

Academic Year: ( 2019 / 2020 )

Review date: 07-05-2020

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: AZPICUETA RUIZ, LUIS ANTONIO

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Physics, Linear Systems and Electromagnetic Fields

**OBJECTIVES**

The students will understand the analogies among acoustic, mechanical and electric systems. Likewise, they will be able to understand, assess and address the design of different transducers (mainly microphones and loudspeakers), and, consequently, they will learn about the importance of these transducers in the professional audiovisual systems. They will learn the principles of room acoustics to be able (with the required electroacoustics devices) to design a basic sound reinforcement system.

**DESCRIPTION OF CONTENTS: PROGRAMME**

- 1.- Electro-mechanical-acoustical analogies.
- 2.- Physical fundamentals of transducers. Classification.
- 3.- Microphones. Characteristics. Types. Design parameters.
- 4.- Loudspeakers and acoustic enclosures. Types of loudspeakers. Design of acoustic enclosures. Thiele-Small parameters.
- 5.- Multiple-driver speaker systems. Bass-Reflex systems.
- 6.- Principles of room acoustics: statistical theory, geometric theory, theory of sound and psychoacoustics.
- 7.- Microphones and loudspeakers interaction with the remaining equipment of an electroacoustic system. Sonorization.

**LEARNING ACTIVITIES AND METHODOLOGY**

Four teaching activities are proposed: theoretical classes, class exercises, and lab exercises.

**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.

In these sessions the student will acquire the basic concepts of the course. It is important to highlight that these classes will require the initiative and the personal and group involvement of the students (there will be concepts that the students themselves should develop). (PO a, e, g)

**CLASS EXERCISES**

Before the exercise class, the student will have available the exercise formulation. In this type of classes, the students will be encouraged to form work groups so that they actively participate in the problem solving task. (PO a, e, g)

These class exercises help the students assimilate the concepts explained during the theoretical class in a variety of cases, and, furthermore, auto-assess their knowledge.

**GUIDED PROJECTS**

The students, working in small groups, will carry out guided projects on specific and more advanced subjects in the field of acoustics. To this end, the students will be given a detailed guide and some specific tutoring. ( PO d, g)

#### LABORATORY EXERCISES

A methodology aiming to measure loudspeaker and microphone characteristics using several techniques will be developed through the lab exercises. Additionally, some basic notions of sound reinforcement design will be given. In this way, the students will consolidate the theoretical concepts and learn to use both instrumentation for electroacoustic equipment characterization. (PO b,c,d,e,g,k)

#### ASSESSMENT SYSTEM

The final grade will be a weighted sum of partial grades coming from: a final written exam (60%) ( PO a, b, e, g, k), group exercises (12%) ( PO e, g), lab exercises reports (16%) ( PO b, c, d, e, g, k), and individual test about group exercise and lab exercises (12%).

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

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

#### BASIC BIBLIOGRAPHY

- Pueo Ortega, Basilio y Roma Romero, Miguel. Electroacústica: altavoces y micrófonos., Madrid: Pearson Education, , 2003.

#### ADDITIONAL BIBLIOGRAPHY

- Glen Ballou Handbook for Sound Engineers, Focal Press, 2002
- W. Marshall, Jr. Leach Introduction to Electroacoustics and Audio Amplifier Design, Kendall/Hunt Publishing Company, 2003