

Academic Year: ( 2022 / 2023 )

Review date: 08-04-2022

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: GONZALEZ SERRANO, FRANCISCO JAVIER

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

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

Communication Theory (2nd course, 1st. semester)

**OBJECTIVES**

The student will acquire knowledge about the principles of contemporary telecommunication systems. With an integrating and systemic character, the student acquires the ability to analyze and design complete telecommunication systems according to the fundamental quality parameters and requirements. He/She will also be able to evaluate the pros and cons of different technological alternatives.

The student will learn the fundamentals of digital communication techniques (linear, non linear, multicarrier and spread spectrum) and basic error correction techniques in digital communications.

Also, the student will be capable of communicating efficiently in written and oral form, the procedure followed to solve problems of design of mobile communication systems.

**DESCRIPTION OF CONTENTS: PROGRAMME****Part I**

1. Introduction to telecommunication systems and digital communications: classification, basic concepts of networks, systems and services, regulation.
2. Linear modulation techniques: low-pass and band-pass PAM; bandwidth and noise analysis.
3. Phase and frequency modulation techniques: phase non linear modulation; frequency and continuous phase modulation.
4. Multipulse modulation: multicarrier modulation; spread spectrum modulation; bandwidth and noise analysis.

**Part II**

5. Error correction techniques. block codes; convolutional and trellis coding modulation (TCM).
6. Fixed communication systems: HFC networks, xDSL, PON.
7. Radio communication systems: terrestrial radiolinks, mobile communications, WLAN, Satellite Communications Systems.
8. Broadcasting Systems: DVB standards.

**LEARNING ACTIVITIES AND METHODOLOGY**

Two types of learning activities will be used: theory lectures and practical exercises with and use cases.

ECTS credits include the work to be carried out by the student either personally or in groups.

**THEORY LECTURES (4ECTS)**

Theory lectures are taught using the blackboard or other audiovisual media in order to illustrate some concepts.

In these sessions the theoretical concepts will be illustrated with practical exercises.

In these lectures the student will acquire the basic knowledge of the course. It is important to highlight that these sessions will require the initiative and participation from the student (some concepts will have to be studied personally with some indications, particular cases will have to be developed, ¿)

These lectures will be given following the online synchronous mode.

**STUDY CASES (2 ECTS)**

In order for the student to acquire an integrated and systemic view of telecommunication systems,

He/She will practice deeper, through personal work, in specific telecommunication systems. In these study cases the student will have to use the knowledge acquired in previous subjects, of a more specific character, about the different techniques and technologies that are applicable to telecommunication systems.

In order to guarantee and protect the health of students and teachers, these classes will not be held in closed and/or poorly ventilated spaces. Consequently, it is very likely that classes will be given following the synchronous online teaching mode.

#### ASSESSMENT SYSTEM

The evaluation is carried out through:

- Continuous assessment. 50%
  - \* Partial exams at the end of each part. 2 x 20%
  - \* Laboratory practices: 10%
- Final Exam: 50%

The final grade is obtained as a weighted sum of the final exam score (50%) and continuous assessment (50%).

Those students who have passed (grade > 5.0) the two partial exams and the laboratory practices, may transform the grade of the continuous assessment into the final one.

<b>% end-of-term-examination:</b>	50
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	50

#### BASIC BIBLIOGRAPHY

- Annabel Dodd The Essential Guide to Telecommunications (5th Edition), Prentice Hall; 5 edition , 2012
- Freeman, Roger L. Telecommunication system engineering 4th ed. , John Wiley & Sons, ISBN: 978-0-471-45133-4, 2004
- Freeman, Roger L. Radio System Design for Telecommunication, Wiley-IEEE Press; 3 edition (April 20, 2007), 2007