Universidad Zaragoza

Academic Year: 2025/26

61074 - Heterogeneous networks

Teaching Plan Information

Academic year: 2025/26
Subject: 61074 - Heterogeneous networks
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 658 - Master in Telecommunications Engineering
Ambit: Electrical engineering, electronic engineering and telecommunications engineering
Tipo de enseñanza: Presencial
ECTS: 6.0
Year: 1
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

The general objective of this subject is that the student learns about the technologies on which the new mobile/wireless communications systems are based, with emphasis on heterogeneous mono and multi-technology network deployment configurations. Specifically, to know the basics of communication protocols and basic procedures of this type of networks, of mechanisms for the provision of mobility services, quality of service, transport and dissemination of multimedia services, and to be able to plan and dimension these networks.

2. Learning results

HA_01: Ability to project, calculate, and design products, processes, and facilities in all areas of telecommunications engineering.

HA_04: Ability for mathematical modeling, calculation, and simulation in technological centers and business engineering, particularly in research, development, and innovation tasks in all areas related to Telecommunications Engineering and related multidisciplinary fields.

HA_07: Ability to implement, direct, and manage manufacturing processes for electronic and telecommunications equipment, ensuring the safety of people and property, the final quality of products, and their certification.

HA_13: Ability to design and size networks for the transport, dissemination, and distribution of multimedia signals.

HA_15: Ability to model, design, implement, manage, operate, administer, and maintain networks, services, and content.

HA_16: Ability to plan, make decisions, and package networks, services, and applications considering service quality, direct and operational costs, implementation plan, supervision, security procedures, scaling, and maintenance, as well as to manage and ensure quality in the development process.

HA_18: Ability to solve the convergence, interoperability, and design of heterogeneous networks with local, access, and backbone networks, as well as the integration of telephony, data, television, and interactive services.

CP_06: Lifelong self-learning.

CP_07: Ability to communicate (both orally and in writing) the conclusions, and the knowledge and rationale behind them, to specialized and non-specialized audiences clearly and unambiguously.

3. Syllabus

Block 0. Introduction. Overview of the mobile and wireless communications sector. Mobile radio access: principles of evolution and expansion.

Block 1. 4G mobile networks. Operator mobile network architecture models. Functional elements, interfaces and protocols. Basic procedures. Carrier management, sessions, mobility, multicast service provision. Radio interface and associated procedures. Quality of service, radio resource management and radio spectrum.

Block 2. Evolution of mobile networks and adaptations to new service contexts. 5G evolution. New scenarios of integration, interoperation and coexistence of wireless heterogeneous networks. Deployments for IoT solutions.

4. Academic activities

Master class. Presentation by the teacher of the main contents of the subject. 46 hours.

Problem solving and practical cases proposed by the teacher, with student participation. 14 hours

5. Assessment system

It consists of the following evaluation activities:

Students will solve practical cases by applying the techniques and procedures seen in the theoretical and problem sessions. It will account for 10% of the final grade. A 4.5 out of 10 is required to pass the subject.

Mid-term exam. There will be a written test. It can include problem solving as well as theoretical and practical questions formulated as multiple-choice tests. It represents 40% of the final grade. Passing the exam with a grade of 4.5 out of 10 will voluntarily exempt the student from taking this part of the final exam.

Final exam. It will consist of 2 parts. It can include problem solving as well as theoretical and practical questions formulated as multiple-choice tests. Part one. It assesses the contents contemplated in the mid-term exam (40%) Second part. It addresses the rest of the contents not covered in the mid-term exam. (50%). In case of not passing the tutored assignments, a group of extra questions will be included in the second part, and the whole will be assessed with 60% of the grade. A minimum of 4.5 out of 10 in each part is required to pass the subject.

The student is entitled to a global test in each of the exams established throughout the academic year

6. Sustainable Development Goals

7 - Affordable and Clean Energy
8 - Decent Work and Economic Growth
9 - Industry, Innovation and Infrastructure