Course guide

**310401 - 310401 - Physical Phenomena in Building Construction**

**Unit in charge:** Barcelona School of Building Construction  
**Teaching unit:** 748 - FIS - Department of Physics.

**Degree:** MASTER'S DEGREE IN ADVANCED BUILDING CONSTRUCTION (Syllabus 2014). (Compulsory subject).

**Academic year:** 2022  
**ECTS Credits:** 5.0  
**Languages:** Catalan, Spanish, English

**LECTURER**

**Coordinating lecturer:** Peñaranda Ayllon, Angelina  
**Others:**  
Lacasta Palacio, Ana Maria  
Rodriguez Cantalapiedra, Inmaculada  
Ramirez De La Piscina Millan, Laureano  
Vásquez Paredes, Rodrigo Antonio

**DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES**

**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.

**Generical:**
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, technologies, socials or culturals in the society of knowledge.  
11. Obtain results that can be transferred to the building construction sector, through the applied investigation, the technological development 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.

**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.

**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 the 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>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>72.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>17,5</td>
<td>14.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>7,5</td>
<td>6.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>5,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>5,0</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Total learning time: 125 h

CONTENTS

**Fundamentals of heat and water vapor transfer**

Description:

Full-or-part-time: 42h
- Theory classes: 8h
- Practical classes: 2h
- Guided activities: 2h
- Self study: 30h

**Thermal comfort and indoor air quality**

Description:

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

Full-or-part-time: 23h
- Theory classes: 4h
- Practical classes: 1h
- Laboratory classes: 3h
- Self study: 15h
### Basic concepts for natural ventilation of buildings

**Description:**

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

### Fundamentals of Lighting

**Description:**

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

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

### Fundamentals of acoustics

**Description:**

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

### GRADING SYSTEM

The qualification system consist 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:

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

Basic: