Course guide
310413 - 310413 - Environmental and Architectural Acoustics

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). (Optional subject).

Academic year: 2022 ECTS Credits: 5.0 Languages: Spanish

LECTURER

Coordinating lecturer: Carlota E. Auguet Sangrá

Others: Julián Álvarez Chaia

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
6. Use the physic principles in the thermic, luminic and acoustic scope.
9. Recognise the materials and construction techniques of each historical period and value its influence in the architecture design.

General:
7. Provide to the student the capacity to apply the knowledge acquired in the resolution of complex problems in any sector of the building construction.
CG2. Prepare to communicate with efficiency, orally but also in written.

Transversal:
10. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
11. 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

Theory classes and problems by Google Meet.
LEARNING OBJECTIVES OF THE SUBJECT

The subject will make special emphasis in developing the necessary knowledge to get introduced in the acoustic consultancy work: compliance of law, both in environmental and construction frameworks, and the evaluation of the acoustic performance of a room. Basic physical concepts of acoustical architecture will be explained, which will be used to solve different practical exercises. Moreover, practical skills in design and acoustical evaluation of concert halls, theaters, and conference rooms, among others, will be developed. Finally, techniques and instrumentes of acoustical in-situ measuring will be presented.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Hours medium group</td>
<td>5,0</td>
<td>4.00</td>
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<tr>
<td>Hours large group</td>
<td>15,0</td>
<td>12.00</td>
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<tr>
<td>Self study</td>
<td>90,0</td>
<td>72.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>5,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>10,0</td>
<td>8.00</td>
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</tbody>
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Total learning time: 125 h

CONTENTS

INTRODUCTION TO ENVIRONMENTAL NOISE

Description:

Specific objectives:
Acquisition of principles and fundamental concepts of sound and its propagation. Knowledge on the evaluation of discomfort caused by noise.

Related activities:
Measurement and analysis. of environmental noise

Related competencies:
CG1. Provide to the student the capacity to apply the knowledge acquired in the resolution of complex problems in any sector of the building construction.
CE2. Recognise the materials and construction techniques of each historical period and value its influence in the architecture design.
CB9. 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.
CB8. 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 responsabilities linked to the application of their knowledges and opinions.
CB7. 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.

Full-or-part-time: 21h
Theory classes: 2h
Practical classes: 2h
Laboratory classes: 1h
Guided activities: 1h
Self study : 15h
ROOM ACOUSTIC

Description:
Absorbent materials and acoustic systems. Porous materials, resonators, combined systems.
Norms of measurement of acoustic parameters of rooms. Regulations. Control of the reverberation according to the CTE DB-HR

Specific objectives:
Analysis and determination of acoustic comfort of rooms. Solve potential problems

Related activities:
Measurement of Reverberation time. Study of room acoustic

Related competencies:
CG1. Provide to the student the capacity to apply the knowledge acquired in the resolution of complex problems in any sector of the building construction.
CE2. Recognise the materials and construction techniques of each historical period and value its influence in the architecture design.
CE3. Use the physic principles in the thermic, luminic and acoustic scope.
CB9. 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.
CB8. 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 responsabilities linked to the application of their knowledges and opinions.
CB7. 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.
CB10. 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.

Full-or-part-time: 42h
Theory classes: 5h
Practical classes: 4h
Laboratory classes: 1h
Guided activities: 2h
Self study : 30h
ACOUSTIC ISOLATION AND NOISE CONTROL

Description:

Specific objectives:
Acquisition of knowledge and capacity for determination of sound insulation of building elements and correction of potential problems.

Related activities:
Analysis of sound insulation of building elements

Related competencies:
CG1. Provide to the student the capacity to apply the knowledge acquired in the resolution of complex problems in any sector of the building construction.
CE2. Recognise the materials and construction techniques of each historical period and value its influence in the architecture design.
CE3. Use the physic principles in the thermic, luminic and acoustic scope.
CB9. 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.
CB8. 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 responsabilities linked to the application of their knowledges and opinions.
CB7. 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.
CB10. 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.

Full-or-part-time: 62h
Theory classes: 7h
Practical classes: 7h
Laboratory classes: 1h
Guided activities: 2h
Self study: 45h

GRADING SYSTEM

Delivery of exercises proposed in class.

EXAMINATION RULES.

Exercises corresponding to environmental acoustics: 20%
Exercises corresponding to acoustic conditioning: 40%
Exercises corresponding to acoustic insulation: 40%
BIBLIOGRAPHY

Basic: