Course Syllabus

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Oran National Polytechnic School (ENPO)

Course Title

Enterprise Networks

Semester

S1

Institution

École Nationale Polytechnique d'Oran – Maurice Audin (ENPO-MA)

Degree Program

Computer Networks and Telecommunications (RIT)

Course Description

This course introduces the fundamental concepts of enterprise networking, focusing on the mechanisms used to transport information across computer networks and the protocols operating at different communication levels (frame, packet, and message).

It provides both theoretical foundations and practical skills required to understand, design, configure, and manage enterprise network infrastructures.

Course Objectives

The main objectives of this course are to enable students to:

- Understand the principles of **data transmission** and communication media.
- Identify different **network types, topologies, and architectures.**
- Master the **OSI and TCP/IP reference models.**
- Understand and **apply IPv4 and IPv6 addressing and subnetting.**
- Gain an introduction to **IP routing concepts.**
- Configure and analyze **essential network services** used in enterprise environments.
- Develop practical skills in **network configuration, administration, and troubleshooting**

By the end of this course, students will be able to **design and configure a small to medium-sized enterprise network**

Prerequisites

Recommended background knowledge includes:

- Binary representation and number systems.
- ASCII character encoding.
- Basic knowledge of microprocessors, memory, and peripheral devices.
- Basic use of operating systems (Windows and Linux).

Course Content

1. Chapter I: Introduction to Networking

- Data transmission: analog vs. digital
- Signals, bandwidth, and data rate
- Network types: LAN, MAN, WAN, PAN, WLAN, SAN
- Network topologies: bus, ring, star, mesh, hybrid
- Peer-to-peer and client-server networks

2. Chapter II: Physical Network Architecture

- Transmission media:
  - Twisted pair (Cat 5 / 6 / 7)
  - Coaxial cable
  - Optical fiber
  - Wireless media (radio waves)
- Passive components: connectors, patch panels, adapters
- Active devices: repeaters, hubs, switches, bridges, routers, access points

3. Chapter III: Ethernet Technologies

- Ethernet principles and operation
- Ethernet frame structure
- Medium access method: CSMA/CD
- Ethernet standards (10/100/1000 Base-T, etc.)

4. Chapter IV: OSI Reference Model

- OSI layers and their functions
- Encapsulation process and Protocol Data Units (PDU)

5. Chapter V: IPv4 Addressing

- IPv4 address structure and definition
- Address classes
- Subnet masks and broadcast addressing
- Subnetting techniques
- CIDR (Classless Inter-Domain Routing)
- Introduction to IP routing (gateways and static routing)

6. Chapter VI: IPv6 Addressing

- IPv6 address structure
- Address types: unicast, multicast, anycast
- Auto-configuration mechanisms
- IPv6 subnetting

7. Chapter VII: TCP/IP Model

- Network Access Layer
- Internet Layer: IP, ICMP
- Transport Layer: TCP, UDP, port concepts
- Application Layer: HTTP, FTP, TFTP, DNS, DHCP, Telnet

8. Chapter VIII: Network Services

- DHCP: role, operation, lease mechanism
- DNS: name resolution, zones, DNS servers
- Application services: FTP, HTTP, SSH, etc.

9. Laboratory Work (Practical Sessions)

9.1. Lab I: Cabling and Network Architecture

- Straight-through, crossover, and rollover cables (TIA/EIA 568A/B)
- Network simulation using Cisco Packet Tracer and/or GNS3

9.2. Lab II: Host Configuration (Windows / Linux)

- Network commands: `ipconfig, ifconfig, ip, ping, tracert, netstat`
- Manual network configuration
- Wireless network configuration

9.3. Lab III: Network Sharing

- Peer-to-peer file sharing
- Workgroup configuration

9.4. Lab IV: Windows Server (Introduction)

- Installation
- Active Directory
- User and permission management

9.5. Lab V: IP Addressing

- IPv4 addressing: classes, subnetting, CIDR
- Routing and gateways
- IPv6 configuration:
    - Manual IPv6 addressing
    - ping6, tracepath6, IPv6 DNS configuration

9.6. Lab VI: DHCP

- DHCP server and client configuration (Windows / Linux)

9.7. Lab VII: DNS

- Local DNS server configuration (Bind9 or equivalent)
- Testing using nslookup and dig

9.8. Lab VIII: FTP

- Deployment of a simple FTP server
- File transfer operations

10. Assessment Methods

- Continuous assessment (laboratory work, quizzes, assignments)
- Final examination

Mentions légales

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