INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Computer Networks II			Field of study	Computer Engineering		
Bachelor in	Informatics Engineering			School	School of Technology and Management		
Academic Year	2022/2023	Year of study	2	Level	1-2	ECTS credits	6.0
Type	Semestral	Semester	2	Code	9119-706-2205-00-22		

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

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, 2021
2. Cisco Networking Academy, CCNA v7. 02 - Enterprise Networking, Security and Automation, Cisco Systems, 2021
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, 2022

Teaching and learning methods

Exposition and discussion of the programatic contents, illustrated with examples. Exercitation of the theoretical concepts, with base on practical and laboratorial tasks.

Assessment methods

1. Alternative 1 - Ongoing assessment - (Regular, Student Worker) (Final)

Assessment methods

   - 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

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05-03-2023	17-03-2023	17-03-2023