310010 - Installations I

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: ALEJANDRO FALCONES DE SIERRA
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 1. Showing enterprise, acquiring basic knowledge about organizations and becoming familiar with the tools and techniques for generating ideas and managing organizations that make it possible to solve known problems and create opportunities.

Teaching methodology

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

Support material in educational plan form is used: learning objectives by contents, concepts, examples, evaluation activities and directed learning schedule and bibliography. Generally, after each session out of class work is proposed, these exercises must be done and they are the basis of the directed activities. The other autonomous self-learning hours have to be considered too, like the hours 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 Building Services course, students should be able to:

Define and design a fluids installation based on the type and use of the building and the regulations.
Dimension a fluids installation.
Assess the suitability of a fluids installation with the different tests and verifications.
# 310010 - Installations I

## 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>
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<tr>
<td></td>
<td>Hours small group: 0h (0.00%)</td>
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<tr>
<td></td>
<td>Guided activities: 15h (10.00%)</td>
</tr>
<tr>
<td></td>
<td>Self study: 90h (60.00%)</td>
</tr>
</tbody>
</table>
# 310010 - Installations I

## Content

<table>
<thead>
<tr>
<th>C1: PLUMBING-COLD WATER, HOT AND SOLAR ENERGY</th>
<th>Learning time: 41h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 10h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h 30m</td>
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<tr>
<td></td>
<td>Guided activities: 6h</td>
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<tr>
<td></td>
<td>Self study: 22h</td>
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</tbody>
</table>

### Description:


1.2. Object and necessity of the facility. Pressure and flow conditions in the networks. Needs posed by these parameters in the facility. Simultaneity and application concepts.

1.3. Connection of companies? services. Materials, types and specifications.

1.4. Regulations. CTE.DB.HS-4 Exactitude. Commentary of the part D.B.

1.5. Elements that form a pipes facility. Function and symbology. Common part of the facility: Stopcock, inflow pipe and meters box.

1.6. User facility: meter, uprights, stopcock, inside branch, device connection points.

1.7. Materials used in the facility: types of stopcock and valve. Pipes: iron, copper, steel, stainless steel, polyethylene, reticulated polyethylene, polypropylene, multilayer. Advantages and disadvantages of each material.

1.8. Requirements of the regulations. Manholes, meters room, separation from other facilities.

1.9. Facility dimension according to CTE.

1.10. Other methods of dimension, non-according to CTE.

1.11. Diagrams and graphics of the facilities in floors. Variants based on the values of pressure and flow.

1.12. Works in-situ of the facilities. Ways to execute the facility: joins and support of the pipes depending on the material. Placing and passage of pipes for different types of closure.


1.15. Parts of the ACS facility. Function and symbology. Water heater, pipes and valves.

1.16. Individual and centralize systems. Return to centralize systems.

1.17. Materials used in hot water facilities.

1.18. Calculation of hot water needs.

1.19. Dimensioning of the installation.

### Related activities:

- Theoric class
  - Activity 1. Practice of facility design.
  - Activity 2. Practice of facility calculations.
  - Activity 3. Individual tests in Atenea.
  - Activity 13. Final exam
## C2: FACILITY OF WATER EVACUATION

**Description:**
1. Symbology, definitions, components and purpose of the evacuation network of rainwater, sewage and faecal waters.
3. Network itinerary, the design of the rainwater, faecal and sewage network.
4. Different types of ventilation in facilities, objectives of these (return), definitions of primary, secondary and tertiary ventilation.
5. Sizing the network of rainwater, sewage and faecal waters. Method of CTE, section HS-5
6. Demand of CTE, section HS-5

**Related activities:**
- Theoric class
  - Activity 4. Exercice of design the evacuation facility.
  - Activity 5. Calculate all the evacuation facility.
  - Activity 6. Individual tests in Atenea.
  - Activity 13. Final exam.

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>38h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes</td>
<td>9h</td>
</tr>
<tr>
<td>Practical classes</td>
<td>1h 30m</td>
</tr>
<tr>
<td>Laboratory classes</td>
<td>1h 30m</td>
</tr>
<tr>
<td>Guided activities</td>
<td>4h</td>
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<tr>
<td>Self study</td>
<td>22h</td>
</tr>
</tbody>
</table>
### C3: GAS FACILITY

**Learning time:** 38h  
- Theory classes: 9h  
- Practical classes: 1h 30m  
- Laboratory classes: 1h 30m  
- Guided activities: 4h  
- Self study: 22h

<table>
<thead>
<tr>
<th>Description:</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>3.6. Diagrams of the gas facilities depending on the situation of the meters and the pressure supplied.</td>
<td>3.7. Sizing with the simplified method of the facility. Flow calculation. Diameter of the pipes. Test.</td>
<td>3.8. Works in-situ of the facility. Facility execution according to the regulations and the materials used.</td>
</tr>
</tbody>
</table>

**Related activities:**  
- Theoric class  
  - Activity 7. Exercise of design the gas facility.  
  - Activity 8. Calculate all the gas facility.  
  - Activity 13. Final exam.
(ENG) C4: INSTAL·LACIÓ CONTRA INCENDIS

Learning time: 33h
- Theory classes: 8h
- Practical classes: 1h 30m
- Laboratory classes: 1h 30m
- Guided activities: 4h
- Self study: 18h

Description:
4.5. Extinguishing manual systems. Extinguishers. Firefighting fixtures. Hydrants. Dry column system. Features and requirements of these facilities, according to CTE. DB and fire-protection Regulations of facilities.
4.6. Extinguishing fixed systems. Fire sprinkler. Foam systems. Gaseous agents systems. Features and requirements of these facilities, according to SI and the fire-protection Regulations of facilities.

Related activities:
Theoretical explanation class.
Activity 11. Fire-protection facilities calculation practice.
Activity 12. Individual tests by Atenea.
### Planning of activities

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Hours: 6h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1 DESIGN PRACTICE OF WATER INSTALLATION</strong></td>
<td>Theory classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 2h</td>
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<tr>
<td></td>
<td>Self study: 3h</td>
</tr>
</tbody>
</table>

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

**Support materials:**
Wording with the Cías information 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 student should be able to:
- Define and design a IFF and ACS facility according to the type and the use of the building and the regulations.

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Hours: 6h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A2 MEASURING PRACTICE OF WATER INSTALLATION</strong></td>
<td>Theory classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study: 3h</td>
</tr>
</tbody>
</table>

**Description:**
In this practice the student will learn how to calculate a water 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 student should be able to:
- To measure the IFF and ACS facilities.

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Hours: 12h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A3 INDIVIDUAL TEST</strong></td>
<td>Practical classes: 2h</td>
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<tr>
<td></td>
<td>Self study: 10h</td>
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</tbody>
</table>

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

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

**Descriptions of the assignments due and their relation to the assessment:**
Resolution of the activity.
### Specific objectives:
At the end of the activity, the student should be able to:
1. Define and design a IFF and ACS facility, according to the type and the use of the building and the regulations.
2. To measure a IFF and ACS facility.
3. To consider the suitability of the facility, the trials, tests and verifications.

### A4 DESIGN PRACTICE OF EVACUATION INSTALLATION

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

**Support materials:**
Wording with the Cías information 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 student should be able to:
- Define and design a water evacuation facility, according to the type and the use of the building and the regulations.

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

### A5 MEASURING PRACTICE OF EVACUATION INSTALLATION

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

**Support materials:**
Wording of the exercise.

**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:
- To measure a water evacuation facility.

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

### A6 INDIVIDUAL TEST

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

**Hours:** 12h  
Practical classes: 2h  
Self study: 10h
### A7 Design Practice of Gas Installation

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

**Support materials:**
Wordings with the Clas information 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:
1. Define and design a gas facility, according to the type and the use of the building and the regulations.
2. To measure a gas facility.
3. To consider the suitability of the facilities, the trials, tests and verifications.

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

### A8 Measuring Practice of Gas Installation

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

**Support materials:**
Wording of the exercise.

**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:
1. To measure a gas facility.
# A9 INDIVIDUAL TEST

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

**Support materials:**
Wording 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 a domestic gas facility, according to the type and the use of the building and the regulations.
2. To measure a domestic gas facility.
3. To consider the suitability of the facility, the trials, tests and verifications.

| Hours | Practical classes: 2h  
Self study: 10h |
|-------|---------------------|

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# A10 DESIGN PRACTICE OF INSTALLATION AGAINST FIRE

**Description:**
In this practice the students will learn how to design a fire-protection facility.

**Support materials:**
Wording with the Cías information 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 fire-protection facility, according to the type and the use of the building and the regulations.

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

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# A11 MEASURING PRACTICE OF INSTALLATION AGAINST FIRE

**Description:**
In this practice the students will learn how to calculate a fire-protection facility.

**Support materials:**
Wording of the exercise.

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

| Hours | Theory classes: 1h 30m  
Practical classes: 2h  
Self study: 3h |
|-------|---------------------|
### Specific objectives:
At the end of the activity, the student should be able to:
1. To measure a fire-protection facility.

### A12 INDIVIDUAL TEST

<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>Individual test at home with a part of the minimum essential theoretical concepts of the subject and subsequently the resolution of 2 or 3 problems related with the learning objectives of the contents.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Support materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wording of the two parts, calculator and plans.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Descriptions of the assignments due and their relation to the assessment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution of the test.</td>
</tr>
</tbody>
</table>

### Specific objectives:
At the end of the activity the student should be able to:
1. Define and design a fire-protection facility, according to the type and the use of the building and the regulations.
2. To measure a fire-protection facility.
3. To consider the suitability of the facility, the trials, tests and verifications.

### A13 INDIVIDUAL FINAL TEST

<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>Individual test at class with a part of the minimum essential theoretical concepts of the subject and subsequently the resolution of 2 or 3 problems related with the learning objectives of all the contents of the subject.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Support materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wordings of the two parts, calculator, sizing formulas guide.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Descriptions of the assignments due and their relation to the assessment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution of the exam. It worths the 60% of the final mark of the subject.</td>
</tr>
</tbody>
</table>

### Specific objectives:
At the end of the activity, the student should be able to:
1. Ability to create a water facility according to the type and the use of the building and the valid regulations.
2. Ability to strategize the design of the facility.
3. Ability to calculate all the facility.
4. Ability to consider the suitability of the facility.
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Qualification system

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

Regulations for carrying out activities

. If some of the continuous evaluation activities is not done, it will be considered as non-marked.
. The students can have a vade mecum of formulas in the learning exams or tests.
. The lab practices are compulsory for all the students and these practices are an essential condition for taking the written exam, which has a worth of 20% of the final exam.

Bibliography

Complementary:

- Huadernos de gas del instalador. El Instalador.

Others resources: