310401 - Physical Phenomena in Building Construction

Coordinating unit: 310 - EPSEB - Barcelona School of Building Construction
Teaching unit: 748 - FIS - Department of Physics
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: Peñaranda Ayllon, Angelina
Others: Lacasta Palacio, Ana Maria
Rodriguez Cantalapiedra, Inmaculada
Ramirez De La Piscina Millan, Laureano

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. Use the physic principles in the thermic, luminic and acoustic scope.
7. Recognise the materials and construction techniques of each historical period and value its influence in the architecture design.
8. Manage the installations, its costs and maintenance.

General:
9. Provide to the student the capacity to apply the knowledge acquired in the resolution of complex problems in any sector of the building construction.
10. Analyse, evaluate and synthesise critically, new and difficult ideas of promotion, in academic and professional contexts, scientific advances, technologics, socials or culturals in the society of knowledge.
11. Obtain results that can be transfered to the building construction sector, through the applied investigation, the technological developement and the innovation.

Transversal:
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.
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**Teaching methodology**

Blackboard classes: theory and problems.
Two lab practices.
Promotion of group work.

**Learning objectives of the subject**

- Acquisition of basic physical knowledge in thermal, lighting and acoustic fields.
- Acquiring knowledge on modeling of physical processes and their resolution using numerical simulation methods.
- Learning about heat exchange, thermal perception, indoor air quality, ventilation, lighting conditions and propagation and noise control.
- Development of practices to assess the degree of comfort of a particular room or building, identifying and resolving problems caused by improper use or design skills.
- Acquisition of generic skills to integrate studies of comfort within generic architectural projects.

**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>
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</tbody>
</table>
## Content

### Fundamentals of heat and water vapor transfer

**Learning time:** 42h  
- Theory classes: 8h  
- Practical classes: 2h  
- Guided activities: 2h  
- Self study: 30h

**Description:**  

### Thermal comfort and indoor air quality

**Learning time:** 23h  
- Theory classes: 4h  
- Practical classes: 1h  
- Laboratory classes: 3h  
- Self study: 15h

**Description:**  
**Related activities:**  
Practice on thermal comfort and indoor air quality at the Laboratory of Acoustics and Energy Saving

### Basic concepts for natural ventilation of buildings

**Learning time:** 20h  
- Theory classes: 2h  
- Practical classes: 1h  
- Laboratory classes: 1h  
- Guided activities: 1h  
- Self study: 15h

**Description:**  
### Qualification system

The qualification system consists of a final exam (FE) and a course evaluation including problems (P), works in group (TG) and lab practices (PL). The final mark is given by:

\[ 0.40 \times EF + 0.15 \times P + 0.15 \times TG + 0.30 \times PL \]

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#### Fundamentals of Lighting

<table>
<thead>
<tr>
<th>Learning time: 20h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 2h</td>
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<tr>
<td>Practical classes: 1h</td>
</tr>
<tr>
<td>Laboratory classes: 1h</td>
</tr>
<tr>
<td>Guided activities: 1h</td>
</tr>
<tr>
<td>Self study: 15h</td>
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</tbody>
</table>

**Description:**

**Related activities:**
Practical work on lighting, at the Laboratory of Acoustics and Energy Saving EPSEB

#### Fundamentals of acoustics

<table>
<thead>
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<tbody>
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<td>Practical classes: 1h</td>
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<tr>
<td>Laboratory classes: 1h</td>
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<tr>
<td>Guided activities: 1h</td>
</tr>
<tr>
<td>Self study: 15h</td>
</tr>
</tbody>
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**Description:**
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**Bibliography**

**Basic:**


