Course guide
320120 - A2 - Acoustics II

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering.

Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Jordi Romeu

Others: Romeu Garbi, Jordi
Clot Razquin, Arnau

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE24-ESAUD. Ability to carry out acoustic engineering projects on: acoustic insulation and conditioning of premises; public address systems; specification, analysis, and selection of electroacoustic transducers; noise and vibration measurement, analysis, and control systems; environmental acoustics; underwater acoustics systems. (Specific Technology Module: Sound and Image)

Transversal:
CT04 N3. Teamwork - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

TEACHING METHODOLOGY

Guided learning hours consist, on the one hand, of theory classes (large groups) in which a lecturer briefly presents the general learning objectives corresponding to the basic subject concepts. Students are encouraged to actively participate in their own learning through practical exercises. Support material in the form of a detailed syllabus will be used via ATENEA: learning objectives according to content, concepts, examples, programmed evaluation and guided learning activities and reading lists. On the other hand, guided learning hours also consist of problem-solving classes (medium-sized groups). Students will generally work in teams of three or five members to complete numerical exercises or solve problems related to the specific learning objectives corresponding to subject content. Generic competencies such as teamwork will be incorporated into these tasks. The last type of guided learning hours consists of laboratory practicals as pairwork, aimed at developing basic instrumental skills in the field of acoustic engineering. Tasks forming the basis for the guided activities will be assigned before and after each session, to be completed by individuals or groups outside the classroom. The lecturer may assign other independent learning exercises such as guided reading or the resolution of proposed problems.

LEARNING OBJECTIVES OF THE SUBJECT

On completing this subject, students will be able to:

· Calculate the frequency response of an elastic system.
· Calculate and select a vibration isolation system.
· Select appropriate noise control technology for each case.
· Diagnose ambient noise.
· Use the basic equipment available in an acoustic laboratory.

STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours small group	15,0	10.00
Hours large group	45,0	30.00

Total learning time: 150 h

CONTENTS

Environmental acoustics

Description:
1.1. Overview of basic concepts
1.2. Normative
1.3. Noise measurement
1.4. Environmental noise assessmen

Related activities:
Problem-based lectures
Activity 1. Problem-solving
Activity 2: Directed assignment.
Activity 4: End-of-semester test.

Full-or-part-time: 42h
Theory classes: 18h
Laboratory classes: 9h
Self study : 15h

TOPIC 4: Acoustic insulation

Description:
2.1. Enclosed sound fields
2.2. Simple wall
2.3. Flanking transmission
2.4. Frequency dependence
2.5. Double wall

Related activities:
Problem-based lectures
Activity 1. Problem-solving
Activity 2: Laboratory practical: Sound power and directivity/intensity measurement.
Activity 4: Mid-semester test

Full-or-part-time: 26h
Theory classes: 9h
Laboratory classes: 2h
Self study : 15h

TOPIC 1: Theory of vibration

Description:
1.1. One-degree-of-freedom vibrations with and without damping.
1.2. Forced vibration.
1.3. Two-degrees-of-freedom vibrations.
1.4. N-degrees-of-freedom vibrations in continuous media.

Related activities:
Problem-based lectures
Activity 1. Problem-solving
Activity 2: Mass-spring-damper system. Beam/plate.
Activity 4: Mid-semester test

Full-or-part-time: 26h
Theory classes: 9h
Laboratory classes: 2h
Self study : 15h

TOPIC 2: Vibration isolation

Description:
2.1. Free response
2.2. Forced response
2.3. Vibration isolation

Related activities:
Problem-based lectures
Activity 1. Problem-solving
Activity 2: Laboratory practical: vibration isolation.
Activity 4: Mid-semester test

Full-or-part-time: 26h
Theory classes: 9h
Laboratory classes: 2h
Self study : 15h

Structural noise transmission

Description:
4.1. Vibration of solids
4.2. Sound radiation
4.3. Sstructural noise transmission

Related activities:
Problem-based lectures
Activity 1. Problem-solving
Activity 2: Laboratory practical: Sound power and directivity/intensity measurement.
Activity 4: Mid-semester test

Full-or-part-time: 1h
Theory classes: 1h

GRADING SYSTEM

Nfinal = 0,5 Act4 + 0,2 Act2+ 0,1 Act1 + 0.2 Act3

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

EXAMINATION RULES.

· If a student fails to complete any of the laboratory or continuous-assessment activities, he/she will receive no points for that activity.
· Access to laboratory sessions will be closed five minutes after the scheduled starting time.
· Individual marks will reflect attitude and participation in activities 1, 2 and 3.
· Students will be expected to have passed Acoustic I.

BIBLIOGRAPHY

Basic:
- Bies, David A.; Hansen, Colin H. Engineering noise control: theory and practice [on line]. 4th ed. London: Spon, 2009 [Consultation: 03/05/2022]. Available on: https://www-taylorfrancis-com.recursos.biblioteca.upc.edu/books/mono/10.1201/9781351228152/engineering-noise-control-david-bies-colin-hansen-carl-howard. ISBN 9780415487061.
- Vér, István L.; Beranek, Leo L. Noise and vibration control engineering: principles and applications. 2nd ed. New York: John Wiley & Sons, cop. 2006. ISBN 9780471449423.