INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Computer Networks I			Field of study	Computer Engineering	
Bachelor in	Informatics Engineering			School	School of Technology and Management	
Academic Year	2023/2024	Year of study	2	Level	1-2	ECTS credits	6.0
Type	Semestral	Semester	1	Code	9119-706-2104-00-23	

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)	Eduardo Manuel Mendes Costa, Luísa Maria Garcia Jorge

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Understand the importance of computer networks and how they operate and understand network devices operation and transmission media for computer networks
2. Understand the IPv4 and IPv6 network protocols operation and their addressing structure
3. Be able to build and configure small local area networks, using Cisco routers and switches
4. Understand the concept of switching and LAN switches operation and perform basic configuration, including VLANs
5. Configure switches, routers and inter-VLAN routing in small networks
6. Understand enhanced switching technologies such as VLANs, Spanning Tree with PVST+ and EtherChannel
7. Understand and be able to configure security mechanisms for small networks
8. Be able to manage and maintain small networks during operation

Prerequisites

Before the course unit the learner is expected to be able to:
Present basic knowledge of operating systems.

Course contents

Basic Network Connectivity and Communications. Ethernet Concepts. Communicating Between Networks. IP Addressing. Network Application Communications. Building and Securing a Small Network. Switching Concepts and VLANS. Redundant Networks.

Course contents (extended version)

1. Basic Network Connectivity and Communications
    - Networking Today
    - Basic Switch and End Device Configuration
    - Protocol Models
2. Ethernet Concepts
    - Physical Layer
    - Data Link Layer
    - Ethernet Switching
3. Communicating Between Networks
    - Network Layer
    - Address Resolution
    - Basic Router Configuration
4. IP Addressing
    - IPv4 Addressing
    - IPv6 Addressing
    - ICMP
5. Network Application Communications
    - Transport Layer
    - Application Layer
6. Building and Securing a Small Network
    - Network Security Fundamentals
    - Build a Small Network
7. Switching Concepts and VLANS
    - Basic Device Configuration
    - Switching Concepts
    - VLANs
    - Inter-VLAN Routing
8. Redundant Networks
    - STP
    - EtherChannel

Recommended reading

1. Cisco Networking Academy, CCNA v7. 02 - Introduction to Networks, Cisco Systems, February 2021
2. Cisco Networking Academy, CCNA v7. 02 - Switching, Routing and Wireless Essentials, Cisco Systems, February 2021
3. Monteiro, E. e Boavida, F. , "Engenharia de Redes Informáticas", 10ª Edição, FCA - Editora de Informática , 2011 [004. 73/MON/ENG]
4. Tanenbaum, Andrew S. e Wetherall, David J. , "Computer Networks", 5/E, Prentice Hall International, 2011 [004. 7/TAN/COM]
5. Material de apoio produzido pelo docente, 2023

Teaching and learning methods

Blended learning will be used, including expository and interrogative components, and practical exercise solving (using simulated equipment). Individual, group and accompanied study and flipped classrooms will be used. All material will be made available through the Cisco Academy e-learning system and the IPB e-learning system.

Assessment methods

1. Alternative 1 - (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%.)

Assessment methods

2. Alternative 2 - (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. Portuguese
2. English

Electronic validation

Eduardo Manuel Mendes Costa, Luísa Maria Garcia Jorge	Tiago Miguel Ferreira Guimaraes Pedrosa	José Carlos Rufino Amaro
16-10-2023	25-10-2023	31-10-2023