



Course guide

210740 - AA - Acoustics in Architecture

Last modified: 14/12/2023

Unit in charge: Barcelona School of Architecture
Teaching unit: 753 - TA - Department of Architectural Technology.

Degree: MASTER'S DEGREE IN ADVANCED STUDIES IN ARCHITECTURE-BARCELONA (Syllabus 2015). (Optional subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: CARLOS ALONSO MONTOLÍO

Others: Primer quadrimestre:
CARLOS ALONSO MONTOLÍO - Grup: AEMA1

TEACHING METHODOLOGY

[Go to Spanish or Catalan version](#)

LEARNING OBJECTIVES OF THE SUBJECT

[Go to Spanish or Catalan version](#)

STUDY LOAD

Type	Hours	Percentage
Hours small group	30,0	24.00
Hours large group	15,0	12.00
Self study	80,0	64.00

Total learning time: 125 h

CONTENTS

title english

Description:

Basic principles. Physics of sound. Characterization. Physical units. Physiology of sound: Weber-Fechner physiological perceptive system. Ear audiogram. Practical units: dB, dBA, dB SPL, dB PWL, NC.

Psychology of sound: sound's concept. Psychological comfort. Sound evaluation: Typical levels of audible pressure. Sound masking and critic bands. Spatial behaviour. Distribution: reflection, transmission, propagation, absorption, resonance, etc.

Diffusion: poly cylindrical diffusers, QRD, MLS. Edge behaviour: acoustic barrier diffraction. Isolation of aerial or impact sound (mass law, R, D, coincidence effect). Sound protection systems. Open enclosures: Outdoor spaces: squares, streets and patios.

Indoor enclosures: Rooms, shape and geometry of sound. Acoustic phenomena in the enclosures. Modelling: geometrical acoustics, statistical acoustics, undulatory acoustics. General systems of indoor acoustic conditioning. Natural means: Systems of controlled reflection. Geometrical systems and volume changes. Room response control. Artificial means: electro acoustic systems. Amplifiers and players. Room acoustic design. Computer programs: simulation and correcting means.

Specific objectives:

In this course, relations between architecture and sound will be covered, considering the latter as an element of the design of interior and exterior spaces in buildings, both from an energetic understanding and from the point of view of the requirements of the sonorous space. The objective is to establish the acoustic characteristics of architecture in relation to the design of buildings, urban and natural landscapes using the necessary acoustic tools.

Full-or-part-time: 125h

Theory classes: 15h

Laboratory classes: 30h

Self study : 80h

GRADING SYSTEM

Continuous evaluation (%) Final evaluation (%)

SE04 Testing and reporting of experimental work 30

SE09 Individual practical exercises 70

Continuous evaluation throughout the entire course by means of successive evaluation acts:

Field work, in a team (30%)

Individual work proposition (constructive solutions), tutored and assisted (70%)

Continuous telematic evaluation

In online teaching situations, continuous assessment will be carried out synchronously and asynchronously by the means established by the University and the School, with a periodic record of academic activity through submissions, forums, questionnaires or any other means facilitated by the Atenea platform, or the alternatives provided to the teaching staff. In the situations in which this telematic teaching is a product of face-to-face teaching that has already begun, or for questions of extra-academic order, the changes in the weightings or regular control systems of the teaching will be communicated in detail to all students by the Athena of each subject.

Telematic final evaluation

If the continuous telematic evaluation is not positive, a second evaluation can be carried out, which will consist of a final test of a global nature in telematic format that will be established in accordance with the criteria of the professor responsible and the media and ICTs provided by the University or School.

The measures for adaptation to non-classroom teaching will be implemented in accordance with the criteria of ICT security and personal data protection to ensure compliance with the legislation on Personal Data Protection (RGPD and LOPDGDD)

BIBLIOGRAPHY

Basic:

- Sabine, Paul E. Acoustics and Architecture. New York: McGraw-Hill Book Company, 1932.
- Isalgué Buxeda, Antoni. Física de la Llum i el So. Barcelona: Edicions UPC, 1995. ISBN 8476535449.
- Beckers, Benoit. Nociones de Acústica Técnica [on line]. 2002. Available on: www.heliodon.net.
- Llinares Galiana, Jaime; Llopis Regna, Ana. Acústica Arquitectónica. Servicio de Publicaciones de la Universidad Politécnica de Valencia, 1987. ISBN 8477210330.
- Cingolani, Sergio. Acustica musicale e architettura. Torino: UTED Libreria, 2005. ISBN 8877509414.
- Carrión Isbert, Antoni. Diseño acústico de espacios arquitectónicos [on line]. Barcelona: Edicions UPC, 1998 [Consultation: 05/05/2020]. Available on: <http://hdl.handle.net/2099.3/36341>. ISBN 8483012529.
- Egan, David M. Architectural acoustics. New York: McGraw Hill, 1988. ISBN 0070191115.
- Beranek, Leo L. Music, Acoustics and Architecture. London: Wiley & Sons, 1962.

Complementary:

- Lord, Peter; Templeton, Duncan. The Architecture of Sound. Designing Places of Assembly. London: The Architectural Press, 1986. ISBN 0851397263.
- Pierce, John R.. Los Sonidos de la Música. 1985: Prensa Científica, Barcelona, ISBN 8475930093.
- Bianchi, Francesco; Carratú, Robreto. L'Acustica in Architettura. Novara: De Agostini Scuola, 2007.
- Cavanaugh, William; Wilkes, Joseph A.. Architectural acoustics: principle and practice. New York: Wiley & Sons, 1998. ISBN 0471306827.
- Colina Tejada, Carlos.; Moreno Arranz, Antonio. Acústica de la edificación. 5ª ed.. Madrid: Fundación Escuela de la Edificación, 2005. ISBN 8486957982.
- Querol, J.M. Manual de mesurament i avaluació del soroll. Barcelona: Generalitat de Catalunya. Departament de Medi ambient, 1994. ISBN 8439332351.
- Spagnolo, Renato. Manuale di acustica applicata. Torino: UTED Libreria, 2004. ISBN 8877507101.