

COMPUTER NETWORKS

Degree in Computer Systems

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Code: 10306

Main Scientific Area: Hardware, Communications and Operating Systems

Lecturer: José Paulo Fernandes Macedo

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 60h Total Workload: 100h

ECTS: 6,0

Objectives

This curricular unit aims to present the basic concepts of computer networks, including technologies, architectures and applications that provide the basis for communication devices on the Internet and design, develop and deploy network infrastructures over IPv4 and IPv6 protocols suite.

Learning Outcomes

The students who successfully conclude this curricular unit should be able to:

Get an overview of the various elements of a communications system, its function and relationship.

Understand the main kinds of telecommunication networks, with special emphasis on Ethernet local area network.

Understand the main transmission media and the main communication devices.

Understand the relationship between the OSI model, the TCP/IP architecture and key technologies for local area networks.

Explain and define the addressing spaces over IPv4 and IPv6 networks.

Develop and implement infrastructure projects in IPv4 and IPv6 networks.

Course Contents

Introduction to Networking

Type of signals

Principles of data transmission

Architecture and type of networks

Network Topologies

LAN technologies

Media Access Control

Network Components

OSI model and TCP/IP architecture

internetworking

ARP and ICMP network protocols

IPv4 protocol

IPv4 fragmentation and reassembly

IPv4 addressing, address classes and masks

NAT/PAT protocol

Subnetting CIDR and VLSM

VLANs

IP Routing

introduction and study of IPv6 protocol

Network infrastructure implementation and configuration (practical work)

Recommended Bibliography

William Stallings, Data and Computer Communications, 10th Edition, Prentice-Hall, 2013.

Andrew S. Tanenbaum David J. Wetherall, Computer Networks, 5th Edition, Prentice-Hall International Editions, 2011.

Learning and Teaching Methods

With the acquired knowledge along the course, the students will be able to have a global vision on the main elements of a data communication system, its function and inter-relationship; understand the main type of communication networks, with special focus on Ethernet technology; understand the main transmission systems and the main communication network devices, as well as to understand the relation between the OSI model and TCP/IP architecture.

What concern the TCP/IP protocols suite, the students will know explain and implement the addressing and routing over IP networks, subnetting CIDR/VLSM, NAT/PAT and Vlan. Also, they will understand and implement the main protocols present in the lower level layers of the TCP / IP architecture.

Assessment Methods

The evaluation consists on two major components: a theoretical and a practical component. The theoretical component has 60% weighting, and the practical component 40% in the final grade.

It is required to obtain a minimum score of 7.5 points in the assesement tests and 9 points in the final practical work. The practical work only can be delivered in the normal assessment period and is mandatory.

The final average must to be greater or equal than 10 points, for approval.

The weighted values are on a scale of 0 to 20 points.