Practical classes: 1h 30m</td>
</tr>
<tr>
<td>Laboratory classes: 1h 30m</td>
</tr>
<tr>
<td>Guided activities: 5h</td>
</tr>
<tr>
<td>Self study: 22h</td>
</tr>
</tbody>
</table>

**Description:**

2.2. Heating facilities reliances. Reliances of water, gas and electricity.
2.3. RITE regulations. Application of heating facilities CTE.DB.HE.
2.4. Individual heating facilities systems. Description and working: heating by emitting, monotube and two-tube systems, underfloor heating; heating by accumulators, heating by air.
2.5. Centralized system. Description and application cases.
2.8. Pipes. Different materials to use depending on the system.
2.9. Accessories, regulation. Different regulation systems.
2.10. Underfloor heating. Electrical wire and hot water systems.
2.11. Accumulation and air systems. Parameters of calculation.
2.12. Sizing of monotube and two-tube facilities.
2.13. Model of the sizing of an underfloor heating facility.
2.14. Execution of the different heating systems.

**Related activities:**

Theoretical class.

Activity 4. Design practice of a heating facility.
Activity 5. Calculation practice of a heating facility.
Activity 6. Individual tests by Atenea.
Activity 13. Final exam.
### C3: AIR CONDITIONING FACILITIES

#### Learning time: 39h
- **Theory classes:** 9h
- **Practical classes:** 1h 30m
- **Laboratory classes:** 1h 30m
- **Guided activities:** 5h
- **Self study:** 22h

#### Description:
- **3.1.** Air conditioning foundations. Comfort parameters. Factors which intervene in the air control. Requirements.
- **3.3.** Reliability of other facilities. Energy sources used.
- **3.5.** Psychometrics. Application of the psychometrical diagram to the air conditioning.
- **3.7.** RITE regulations. Commentaries. Requirement criteria and application CTE.DB.HE.
- **3.8.** Centralized thermal conditioning systems. Application to public and semi-public buildings.
- **3.9.** Sizing of the facilities. Calculation of the elements producers of hot and cold. Calculation of the air flow. Calculation of pipes, grilles and diffusers.
- **3.10.** Simbology, schemes and graphics of the facilities.
- **3.11.** Execution of the facilities. Space needs for the conditioning units and different conduits. Retainers, attachments, pieces and accessories.

#### Related activities:
- Theoretical class.
- Activity 7. Design practice of an air conditioning facility.
- Activity 13. Final exam.

### C4: TELECOMMUNICATIONS INSTALLATION

#### Learning time: 26h
- **Theory classes:** 3h
- **Practical classes:** 1h 30m
- **Laboratory classes:** 1h 30m
- **Guided activities:** 2h
- **Self study:** 18h

#### Description:
- **4.1.** Definition of the parts of a ICT facility, with the power point registration, pass registration, PAU (Point of Acces for the User), secondary conduit, secondary registrations, chief conduit, RITI-RITS-RITU, connection conduit and manhole.
- **4.2.** Example of space sizing of the ICT.

#### Related activities:
- Theoretical class.
- Activity 10. Design practice of a telecommunications facility.
- Activity 12. Individual tests by Atenea.
- Activity 13. Final exam.
## Planning of activities

| (ENG) A1 DESIGN PRACTICE OF THE FACILITIES. ELECTRICITY BT | Hours: 6h 30m  
Theory classes: 1h 30m  
Practical classes: 2h  
Self study: 3h |
|----------------------------------------------------------|----------------------------------------------------------|
| **Description:**  
In this practice the students learn how to design a electrical facility in BT. | |
| **Support materials:**  
Wording with the Cías data and plans of the building. | |
| **Descriptions of the assignments due and their relation to the assessment:**  
Resolution of the exercise by the student. Following questionnaire by ATENEA. | |
| **Specific objectives:**  
At the end of the activity, the student should be able to:  
. Define and design a electrical facility in BT, depending on the type and the use of the building and the regulations. | |

| (ENG) A2 SIZING PRACTICE OF THE ELECTRICAL FACILITY IN B.T. | Hours: 6h 30m  
Theory classes: 1h 30m  
Practical classes: 2h  
Self study: 3h |
|-----------------------------------------------------------|----------------------------------------------------------|
| **Description:**  
In this practice the students learn how to calculate a electrical facility in BT. | |
| **Support materials:**  
Exercise wordings. | |
| **Descriptions of the assignments due and their relation to the assessment:**  
Resolution of the exercise by the students. Following questionnaire by ATENEA. | |
| **Specific objectives:**  
At the end of the activity, the students should be able to:  
. Sizing of the electrical facility in BT. | |

| (ENG) A3 INDIVIDUAL TEST | Hours: 12h  
Practical classes: 2h  
Self study: 10h |
|--------------------------|----------------------------------------------------------|
| **Description:**  
Individual test at home with a part of the basic essential theoretical concepts of the subject and following resolution of 2 or 3 problems related with the learning objectives of the contents. | |
| **Support materials:**  
Wordings of the two parts, calculator, plans. | |
| **Descriptions of the assignments due and their relation to the assessment:**  
Resolution of the test. | |
**Specific objectives:**

At the end of the activity, the student should be able to:
1. Define and design an electrical BT facility, depending on the type and use of the building and the regulations.
2. Sizing of the electrical BT facilities.
3. Value the suitability of the facility, the trials, tests and verifications.

**Description:**
In this practice the students learn how to design a heating facility.

**Support materials:**
Wording with the Cías data and the building plans.

**Descriptions of the assignments due and their relation to the assessment:**
Resolution of the exercise by the student. Following questionnaire by ATENEA.

**Specific objectives:**
At the end of the activity, the student should be able to:
- Define and design a heating facility, depending on the type and use of the building and the regulations.

---

**A4 DESIGN PRACTICE OF HEATING FACILITIES**

**Hours:** 6h 30m
- Theory classes: 1h 30m
- Practical classes: 2h
- Self study: 3h

**Description:**
In this practice the students learn how to design a heating facility.

**Support materials:**
Exercise wording.

**Descriptions of the assignments due and their relation to the assessment:**
Resolution of the exercise by the student. Following questionnaire by ATENEA.

---

**A5 SIZING PRACTICE OF HEATING FACILITIES**

**Hours:** 6h 30m
- Theory classes: 1h 30m
- Practical classes: 2h
- Self study: 3h

**Description:**
In this practice the students learn how to design a heating facility.

**Support materials:**
Exercise wording.

**Descriptions of the assignments due and their relation to the assessment:**
Resolution of the exercise by the student. Following questionnaire by ATENEA.

**Specific objectives:**
- Define and design a heating facility, depending on the type and use of the building and the regulations.
- Size the heating facility.

---

**A6 INDIVIDUAL TEST**

**Hours:** 12h
- Practical classes: 2h
- Self study: 10h

**Description:**
Individual test at home with a part of the basic essential theoretical concepts of the subject and following resolution of 2 or 3 problems related with the learning objectives of the contents.
### A7 DESIGN PRACTICE OF AIR CONDITIONING FACILITIES

**Description:**
In this practice the students learn how to design an air conditioning facility.

**Support materials:**
- Wording with the Cías data and the building plans.

**Descriptions of the assignments due and their relation to the assessment:**
- Resolution of the exercise by the student. Following questionnaire by ATENEA.

**Specific objectives:**
At the end of the activity, the student should be able to:
- Size an air conditioning facility.

**Hours:**
- Theory classes: 1h 30m
- Practical classes: 2h
- Self study: 3h

### A8 DESIGN PRACTICE OF AIR CONDITIONING FACILITIES

**Description:**
In this practice the students learn how to calculate an air conditioning facility.

**Support materials:**
- Exercise wording.

**Descriptions of the assignments due and their relation to the assessment:**
- Resolution of the exercise by the student. Following questionnaire by ATENEA.

**Specific objectives:**
At the end of the activity, the students should be able to:
- Define and design an air conditioning facility, depending on the type and use of the building and the regulations.
- Size an air conditioning facility.
### A9 Individual Test

**Description:**
Individual test at home with a part of the basic essential theoretical concepts of the subject and following resolution of 2 or 3 problems related with the learning objectives of the contents.

**Support materials:**
Wordings of the two parts, calculator, plans.

**Descriptions of the assignments due and their relation to the assessment:**
Resolution of the test.

**Specific objectives:**
At the end of the activity, the students should be able to:
1. Define and design of an air conditioning facility, depending on the type and use of the building and the regulations.
2. Sizing of an air conditioning facility.
3. To value the suitability of the facility, by trials, tests and verifications.

**Hours:**
Practical classes: 2h
Self study: 10h

### A10 Design Practice of Telecommunications Facilities

**Description:**
In this practice the students learn how to design a telecommunications facility.

**Support materials:**
Wording with the Cías data and building plans.

**Descriptions of the assignments due and their relation to the assessment:**
Resolution of the exercise by the student. Following questionnaire by ATENEA.

**Specific objectives:**
At the end of the activity, the students should be able to:
1. Define and design a telecommunications facility, depending on the type and use of the building and the regulations.

**Hours:**
Theory classes: 1h 30m
Practical classes: 2h
Self study: 3h

### A11 Sizing Practice of Telecommunications Facilities

**Description:**
In this practice the students learn how to calculate a telecommunications facility.

**Support materials:**
Exercise wording.

**Hours:**
Theory classes: 1h 30m
Practical classes: 2h
Self study: 3h
A12 INDIVIDUAL TEST

Description:
Individual test at home with a part of the basic essential theoretical concepts of the subject and following resolution of 2 or 3 problems related with the learning objectives of the contents.

Support materials:
Wordings of the two parts, calculator, plans.

Specific objectives:
At the end of the activity, the students should be able to:
1. To size the telecommunications facility.

A13 INDIVIDUAL FINAL TEST

Description:
Individual exam at class with a part of the basic essential theoretical concepts of the subject and following resolution of 2 or 3 problems related with the learning objectives of all the contents of the subject.

Support materials:
Wordings of the two parts, calculator, sizing formulas guide.

Specific objectives:
At the end of the exam, the students should be able to:
1. Ability to outline an electromechanical facility, depending on the type and use of the building and the current regulations.
2. Ability to outline the design of the facilities.
3. Ability to calculate all the facilities.
4. Ability to value the suitability of the facilities.
**Qualification system**

1st Written exam: 30%.
2nd Lab written exam: 15%.
3rd Final written exam: 50% (includes all the contents of the subject).
4th Activities 3, 6, 9 and 12: 5% total.

Revaluació

L’estudiant que hagi obtingut una qualificació final de suspens amb una nota numèrica compresa entre 3.5 i 4.9 tindrà l’opció de presentar-se a una prova única de revaluació, que inclourà la totalitat dels Continguts i es realitzarà en el període establert a l’efecte. Si supera aquesta prova, la qualificació final de l’assignatura passarà a ser aprovat (5.0)

No podrà realitzar la prova de revaluació l’estudiant que compleixi alguna de les següents condicions:

i) ja ha aprovat l’assignatura

ii) la seva qualificació final està per sota de 3.5 (inclou el cas NP, que és 0 NP)

**Regulations for carrying out activities**

- If a student doesn't do some of the continous evaluation activities it will be considered as non-marked.
- The students can bring a vade mecum of formulas to the exams or tests.
- The lab practices are compulsory for all the students and it is an essential requirement the attendance to these practices for access to the written exam which has a worth of 20% of the final mark.

**Bibliography**

**Complementary:**


**Others resources:**