POLI
ESCOLA SUPERIOR
TECNOLOGIA
GESTÃO
TÉCNICO
GUARDA

SUBJECT DESCRIPTION

MODELO

PED.013.03

Course	Computer Engineering					
Subject	**Computer Networks Engineering**					
Academic year	2023/2024	*Curricular year*	3rd	*Study period*	1st sem	
Type of subject	Compulsory	*Student workload (H)*	Total: 140	Contact: 60	*ECTS*	5
Professor(s)	Fernando Melo Rodrigues					

☒ *Area/Group Coordinator* ☐ *Head of Department*	*(select)*	**Fernando Melo Rodrigues**

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

The aim of this subject is the introduction of communications networks to students. After attending the course the student should:

O1. Know how to analyze telematics applications and their requirements, know how to classify them and know how to apply network architectures depending on each scenario;

O2. Choose the appropriate physical media of communication, and know how to install, test and manage them;

O3. Apply appropriate communication technologies depending on the type of network and requirements;

O4. Design communications networks, network management and security systems; and

O5 Configure network equipment, especially routing protocols and VLAN implementation.

2. PROGRAMME

P1. Telematics Applications

    a.   Telematics applications

    b.   Application requirements

P2. Communication Architectures

    a.   Communication protocols and services

b. Communication architectures

P3. Communication Technologies

 a. Local Network Technologies (LANs, VLANs)

 b. WAN Network Technologies

 c. Wireless network technologies (Wifi)

 d. Voice over IP (VoIP) Services

 e. Power over Ethernet (PoE)

P5. P3. Wiring systens

 a. Transmission physical media

 b. Structured cabling

 c. Installation, testing and administration

Network Management

 a. Network management functions and architectures

 b. Technologies for network management

 c. Tools - Summary presentation of some

P6. Network security

 a. Encryption and authentication

 b. Network applications and transport security: e-mail and TCP connection

 c. Network-Layer Security: IPsec and Virtual Private Networks

 d. Operational Security: Firewalls and Intrusion Detection Systems

P7. Network equipments

 a. Network interconnection equipment

b. IPv4 Unicast, Broadcast, and Multicast

c. Diagnostic and testing equipment

P8. Planning and project

a. Survey of needs/requirements

b. Planning and project

c. Graphical representation of a solution

d. Table of quantity

e. Tender specifications

f. Analysis of case studies

P9. Switching and Routing configuration

a. WANs and Routers

b. VLANs

P10. Dynamic Routing - OSPF Protocol

a. The. OSPF protocol messages

b. DR and BDR election mechanisms

c. Network Attack Mitigations

d. Configuring the OSPF protocol in a network topology

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

Contents 1, 2 are consistent with Objective 1, as they focus on the characteristics of networks, telematics applications and communication architectures. Content 3 is consistent with Objective 2, as content relating to cabling is taught. Content 4 is consistent with Objective 3, as communication technologies existing in different environments are taught. Contents 5 and 6 are consistent with Objective 4, as management and security contents are taught, and how to implement them in a project is explained. Contents 7, 8, 9, and 10 are consistent with objectives 5 and 6, as content is

taught that allows the student to be able to plan, design and supervise the implementation of a communication network.

4. MAIN BIBLIOGRAPHY

Mandatory:

B1. Engenharia de Redes - E. Monteiro, F. Boavida, FCA 11ª Edição, 2021

B2. Redes Cisco - Para Profissionais, Mário Véstias, FCA, 7ª Edição, 2016

B3. Introduction to Networks Labs and Study Guide (CCNAv7), Allan Johnson, Cisco Networking Academy, 2020

Optional / Recommended:

B4. TCP/IP – Teoria e Prática, Fernando Boavida e Mário Bernardes, FCA, 2011

B5. Computer Networking: a Top Down Approach, Pearson, 8th edition., 2020

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

Teaching methodologies:

1. Expositive lecture

2. Individual Search

3. Teamwork

4. Case studies

5. Practical demonstration

Assessment criteria:

Continuous Assessment: The student approves this subject when the weighted average of continuous assessment factors and practical component is equal to or higher than ten (max. 20). This Assessment includes:

Two practical assessments (10%): Will be a practical nature work (using network equipment's or the Cisco Packet Tracer simulator) during the semester without notice and NOT subject to be developed in another day.

A written Assessment (65% - minimum score of 7/20 points). In this assessment are formulated theoretical issues and asked to carry out practical tasks, in order to assess: scientific knowledge and the practical domain.

A Network project design (25%): Develop a structured cabling project. Presentation of the solution answering the needs and requirements. This include a descriptive note and tender specification as well drawn parts, selection of equipment and respective quantities.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

1. **Expositive lecture** is crosswise to the objectives O1, O3 and O4 due to the need for the introduction of the theoretical contents;

2. In addition, as inferred from O4 and O5, a component with a practical nature will be introduced, a **experimental demonstration** method will be adopted in the development of equipment configurations.

7. CONTACTS AND OFFICE HOURS

Office hours: Monday and Thursday 15h30 to 17h00, Office 24. Email fmr_at_ipg.pt

8. OTHERS

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DATE

18 de setembro de 2023

SIGNATURES

Professor(s), Area/Group Coordinator or Head of Department signatures

Professor

Fernando Melo Rodrigues

(signature)