

POLI ESCOLA SUPERIOR TECNOLOGIA GESTÃO TÉCNICO GUARDA	SUBJECT DESCRIPTION	MODELO PED.013.03
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<i>Course</i>	Data Science and Artificial Intelligence					
<i>Subject</i>	Computer Networks					
<i>Academic year</i>	20233/2024	<i>Curricular year</i>	2nd	<i>Study period</i>	2nd sem	
<i>Type of subject</i>	Compulsory	<i>Student workload (H)</i>	Total: 140	Contact: 60	<i>ECTS</i>	5
<i>Professor(s)</i>	Fernando Melo Rodrigues					
☒ <i>Area/Group Coordinator</i> ☐ <i>Head of Department</i>	<i>(select)</i> Fernando Melo Rodrigues					

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

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

- O1. Describe the TCP/IP model, comparing with the OSI model;
- O2. Define an IP addressing scheme for a data network using fixed and variable size of subnetting schemes;
- O3. Describe the various physical media: copper, optical and radio frequency Ethernet technology;
- O4. Compare RIP and OSPF routing protocols.
- O5. Design and configure a Network Solution using Cisco Equipment and IOS operating system

2. PROGRAMME

P1. Introduction to communications networks

- a. Networks Affect our Lives
- b. Network Components
- c. Network Representations and Topologies
- d. Common Types of Networks
- e. Internet Connections
- f. Reliable Networks

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g. New Network Trends

h. Network Security

P2. First Steps

a. Cisco IOS Access

b. IOS Commands

c. Basic Device Configuration

P3. Protocols and Models

a. Protocols e Protocols suites

b. Standards Organizations

c. Reference Models

d. Data Encapsulation

P4. Physical Layer

a. Physical Layer Characteristics

b. Copper Cabling

c. Fiber-Optic Cabling

d. Wireless Media

P5. Data Link Layer

a. Purpose of the Data Link Layer

b. Topologies

c. Data Link Frame

d. Ethernet Switching

e. Ethernet MAC Address

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- f. The MAC Address Table

P6.Network Layer

- a. Network Layer Characteristics
- b. IPv4 and IPv6Packets
- c. Introduction to Routing
- d. MAC and IP, ARP protocol

P7.IPv4 Addressing

- a. IPv4 Address Structure
- b. IPv4 Unicast, Broadcast, and Multicast
- c. Types of IPv4 Addresses
- d. Network Segmentation
- e. Subnet an IPv4 Network
- f. VLSM
- g. IPv4 Issues

P8.IPv6 Addressing

- a. IPv6 Address Representation
- b. IPv6 Address Types
- c. GUA and LLA Static Configuration
- d. Dynamic Addressing for IPv6 GUAs and LLAs
- e. IPv6 Multicast Addresses
- f. Subnet an IPv6 Network

P9.Transport Layer

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- a. Transportation of Data
- b. TCP and UDP Overview
- c. Port Numbers
- d. TCP Communication Process
- e. Reliability and Flow Control
- f. UDP Communication

P10. Application Layer

- a. Application, Presentation, and Session
- b. Peer-to-Peer
- c. Web and Email Protocols
- d. IP Addressing Services
- e. File Sharing Services

P11. Network Security Fundamentals

- a. Security Threats and Vulnerabilities
- b. Network Attacks
- c. Network Attack Mitigations
- d. Device Security

P12. Routing protocols

- a. Routing Concepts
- b. Path Determination
- c. Packet Forwarding
- d. IP Routing Table

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- e. Static and Dynamic Routing

P13.Routing protocols Characteristics

- a. RIP protocol
- b. Router Configuration
- c. Configure Initial Router Settings
- d. Configure Interfaces
- e. Configure the Default Gateway
- f. Static and Dynamic RIP Routing configuration

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The learning objectives 1 (O1) will be achieved by programmer content P1 and P2. Will review the concepts of network architecture (P1) and will present the new paradigms in order to guarantee quality of service (P2). In P3 will be presents IPv6 addresses scheme to fulfill with O2. Learning objectives O3 will be achieved by presenting Switching technologies in P4. Finally, the O5 will be achieved with the introduction of WAN technologies concepts, presented in P6.

4. MAIN BIBLIOGRAPHY

Mandatory:

- B1. Redes Cisco - Para Profissionais, Mário Véstias, FCA, 7ª Edição, 2016
- B2. Engenharia de Redes - E. Monteiro, F. Boavida, FCA 10ª Edição, 2011
- B3. Introduction to Networks Labs and Study Guide (CCNAv7), Allan Johnson, Cisco Networking Academy, 2020

Optional / Recommended:

- B4. *Computer Networking - A Top-Down Approach*, J. F. Kurose & K. W. Ross, 8th edition, Pearson
- B5. TCP/IP – Teoria e Prática, Fernando Boavida e Mário Bernardes, FCA, 2011

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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. This Assessment includes:

:: Three practical assessments (15%): Will be theoretical and practical nature works during the semester without notice and NOT subject to be developed in another day.

:: One written Exam - Frequência (1st) (75% - 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.

Final assessment: Student who has no evaluating on “continuous Assessment”, he or she must do written Exam - Exame (2nd) or Recurso (3rd) this evaluation is 100%,

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

1. **Expositive lecture** is crosswise to the objectives O1, O2 and O4 due to the need for the introduction of the theoretical contents;
2. In order implement the Bologna agreement methodologies; students will perform an **individual search** on P3 to fulfill O2.
3. Additionally, as reflected by the O4 and O5, will be introduced equipment configurations for what will use **experimental demonstration**.

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7. CONTACTS AND OFFICE HOURS

Office hours: Tuesday 16h30 to 18h00. Office 24. Email fmr_at_ipg.pt

8. OTHERS

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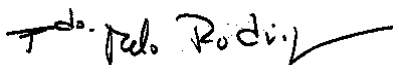
DATE

19 de fevereiro de 2024

SIGNATURES

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

Professor



(signature)