

## Course guide

### 310765 - 310765 - Architectural Acoustics

**Last modified:** 04/04/2024

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

**Degree:** BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019).  
(Optional subject).

**Academic year:** 2023    **ECTS Credits:** 3.0    **Languages:** Catalan, Spanish

#### LECTURER

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**Coordinating lecturer:** JULIAN ALVAREZ CHAIA

**Others:**

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

FE-01. FE-1 Ability to understand and make the graphical documentation of a project, to do data gathering, surveying of plans and geometric control of construction units.

FE-04. FE-4 Knowledge of the materials and traditional or prefabricated construction systems used in construction, their varieties and physical and mechanical features which define them.

**Transversal:**

02 SCS N1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world's situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.

05 TEQ N1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

06 URI N1. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

07 AAT N1. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

#### TEACHING METHODOLOGY

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Theory and problems classes will be taught. During the course, laboratory practices and field work will be carried out. Group work will be promoted.

#### LEARNING OBJECTIVES OF THE SUBJECT

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The subject will place special emphasis on developing the necessary knowledge to be able to enter the profession of acoustic consulting, applying it in the most frequent cases: compliance with the law (especially the DBHR) and the evaluation of the acoustic adequacy of a room. Basic physical knowledge will be given in the field of architectural acoustics, which will be applied to carrying out practical exercises following the DBHR legislation and current acoustic regulations relating to buildings and noise. Likewise, practical skills will be developed for the design and acoustic evaluation of concert halls, theaters and conference rooms, among others. Finally, in-situ acoustic measurement techniques and materials will be introduced.

## STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours large group	30,0	40.00

**Total learning time:** 75 h

## CONTENTS

### Introduction to acoustics

**Description:**

Nature and characteristics of sound. Spectral analysis of noise and weighting of the sound pressure level. Noise in the environment of a building and reduction mechanisms.

**Related activities:**

Sound level measurement

**Full-or-part-time:** 4h

Theory classes: 4h

### Acoustic conditioning

**Description:**

Reverberation time. Acoustic absorption phenomenon. Types of acoustic absorbers. CTE-DBHR study in relation to acoustic conditioning. Acoustic conditioning of rooms.

**Related activities:**

Measurement of reverberation time according to ISO methodology. Concert hall project.

**Full-or-part-time:** 8h

Theory classes: 6h

Practical classes: 2h

### Acoustic isolation

**Description:**

Definition of acoustic insulation. Types of walls: single and double. Acoustic insulation applications: walls, ducts, silencers, screens. Notions of vibration isolation. Application of CTE-DBHR to acoustic insulation. Other regulations. Introduction to in-situ measurements according to ISO methodology.

**Related activities:**

CTE-DBHR compliance study.

Practice with the DBHR sound insulation calculation software.

Air and impact acoustic insulation measures according to ISO

**Full-or-part-time:** 18h

Theory classes: 16h

Practical classes: 2h



## GRADING SYSTEM

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The course will be evaluated through exercises suggested in class, work and practical work.

Class exercises (20%)

Work I - CTE-DBHR compliance study (30%)

Work II - Auditorium design (30%)

Internships (20%)

## BIBLIOGRAPHY

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### Basic:

- Beranek, Leo L. Concert halls and opera houses : music, acoustics and architecture. 2nd ed. New York, [etc.]: Springer, cop. 2004. ISBN 9780387955247.
- Arau, Higiní. ABC de la acústica arquitectónica. Barcelona: CEAC, DL 1999. ISBN 9788432920172.
- Ministerio de Fomento. Real Decreto 732/2019 de 20 de diciembre. CTE-DBHR [on line]. Madrid, 2019 [Consultation: 26/07/2023]. Available on: <https://www.boe.es/eli/es/rd/2019/12/20/732>.

### Complementary:

- Izenour, George C. Theater design. New York [etc.]: McGraw-Hill, [1977]. ISBN 0070320861.
- Sabine, Wallace C. Collected Papers on Acoustics. Los Altos, California: New Publisher, 2021.
- Barron, Michael. Auditorium acoustics and architectural design. 2nd ed. London ; New York: Spon press, 2010. ISBN 978-0419245100.
- Ginsberg, Jerry H. Acoustics-A Textbook for Engineers and Physicists : Volume II: Applications. Cham: Springer International Publishing, 2018. ISBN 978-3-319-56846-1.