

Academic Year: (2024 / 2025)

Review date: 17-05-2024

Department assigned to the subject: Telematic Engineering Department

Coordinating teacher: SERRANO YAÑEZ-MINGOT, PABLO

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

This course has no specific previous requirements

OBJECTIVES

This course introduces the basic principles of communication networks and services (protocol architecture, routing, congestion control, etc.) showing by means of application to real networks. The main objective of this course is to analyse both architectural principles and the mechanisms that are required in order to exchange data between computers, work stations, servers and other data processing devices. To achieve this objective, the student must acquire specific knowledge and capacities. Regarding knowledge, at the end of the course the student will be able to:

- Understand the network concept and the different types of existing networks
- Understand the Internet network layer, IPv4: know the datagram format and the addressing model. ARP. ICMP. - Understanding the IPv6 protocol: header format and addressing.
- Understand basic address management tools, NATs and DHCP.
- Understand routing protocols and algorithms.
- Understand Internet routing protocols by means of an example: RIP.
- Understand Internet transport layer: TCP and UDP.

Regarding capacities, at the end of the course the student will be able to:

- Define the IP addressing (IPv4 and IPv6) for a certain network. Design that network architecture. Properly configure the network layer of the different hosts. Properly configure the routers to support the communication of local area networks.
- Understand routing protocols.
- Understand and configure NATs.
- Understand and analyse TCP behaviour in diverse situations, scalability, interactive traffic, congestion.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Communicating with robots. Definition and types of networks
2. Introduction to protocol stacks and terminology
3. Physical layer options
4. Link layer: medium access protocols (CSMA/CD, CSMA/CA), Ethernet protocol, VLAN, IEEE 802.11
5. Network layer: IPv4, IPv6, DHCP and NAT
6. The transport layer: TCP, UDP

LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology based on active learning will include: (1) Lectures. The course has a basic reference book (see bibliography). The student will know exactly what are the learning objectives for every class and where in the reference book can they be located. Additional questions will also be provided to test the knowledge acquired after this study. In the group classes the concepts related to the learning objectives will be reviewed interactively with students participation. The course will also propose complementary bibliography to allow students to complete and detail particular chapters. (2) Laboratory classes where students will set up router and host configurations and where network and transport layers will be analysed. (3) Guided use cases resolution in small groups to help students acquire the required skills. (4) Exercises and study case solved by students as personal work so that they will be able to auto-evaluate acquired skills. (5) Group discussion of homework that will allow to develop the skill of analysing and communicating the relevant information so as to solve problems.

ASSESSMENT SYSTEM

% end-of-term-examination:	60
% of continuous assessment (assignments, laboratory, practicals...):	40

FINAL EXAM.

Global assessment of knowledge, skills and capacities acquired throughout the course.

CONTINUOUS EVALUATION.

Assesses papers, projects, class presentations, debates, and exercises throughout the course.

BASIC BIBLIOGRAPHY

- Andrew Tanenbaum Computer Networks, Prentice Hall, 2003
- Kurose, Ross Computer Networking, Pearson Education , 2013

ADDITIONAL BIBLIOGRAPHY

- Bertsekas Data Networks, Prentice-Hall international, 1992
- Stallings Data and Computer Communications, Prentice Hall, 2001
- Stevens TCP-IP illustrated, Addison-wesley, 1996