Acoustical instrumentation and noise control

Academic Year: (2022 / 2023) **Review date: 16-05-2022**

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: AZPICUETA RUIZ, LUIS ANTONIO

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Physics, Electromagnetic Fields and Electroacoustic Systems and Sound Reinforment

OBJECTIVES

The students will acquire a deep knowledge of the instrumentation used in acoustic measurements. The students will learn about the different types of noises and be able to deal with current regulations concerning acoustic noise. Additionally, they will acquire abilities regarding the different methods of acoustic noise control, both active and passive.

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Noise types. Airborne noise. Impact noise. Vibrations.

2.- Noise measurement parameters. Current regulations.

3.- Noise control techniques. Passive techniques. Acoustic isolation. Acoustic filters. Acoustic silencers. Acoustic barriers.

4.- Active noise control. Design criteria.

5.- Acoustical instrumentation. Sensors. Measurement microphones.

6.- Sound sources: power and omni-directionality criteria. Tapping machine.

7.- Sound level meters and acoustic analyzers.

LEARNING ACTIVITIES AND METHODOLOGY

Two teaching activities are proposed: theoretical classes and guided projects.

THEORETICAL CLASSES
The theoretical class will be given in the blackboard, with slides or by any other means to illustrate the concepts of the lectures. In these classes the explanation will be completed with examples of technical specs for acoustic instrumentation and references to current regulations.

In these sessions the student will acquire the basic concepts of the course. The students will have to work on the explained concepts, working out and solving the proposed assignments in order to consolidate the concepts of the course.

GUIDED PROJECTS
The students, working in small groups, will carry out a guided project consisting of a realistic simulation of a noise control system. To this end, the students will have to study the specific problematics, assess different solutions, and describe the chosen one. The students will be given a detailed guide and some specific tutoring.

LABORATORY EXERCICES
Laboratory exercices aims to familarize the student with acoustic measurements employing proffesional instruments. In this way, the students will consolidate the theoretical concepts and learn a metodology to develop different kinds of acoustic measurements.

ASSESSMENT SYSTEM

The final grade will be a weighted sum of partial grades coming from: the guided project (10 %) (including report (g) and oral presentation (g)), reports of the lab exercices (30 %) and a final written exam (60 %).

Final written exam is required in order to obtain final score. A minimum grade in this final exam is required (4.0/10).

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- Harris, C.M. Manual de Medias Acústicas y Control de Ruido, McGraw-Hill, 1996.

- Wilson, C. E. Noise Control, Harper & Row, Publishers, 1989.

ADDITIONAL BIBLIOGRAPHY

- BERANEK, L. E Noise and Vibration Control Engineering: Principles and Applications, New York: John Wiley & Sons. 1992.