

Academic Year: ( 2023 / 2024 )

Review date: 27-04-2023

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: GARCIA ARMADA, ANA

Type: Electives ECTS Credits : 3.0

Year : Semester :

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

Digital Communications  
Telecommunication Systems

**OBJECTIVES**

The student will acquire knowledge about the principles of contemporary and future mobile communication systems. He/She will learn about the architectures, the main elements and how to design and plan this type of systems. The student will acquire the ability to analyze and design mobile communication 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. 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**

- 1.- Origin and evolution of mobile communication systems; generations of mobile communications and adaptation to the service requirements. Modeling the channel: elements that configure the propagation channel. Channel models and link budget. Elements of traffic: models for blocked and waiting calls. Traffic intensity and system dimensioning. The cellular concept.
- 2.- GSM system: components, design and planning.
- 3.- 2.5G systems: principles, architecture and components.
- 4.- UMTS system: WCDMA, architecture and components.
- 5.- LTE and 5G systems.

**LEARNING ACTIVITIES AND METHODOLOGY**

Two types of learning activities will be used: theory lectures and problems.  
ECTS credits include the work to be carried out by the student either personally or in groups.

**THEORY LECTURES (2 ECTS)**

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, ...)

(PO a, c, e, j, k)

**PROBLEMS (1 ECTS)**

The students will be given the problems to be solved in advance.

The resolution of problems will allow the student to acquire the concepts taught in the theory lectures in a more applied context

and to self-evaluate his/her acquired knowledge.

(PO a, c, e, g, j, k)

**MOBILE COMMUNICATIONS LABORATORY VISIT:**

Students will visit the mobile communications laboratory at the University where they will see advanced mobile communications equipments and they will be able to carry out measurements on real mobile

systems.

#### ASSESSMENT SYSTEM

Assessment includes:

- Problem solving. (PO a, c, e, g, j, k)
- Final exam. (PO a, c, e, g, j, k)

The final mark is obtained as a weighted sum of the marks of the final exam and the problems.

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

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

#### BASIC BIBLIOGRAPHY

- Andrea Goldsmith Wireless communications, Cambridge University Press, 2005
- David Tse y Pramod Viswanath Fundamentals of wireless communication, Cambridge University Press, 2005
- Harri Holma WCDMA for UMTS : radio access for third generation mobile communications, Wiley, 2002
- Michele Mouly y Marie-Bernadette Pautet The GSM system for mobile communications, Telecom Publishing, 1992
- Theodore Rappaport Wireless communications : principles and practice, Wiley, 2002