

Academic Year: ( 2021 / 2022 )

Review date: 09-06-2021

Department assigned to the subject: Department of Signal and Communications Theory

Coordinating teacher: GARCIA ARMADA, ANA

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

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

No requirements.

**OBJECTIVES**

The student should acquire the following abilities:

- Have acquired and understand the knowledge to have a basis or opportunity to be original in the design or application of ideas, often in a research context.
- Capability to mathematically model, compute and simulate in tecnolgy centers and enterprise engineering, particularly in research tasks, development and innovation in all fields related to telecommunication engineering and afine disciplines.
- Capability to develop radiocommunication systems: design of antennas, subsystems and equipment, channel modeling, link budget and planning.
- Capability to implement cable, fiber optics, radio and fixed and mobile service satellite systems.
- Capability to design and dimension transport networks, broadcasting and distribution of multimedia signals.
- Capability to design radionavigatio, positioning and radar systems.

At the end of the course the student will be able to:

- analyze, simulate and design radiocommunication systems using channel modeling techniques, link budget and planning.
- take design decisions to implement cable, fiber optics, radio and satellite systems, the latter both in fixd and mobile environments, including radionavigation and multimedia broadcasting.

Link to document

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Basic concepts for the design of communication systems.
  - 1.1 Traffic concepts
  - 1-2 Quality of service and availability
  - 1.3 Multiplexing
  - 1.4 Elements of a communication system: atenuation, noise and link budget
2. Channel modeling.
  - 2.1 Large and small scale models
  - 2.2 Examples for cable and radio channels
3. Simulation of communication systems.
  - 3.1 Basic concepts
  - 3.2 Simulation of communication channels and systems
  - 3.3 Parameter estimation
4. Wireline communication systems.
  - 4.1 Optical fiber
  - 4.2 ADSL
  - 4.3 PLC
5. Wireless communication systems.
  - 5.1 WPAN, WLAN and WMAN
  - 5.2 Cellular systems
6. Satelite communication systems.
  - 6.1 Fixed service
  - 6.2 Mobile service
  - 6.3 Positioning
7. Multimedia broadcast systems.
  - 7.1 DVB standards

7.2 Interactivity

8. Examples of communication systems design.

8.1 Examples of complex systems joining the concepts learnt in the course

#### LEARNING ACTIVITIES AND METHODOLOGY

Three types of activities:

- Theoretical lectures with examples
- Problem solving
- Laboratory practical work with simulations.

#### ASSESSMENT SYSTEM

Final exam - 60%

Continuous evaluation of student progress - 40%

The assessment of the extraordinary evaluation is based on a final exam.

**% end-of-term-examination:** 60

**% of continuous assessment (assignments, laboratory, practicals...):** 40

#### BASIC BIBLIOGRAPHY

- Jeruchim et al Simulation of Communication Systems, Plenum, Plenum, 1984
- R L Freeman Telecommunication System Engineering, John Wiley & Sons, 1989
- R L Freeman Telecommunication Transmission Handbook, John Wiley & Sons, 1991
- T S Rappaport Wireless Communications, Prentice Hall, 1996

#### ADDITIONAL BIBLIOGRAPHY

- Lee, B. G Broadband telecommunications technology, Artech House, 1996
- Saadawi, T. N Fundamentals of telecommunication networks, John Wiley & Sons, 1994