

30387 - Mobile communications networks

Syllabus Information

Academic year: 2024/25

Subject: 30387 - Mobile communications networks

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 581 - Bachelor's Degree in Telecommunications Technology and Services Engineering

ECTS: 6.0

Year: 4

Semester: First semester

Subject type: Optional

Module:

1. General information

The general objective of this subject is that the student learns the principles of operation of the main technologies on which mobile networks are based and, taking into account aspects such as coverage area, the services provided, the number of users, the mode of operation, etc., understand the methodology for sizing and planning mobile networks and be able to apply it to network deployments in realistic scenarios.

2. Learning results

Know and use the concept of mobile network, differentiate and know the access network and the network core, and classify mobile networks according to switching techniques, geographical scope, mode of operation and services provided.

Understand and describe the architectures of mobile networks, know the network elements and their corresponding functions, as well as the relationships between them.

Know and understand the fundamental characteristics of the main mobile communications systems in service and the evolutionary trends in wide area, metropolitan, local and personal areas, as well as the services provided.

Understand the regulatory needs derived from the use of the radio spectrum and know the implications of the use of free and licensed bands.

Know the different procedures for radio resource management, mobility management, connection management and security in mobile networks.

Understand the concepts of coverage, capacity and quality of service and the relationships between them, know the tools and procedures necessary for planning cellular networks of different access technologies and know how to dimension the access network in terms of radio resources.

Know how to address all the implications of technical installation, infrastructure deployment, economic profitability and customer acquisition in the new business models supported by mobile networks.

Correctly pose the problem from the proposed statement and identifies the options for its resolution. Apply the appropriate solving method and identify the correctness of the solution.

To develop a critical spirit before the proposed solutions and the ability to select the best technological option, justifying the selection based on technical, economic and usability parameters.

3. Syllabus

Block 0. Introduction.

Presentation of the subject. Review of general concepts. Introduction and justification of mobile networks.

Implications of mobility.

Block 1. Fundamentals of mobile communications systems

Cellular networks. General functions. Mobile network architecture: Access networks and network core. Spectrum, standardization and regulation. Mobile radio access: principles of evolution and expansion. Mobile network architecture. Technologies, services and applications.

Block 2. Second and third generation mobile networks

GSM and GPRS networks: Structure of the radio interface. Definition and organization of physical and logical channels. Implementation of network functions on the radio interface. Operating principles of CDMA-based mobile networks. Dimensioning of third generation mobile networks based on CDMA. Access and backbone network. Third generation mobile third generation: UMTS, HSDPA/HSUPA: Structure of the radio interface. Definition and organization of physical, transport and logical channels.

Implementation of network functions on the radio interface.

Block 3. Fourth generation mobile networks.

Radio interface of fourth generation mobile communications systems. Dimensioning of fourth generation mobile networks.

Block 4. Wireless Local Area Networks (WLAN).

Physical and MAC layers of wireless local area networks. 802.11x standards.

4. Academic activities

Lectures (45 hours). Presentation by the teacher of the main contents of the subject.

Problems and case studies (12 hours). Resolution of problems and practical cases proposed by the teacher.

Supervised practical work (30 hours).

External visit (3 hours). A visit will be made to TELTRONIC.S.A.U., a manufacturer of mobile communications equipment for the professional market.

5. Assessment system

The student will be able to pass the subject through continuous assessment. This will consist of class attendance, the completion and delivery of tutored work and the completion of two evaluation tests.

The tutored assignments represent 20% of the final grade.

Each of the two assessment tests will represent 40% of the final grade.

In order to pass the subject by continuous assessment it is necessary that the class attendance is not below 80%, that the grade of the tutored work is higher than 5 points out of 10, that the average grade of the two written evaluation tests is also higher than 5 points out of 10 and that the grade is higher than 4.5 points out of 10 in each and every one of these two tests. In addition, minimum grades may be established in each test by thematic blocks.

The student who has not passed the subject by the continuous assessment system is entitled to a global test in each of the calls for exams established throughout the academic year. The grade for this test will be obtained as follows:

E1: Final exam (80-100%). Scoring from 0 to 10 points. The grade of this test may represent 80% of the final grade when a grade equal to or higher than 5 is obtained in the evaluation of the tutored work. Otherwise, it represents 100% of the grade.

E2: Supervised work (20%), with a score from 0 to 10 points. The tutored work to be carried out by each student during the academic year will be evaluated through the reports presented by the students and the follow-up sessions in which the student will orally present the work done and will answer the questions posed.

The grade of these tests will represent 20% of the final grade. For students who do not achieve a grade of 5 points in E2, the final exam will represent 100% of the final grade.

To pass the subject a minimum score of 5 points out of 10 in E1 is required if it represents 100% of the grade. When it represents 80%, a minimum score of 4.5 points in E1 and 5 points in E2 will be required. In this in this case, the final score will be the maximum between (80% E1+20% E2, 100% E1). This final score must be higher than 5 to pass the subject.

6. Sustainable Development Goals

- 9 - Industry, Innovation and Infrastructure
- 11 - Sustainable Cities and Communities
- 12 - Responsible Production and Consumption