

Course Unit	Communication Networks II		Field of study	Network and Computer Systems	
Bachelor in	Informatics and Communications		School	School of Public Management, Communication and Tourism	
Academic Year	2022/2023	Year of study	3	Level	1-3
Type	Semestral	Semester	1	ECTS credits	6.0
			Code	9188-320-3103-00-22	
Workload (hours)	162	Contact hours	T 15	TP -	PL 45
			TC -	S -	E -
			OT 20	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) Cosmin Constantinescu, João Pedro Carneiro Borges Gomes

Learning outcomes and competences

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

1. Configure VLANs and Inter-VLAN routing, applying security best practices.
2. Configure redundancy on a switched network using STP and EtherChannel.
3. Explain how to support available and reliable networks using dynamic addressing and first-hop redundancy protocols.
4. Configure dynamic address allocation in IPv4 and IPv6 networks.
5. Configure switch security to mitigate LAN attacks.
6. Configure WLANs using a WLC and L2 security best practices.
7. Configure IPv4 and IPv6 static routing on routers.

Prerequisites

Before the course unit the learner is expected to be able to:

1. understand the principles of communication networks;
2. understand the OSI reference model and the TCP/IP architecture;
3. plan the IP addressing of a network;
4. understand the Ethernet technologies.

Course contents

Switching and VLANs. Redundant networks. Available and Reliable Networks. Layer 2 Security. Wireless Networks. Routing Concepts and Configuration

Course contents (extended version)

1. Switching and VLANs
 - Basic device configuration (switch, router, secure remote access, connectivity)
 - Switching concepts (frame forwarding, switching domains)
 - VLANs (operation, configuration, trunks, DTP)
 - Routing between VLANs (operation, with router, with L3 switch, troubleshooting)
2. Redundant networks
 - STP (objective, operation, evolution)
 - EtherChannel (operation, configuration, troubleshooting)
3. Available and Reliable Networks
 - DHCPv4 (concepts, router configuration as a server and as a client)
 - SLAAC and DHCPv6 (IPv6, SLAAC, DHCPv6 address assignment, DHCPv6 server configuration)
 - FHRP (first hop redundancy protocols, HSRP)
4. Layer 2 Security
 - LAN security (security of switches and terminal devices, access control, threats, attacks)
 - Switch security configuration (security implementation, attack mitigation)
5. Wireless Networks
 - Wireless networks (introduction, components, operation, CAPWAP, channels, threats, security)
 - WLAN configuration (wireless router, WMN, WLC, WLAN enterprise, troubleshooting)
6. Routing Concepts and Configuration
 - IP routing concepts (tables, routes, static and dynamic routing)
 - Static IP routing (static routes, configuration of various types of static routes)
 - Troubleshooting static routes (package processing, configuration problems)

Recommended reading

1. Cisco Networking Academy (2020). Switching, Routing, and Wireless Essentials Companion Guide (CCNAv7). Cisco Press. ISBN-13: 978-0-13-672935-8
2. Odom, W. (2019). CCNA 200-301 Official Cert Guide, Volume 1, 1st Edition. Cisco Press. ISBN-13: 978-0135792735
3. Véstias, M. (2016). Redes Cisco - Para Profissionais (7.ª ed. atualizada). FCA. ISBN-13: 978-972-722-828-7
4. Empson, S. (2016). CCNA Routing and Switching Portable Command Guide (4rd ed). Cisco Press. ISBN-13: 978-1587205880
5. Gomes, J. P. (2021). Diapositivos de Redes de Comunicação II [Documentos PDF]. Disponível em <http://virtual.ipb.pt>

Teaching and learning methods

Lectures, demonstrations, case analysis and discussion, interactive multimedia activities, laboratorial activities, practical assignments, self guided learning, Will be used computer network laboratories, simulators and e-learning.

Assessment methods

1. Continuous Evaluation - (Regular, Student Worker) (Final)
 - Intermediate Written Test - 40% (Two tests. Minimum global grade: 35%. Alternative: Tests (20%) + Networking Academy (20%))
 - Laboratory Work - 60% (Minimum global grade: 35%)
2. Distributed Evaluation - (Regular, Student Worker) (Supplementary, Special)
 - Final Written Exam - 40% (Minimum grade: 35%. Alternative: Exam (20%) + Networking Academy (20%))
 - Laboratory Work - 60% (Minimum final grade: 35%)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

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14-10-2022	16-11-2022	16-11-2022	21-11-2022