310400 - Engineering in the Architecture of the 20th and 21st Century

Coordinating unit: 310 - EPSEB - Barcelona School of Building Construction
Teaching unit: 756 - THATC - Department of History and Theory of Architecture and Communication Techniques

Academic year: 2019
Degree: MASTER'S DEGREE IN ADVANCED BUILDING CONSTRUCTION (Syllabus 2014). (Teaching unit Compulsory)
ECTS credits: 5
Teaching languages: Spanish

Teaching staff
Coordinator: Graus Rovira, Ramon
Others: Graus Rovira, Ramon
Navas Ferrer, Maria Teresa
Navarro Gonzalez, Ruben

Opening hours
Timetable: It will be indicated in the board of the Secció d’Història de la Construcció (3rd floor).

Degree competences to which the subject contributes

Basic:
2. Possess and understand knowledge which provide a basis or opportunity to be original in the development and/or application of ideas, usually in a context of research.
3. The students must be able to apply the acquired knowledges and their ability of resolution of problems in new or little known environments inside more wide environments (or multidisciplinary) related with their study field.
4. The students must be able to integrate knowledges and front to the complexity to formulate opinions from an information which, being incomplete or limited, includes reflections about the social and ethical responsibilities linked to the application of their knowledges and opinions.
5. The students must be able to communicate their conclusions and the knowledges and ultimate reasons which support to specialised and non-specialised audiences in a clear mode and without ambiguities.
1. The students must possess the learning abilities which allow them to continue studying in a way which should be to a large extent self-directed and autonomous.

Specific:
6. Capacity of innovation: identify the reasons and the mechanisms of the technologic and technical changes.
7. Make a model of structures of buildings and evaluate the load they can support.

General:
8. Prepare to communicate with efficiency, orally but also in written.
9. Prepare the student in the using of tools that are common in the investigation activities, like the analysis and treatment of data, just like methodology and investigation techniques.

Transversal:
10. ENTREPRENEURSHIP AND INNOVATION: Knowing about and understanding how businesses are run and the sciences that govern their activity. Having the ability to understand labor laws and how planning, industrial and marketing strategies, quality and profits relate to each other.
11. SUSTAINABILITY AND SOCIAL COMMITMENT. Being aware of and understanding the complexity of social and economic phenomena that characterize the welfare society. Having the ability to relate welfare to globalization and
310400 - Engineering in the Architecture of the 20th and 21st Century

sustainability. Being able to make a balanced use of techniques, technology, the economy and sustainability. 12. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Teaching methodology

There will be combined two supplementary approaches: the historical view and the biographical view. The historical approach shows the technological changes in the architecture, inside the cultural, social and economic milieu; while the biographical approach allows to see, in the framework of the technological innovations, the diversity (educational and occupational) of what means to be an engineer in the architecture of the contemporaneity.

There will be done lectures combined with master classes to motivate and facilitate the learning and the deep reflection of the topics objective of the course. In the same way, inside the in-person schedule there will be reserved a space to guide the works and the autonomous practices.

Learning objectives of the subject

At the end of the subject, the students should be able to:
- Understand what means to be an engineer in the contemporaneity and its educational and occupational diversity.
- Define the own constructive features of each period of the architecture of the 20th and 21st centuries.
- To value the role of the technology in the architecture and the engineering of the 20th and 21st centuries and the influence of the architecture and the engineering in technological changes.
- Recognize the design strategies of each one of the engineers studied during the course.
- Determine the construction period of a building.
- Explain reasonably the meaning of the different technological innovations published during the 20th and 21st centuries.
- Use the existing tools and resources for the documentation of a building.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group:</th>
<th>17h 30m</th>
<th>14.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>5h</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>5h</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>7h 30m</td>
<td>6.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>72.00%</td>
</tr>
</tbody>
</table>
310400 - Engineering in the Architecture of the 20th and 21st Century

Content

<table>
<thead>
<tr>
<th>C1 INTRODUCTION</th>
<th>Learning time: 17h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study: 13h</td>
</tr>
</tbody>
</table>

**Description:**
In this content, there will be done two sessions:

1. The steel frame and the new conception of the binomial structure-enclosure.
2. The reinforced concrete, structural technique of the 20th century.

**Related activities:**
A3 WRITTEN EXAM

**Specific objectives:**
- Understand what means to be an engineer in the contemporaneity and its educational and occupational diversity.
- Define the own constructive features of each period of the architecture of the 20th and 21st centuries.
- To value the role of the technology in the architecture and the engineering of the 20th and 21st centuries and the influence of the architecture and the engineering in the technological changes.
- Recognize the design strategies of each one of the engineers studied during the course.
- Determine the construction period of a building.
- Explain reasonably the meaning of the different technological innovations published during the 20th and 21st centuries.
- Use the existing tools and resources for the documentation of a building.
# 310400 - Engineering in the Architecture of the 20th and 21st Century

## C2 THE ROLE OF TECHNOLOGY IN SHAPING THE ARCHITECTURE OF THE MODERN MOVEMENT

### Learning time: 45h 30m
- Theory classes: 5h
- Practical classes: 2h
- Laboratory classes: 3h
- Guided activities: 3h 30m
- Self study: 32h

### Description:
In this content there will be done 5 sessions:

1. Industrial architecture: From Behrens to Gropius.
2. Technology and architecture in the work of Auguste Perret.
3. Technology and architecture in the work of Le Corbusier.
4. Taylorism and neues Bauen.
5. Technology and architecture in the work of Mies van der Rohe.

### Related activities:
- A1 READING AND TEXT COMMENTARY: INTER-WAR PERIOD
- A3 WRITTEN EXAM

### Specific objectives:
- Understand what means to be an engineer in the contemporaneity and its educational and occupational diversity.
- Define the constructive features of each period of the architecture of the 20th and 21st centuries.
- To value the role of the technique in the architecture and the engineering of the 20th and 21st centuries and the weight of the architecture and the engineering in the technological changes.
- Recognize the design strategies of each one of the engineers studied during the course.
- Determine the construction period of a building.
- Explain reasonably the meaning of the different technological innovations published during the 20th and 21st centuries.
- Use the existing tools and resources for the documentation of a building.
### C3 ENGINEERING IN POSTWAR ARCHITECTURE

**Learning time:** 62h 30m  
- Theory classes: 8h 30m  
- Practical classes: 3h  
- Laboratory classes: 2h  
- Guided activities: 4h  
- Self study: 45h

### Description:

In this content there will be done 7 sessions:

- 8. Exploring advanced techniques: Richard Buckminster Fuller, Case Study House Program.  
- 10. The glass box and the second transformation of the external walls.  
- 11. Technological debates about the collective housing during the European post-War period.  
- 12. The visible construction: Louis I. Kahn with August Komendant, Stirling & Gowan with Frank Newby.  

### Related activities:

- A2 READING AND TEXT COMMENTARY: POSTWAR PERIOD  
- A3 WRITTEN EXAM

### Specific objectives:

- Understand what means to be an engineer in the contemporaneity and its educational and occupational diversity.  
- Define the constructive features of each period of the architecture of the 20th and 21st centuries.  
- To value the role of the technology in the architecture and the engineering of the 20th and 21st centuries and the influence of architecture and engineering in technological changes.  
- Recognize the design strategies of each one of the engineers studied during the course.  
- Determine the construction period of a building.  
- Explain reasonably the meaning of the different technological innovations published during the 20th and 21st centuries.  
- Use the existing tools and resources for the documentation of a building.
### Planning of activities

#### A1 READING AND TEXT COMMENTARY: INTERWAR PERIOD

**Description:**
The student will choose an article of the list to read it and make a critical remark. The text will have an extension between 4 or 5 A4 pages.

**Support materials:**
At the beginning of the course there will be delivered to the students a list of articles about the topics to study.

**Descriptions of the assignments due and their relation to the assessment:**
Pre-delivery (directed activity): October 14th of 2015.
Final delivery: November 4th of 2015.

**Specific objectives:**
- To value the role of the technique in the architecture and engineering of the XX and XXI centuries and the significance of the architecture and engineering in the technical changes.
- Explain reasonably the meaning of the different technical innovations published during the XX and XXI centuries.

#### A2 LECTURA Y COMENTARIO SOBRE UN TEXTO DEL PERÍODO POSTERIOR A LA SEGUNDA GUERRA MUNDIAL

**Description:**
The student will choose an article of the articles list to read it and make a critical remark. The text will have an extension between 4 or 5 A4 pages.

**Support materials:**
At the beginning of the course there will be delivered to the students a list of articles about the topics to study.

**Descriptions of the assignments due and their relation to the assessment:**
Final delivery: January 13th of 2016.

**Specific objectives:**
- To value the role of the technique in the architecture and engineering of the XX and XXI centuries and the significance of the architecture and engineering in the technical changes.
- Explain reasonably the meaning of the different technical innovations published during the XX and XXI centuries.

#### A3 EXAMEN ESCRITO

**Description:**
The student will be tested in writing. An example will be delivered during the lessons. The questions will be developed widely during the in-person classes and, at the moment of the exam, the student can use notes and books.

**Support materials:**
At the beginning of the course there will be delivered to the students a list about the topics to study.

**Descriptions of the assignments due and their relation to the assessment:**
The exam will be done during the final exams period at the day and the time scheduled by the faculty.
### Specific objectives:
- Understand what means to be an engineer in the contemporaneity and its educational and occupational diversity.
- Define the own constructive features of each period of the architecture of the XX and XXI centuries.
- To value the role of the technique in the architecture and the engineering of the XX and XXI centuries and the weight of the architecture and the engineering in the technical changes.
- Recognize the design strategies of each one of the engineers studied during the course.
- Determine the construction period of a building.
- Explain reasonably the meaning of the different technical innovations published during the XX and XXI centuries.
- Use the existing tools and resources for the documentation of a building.

### A4 VISIT TO THE ARCHITECTURE OF BARCELONA WITH THE TEACHER

<table>
<thead>
<tr>
<th>Description:</th>
<th>Guided activities: 9h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntarily visit with the professor, on a Saturday morning, to a building, neighbourhood or city for consolidating the explanations given to the theory group.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Support materials:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>There will be given surveyings of the building or brief descriptions of the visited object.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Descriptions of the assignments due and their relation to the assessment:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>There won’t be any delivery.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific objectives:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To approximate on first hand to the architecture, construction and the city of Barcelona.</td>
<td></td>
</tr>
<tr>
<td>To consolidate the teaching given to the theory groups.</td>
<td></td>
</tr>
</tbody>
</table>

### Qualification system

Activity A1 - Reading and text commentary: inter-war period: 30% of the final mark.
Activity A2 - Reading and text commentary: postwar period: 40% of the final mark.
Activity A3 - Written exam: 30% of the final mark.

### Regulations for carrying out activities

Activity A3 - Written exam: At the moment of the exam, the student can use notes and books. The written exam will have a maximum extent of 4 A4 pages.
310400 - Engineering in the Architecture of the 20th and 21st Century

Bibliography

Basic:


Complementary:


