30313 - Intoduction to Computer Networks

Syllabus Information

Academic year: 2024/25
Subject: 30313 - Intoduction to Computer Networks
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 330 - Complementos de formación Máster/Doctorado
          438 - Bachelor's Degree in Telecommunications Technology and Services Engineering
          581 - Bachelor's Degree in Telecommunications Technology and Services Engineering
ECTS: 6.0
Year: 581 - Bachelor's Degree in Telecommunications Technology and Services Engineering: 1
330 - Complementos de formación Máster/Doctorado: XX
438 - Bachelor's Degree in Telecommunications Technology and Services Engineering: 2

Semester: Second semester
Subject type: 581 - Compulsory
438 - Compulsory
330 - ENG/Complementos de Formación
Module:

1. General information

The purpose of this subject is to provide students with a basic knowledge of communications networks.

To this end, the basic concepts of these communications networks (architectures, protocols and services) are presented first. The most important functions associated with the physical interface and link layer between equipment and communications networks are then studied, with particular emphasis on local area networks and their most widespread technologies. To conclude,discusses wide area networks and their basic concepts.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/) and certain specific targets, such that the acquisition of the learning results of the subject will contribute to some extent to the achievement of target 8.2 of Goal 8, and targets 9.1 and 9.c of Goal 9.

2. Learning results

Classify telecommunication networks according to switching techniques, topology, geographical scope and means of transmission. Know how to differentiate between access and transport networks, circuit-switched and packet-switched networks, fixed networks and mobiles.

Understand and describe the architectures of communications protocols, as well as the functions developed by each one of its layers. Know and apply IP addressing.

Know how to explain the concepts related to the physical level layer and the need for standardization. Know the structure of a physical level standardand how to identify the most common physical interfaces and their main characteristics.

Know the main functions of the data link layer, highlighting link management, flow control, error control and framing. Know how to analyze its operation and performance.

Know the operation, characteristics and limitations of local area networks. Understand the problems and the classic solutions for access to the shared medium (reserve, contention) by analyzing the performance of the various technologies proposed, acquiring criteria for use in different scenarios.

Know the evolution of wide area networks in terms of their main characteristics and operation.

Understand the existing problems and the solutions adopted.

Know the main functions of a network layer, highlighting routing, congestion control, interconnection of networks and quality of service. Know and apply the main routing techniques.

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

Know and use in an autonomous and correct way the tools, instruments and software applications available in the laboratories and correctly perform the analysis of the collected data.

Know how to apply the concepts learned in the commercial laboratory equipment acquiring autonomy in the work and getting in touch with technologies widely used in the business world.

Develop the habit (and above all the ability) to consult the technical documentation of the manufacturers of the devices used in practice. Include manuals and product specifications.

Develop the ability to work as a team to carry out the designs and configurations considered, sharing the workload to face complex problems, exchanging information among different groups, in a coordinatedand organized way.

3. Syllabus

Thematic units

Unit 1. Introduction to communications networks.

Introduction and justification of the networks. Multiplexing, switching, routing and management. Network architectures: OSI and TCP/IP models. IP addressing.

Unit 2. Physical and link layer.

Synchronization. Physical layer interface standards. Link layer functions. LAN networks: IEEE 802.x standards.

Unit 3. Wide Area Networks.

Evolution of WAN networks. Network layer concepts and functions.

Practices

Practice 1. Analysis of OSI layers 1 and 2: point-to-point and multipoint communications.

Practice 2. Switching and routing in WAN networks.

4. Academic activities

- **Theoretical sessions and seminars (30 hours)** whose main contents are organized in 3 thematic units.
- **Problem solving sessions (10 hours)**. Resolution of problems proposed by the professor for each theoretical unit with the objective of contributing to consolidate the concepts worked in the theoretical sessions.
- **Laboratory sessions (20 hours)**, aimed at developing the techniques and procedures seen in the theoretical and problem sessions and their application in the world of Telecommunications.
- **Personalized attention to students through tutorials.**
- **Personal work of the student.**
- **Assessment tests (6 hours)**

5. Assessment system

Practice assessment (30% of the final grade, each test minimum of 4, final average minimum of 4). The completion of the laboratory practices in the sessions scheduled during the term is mandatory for all students. Given the exceptionally practical nature of this part of the subject, as well as the need to use specific laboratory material, the assessment system will be governed by the continuous assessment mode and its grade will be transferred to the corresponding call . The evaluation will consist of the resolution of a series of questions and exercises that will be presented to at the end of each practice session.

Final assessment of the subject (30% practical, 30% test with a minimum of 4 and 40% problem test with a minimum of 4. **Final average minimum of 5)**. Two tests are added to the practical assessment already indicated. The first test will consist of a multiple-choice test and a second test where a set of exercises or problems to be solvedwill be presented.

If the practical assessment has not been passed during the term, a final test associated with the practices must be taken (minimum of 4).

6. Sustainable Development Goals

8 - Decent Work and Economic Growth
9 - Industry, Innovation and Infrastructure