

Academic Year: (2023 / 2024)

Review date: 30-03-2023

Department assigned to the subject: Telematic Engineering Department

Coordinating teacher: OLIVA DELGADO, ANTONIO DE LA

Type: Electives ECTS Credits : 3.0

Year : Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Communications Networks and Services

OBJECTIVES

This course describes the principles of Networks with wireless access technologies, and the implications that the special features that this type of access (for example, mobility of users) have in the provision of audiovisual services. The traditional cellular communication networks (GSM) and their evolution (GPRS and UMTS), and the paradigms coming from the evolution of data networks (IEEE 802, Internet) to support mobility, will be analysed. To achieve this objective, the student must acquire specific knowledge and capacities. To achieve this goal, the student must acquire the following program outcomes: a, b and k.

Regarding KNOWLEDGE (PO j), at the end of the course the student will be able to:

- Understand the specific characteristics of the wireless access, the requirements that this access imposes in the design of services and the networks to support them, the impact of mobility, and the different trends in the networks and services that involve this type of technologies.
 - Understand the standards IEEE 802.11, including aspects related to QoS and its use to support audiovisual services.
 - Understand the UMTS system and its evolution: standardization process, architecture, protocols, and service provisioning.
 - Understand the IP Multimedia sub-system in UMTS, audiovisual services in UMTS, mobile TV.
- Regarding specific CAPACITIES, at the end of the course the student should be able to:
- Work with the main technologies in the field of mobile communication networks (PO j).
 - Design and configure mobility solutions in IP networks to support audiovisual services to a group of mobile users (POs a, k).
 - Configure equipment based on IEEE 802.11 technologies, understanding advanced configuration options (POs b, k).
 - Design and configure a wireless access solution to provide audiovisual services, supporting mobile users in a network (PO b).
 - Design cellular communications networks architectures (POs a).
 - Design the provision of audiovisual services in cellular communications Networks, in particular UMTS (POs a).

The following SKILLS will be developed in the course:

- A global view of the problem of the provision of audiovisual services in networks with mobility and wireless access (POs a, k).
- Skills to work in teams to achieve certain designs and configurations (POs b).
- Skills to access and understand technical bibliography both in English and Spanish.
- Contact with widespread technologies used in the business and operator world (PO j).
- Skills to access the required information so as to know the details of a certain configuration.

DESCRIPTION OF CONTENTS: PROGRAMME

This is a wireless and mobile communications course, which covers and analyzes the implications that the particular characteristics of these types of networks have on the different protocols used in the networks and on the service provisioning.

The program is divided into 3 parts:

-FIRST PART: The concept of wireless networks is introduced. The different ways in which this functionality has been introduced into the communication networks are reviewed.

-SECOND PART: Advanced aspects of the IEEE 802.11 standards family. Technology independent

handover control: IEEE 802.21. Other wireless Access technologies: IEEE 802.16, IEEE 802.15, etc. Characteristics and configuration for the support of audiovisual services (with special attention to IEEE 802.11e).

-THIRD PART: Cellular mobile communication networks and their evolution: GSM, GPRS, UMTS, EPS; architecture, protocols and service provisioning (IMS).

LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology includes:

- Theoretical classes. Students will be provided with the learning objectives to be covered in which lecture and the specific material to prepare it (prior to the actual class). In these classes, the concepts related to the learning objectives are revised and, with the participation of the students, the acquired knowledge will be checked and strengthened interactively (POs a, j).
- Laboratory classes in computer rooms, where students will configure wireless communication nodes with mobility support, and end devices, as well as elements to provide audiovisual services (including the provision and development of IMS services). Using traffic supervision tools, students will also analyze the proper operation of the protocols (POs b, k).
- Exercise solving by the students, which will help them to auto-assess their level of knowledge and acquire the necessary abilities (POs e, k).
- In-class solution comparison and joint correction to the exercises, which should help to strengthen knowledge and develop the ability of analyze and communicate the information that is relevant in order to solve problems (POs b, k).

ASSESSMENT SYSTEM

The evaluation is 100% continuous assessment in the first evaluation, following the existing University regulation in the second evaluation. The mark of the continuous assessment work is composed of three parts:

- o Deliverables (questions, study cases, specific works assigned by the lecturers, and can also involve discussion with the students): 25% of the final mark [Evaluates POs a, j, k].
- o Laboratory results: 35%
- o Knowledge tests: 45%

% end-of-term-examination:	0
% of continuous assessment (assignments, laboratory, practicals...):	100

BASIC BIBLIOGRAPHY

- CAMARILLO, G. y GARCÍA-MARTÍN, M. A. The 3G IP multimedia subsystems: merging the Internet and the cellular worlds, 2nd ed. John Wiley, 2006.
- CAMARILLO, G. y GARCÍA-MARTÍN, M. A. The 3G IP multimedia subsystems: merging the Internet and the cellular worlds, 2nd ed. John Wiley, 2006.
- GAST, M. 802.11 Wireless Networks: The Definitive Guide, O'Reilly Media; 2 edition, 2005.
- KAARANEN, H. UMTS networks: architecture, mobility and services, John Wiley & Sons, 2005.
- KAPPLER, CORNELIA UMTS networks and beyond, John Wiley & Sons.