

Course Unit	Computer Networks II	Field of study	Computer Engineering
Bachelor in	Informatics Engineering	School	School of Technology and Management
Academic Year	2023/2024	Year of study	2
Type	Semestral	Semester	2
Level	1-2	ECTS credits	6.0
Code	9119-706-2205-00-23		
Workload (hours)	162	Contact hours	T - TP 60 PL - TC - S - E - OT - O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Luísa Maria Garcia Jorge, Nuno Gonçalves Rodrigues, Eduardo Manuel Mendes Costa

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Explain how to support available and reliable networks using dynamic addressing and first-hop redundancy protocols
2. Configure dynamic address allocation, IPv4 and IPv6 static routing on routers, and single-area OSPFv2 in both point-to-point and multiaccess networks
3. Configure switch security to mitigate LAN attacks and explain how to mitigate threats and enhance network security using access control lists and security best practices
4. Configure wireless local area networks (WLANs) using a wireless LAN controller (WLC) and Layer 2 security best practices
5. Implement standard IPv4 ACLs to filter traffic and secure administrative access, and configure NAT services on the edge router to provide IPv4 address scalability
6. Explain techniques to provide address scalability and secure remote access for WANs and implement protocols to manage the network
7. Explain how to optimize, monitor, and troubleshoot scalable network architectures and how networking devices implement QoS
8. Explain how technologies such as virtualization, software-defined networking, and automation affect evolving networks

### Prerequisites

Before the course unit the learner is expected to be able to:  
Demonstrate basic knowledge and skills on Computer Networks

### Course contents

Available and Reliable Networks. Layer 2 Security and Wireless Area Networks (WLANs). Routing Concepts and Configuration. OSPF Concepts and Configuration. Network Security. Wide Area Network (WAN) Concepts. Optimize, Monitor, and Troubleshoot Networks. Emerging Network Technologies.

### Course contents (extended version)

1. Available and Reliable Networks
  - DHCPv4
  - SLAAC and DHCPv6
  - FHRP Concepts
2. Layer 2 Security and WLANs
  - LAN Security Concepts
  - Switch Security Configuration
  - WLAN Concepts
  - WLAN Configuration
3. Routing Concepts and Configuration
  - Routing Concepts
  - IP Static Routing
  - Troubleshoot Static and Default Routes
4. OSPF Concepts and Configuration
  - Single-Area OSPFv2 Concepts
  - Single-Area OSPFv2 Configuration
5. Network Security
  - Network Security Concepts
  - ACL Concepts
  - ACLs for IPv4 Configuration
6. WAN Concepts
  - NAT for IPv4
  - WAN Concepts
  - VPN and IPsec Concepts
7. Optimize, Monitor, and Troubleshoot Networks
  - QoS Concepts
  - Network Management
  - Network Design
  - Network Troubleshooting
8. Emerging Network Technologies.
  - Network Virtualization
  - Network Automation

### Recommended reading

1. Cisco Networking Academy, CCNA v7. 02 - Switching, Routing and Wireless Essentials, Cisco Systems, 2022
2. Cisco Networking Academy, CCNA v7. 02 - Enterprise Networking, Security and Automation, Cisco Systems, 2022
3. Tanenbaum, A. , Wetherall, D. , Redes de computadores, Elsevier, 2011
4. Monteiro, E. , Boavida, F. , Engenharia de Redes Informáticas - 10ª Ed. , FCA, 2011
5. Material de apoio produzido pelo docente, 2024

### Teaching and learning methods

The curricular unit will adopt hybrid teaching, combining lectures and discussion, exposition and exemplification of the syllabus, and exercising the concepts through practical and laboratory work (with real and simulated equipment). Diverse methodologies will be used, such as individual and group study with teacher support and flipped classrooms.

**Assessment methods**

1. Alternative 1 - Ongoing assessment - (Regular, Student Worker) (Final)
  - Practical Work - 60% (Practical and laboratory assignments.)
  - Final Written Exam - 40% (Theoretical intermediate assessments. Theoretical final assessments. Component minimum grade: 35%.)
2. Alternative 2 - Assessment of Appeal - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 40% (Final Theoretical exam. Minimum grade: 35%)
  - Laboratory Work - 60% (Practical laboratory assignment.)

**Language of instruction**

1. English
2. Portuguese

**Electronic validation**

Luísa Maria Garcia Jorge, Nuno Gonçalves Rodrigues	Tiago Miguel Ferreira Guimaraes Pedrosa	Luís Manuel Alves	José Carlos Rufino Amaro
05-03-2024	14-03-2024	16-03-2024	24-03-2024