ITEC-251
Data Communication and Computer Networks

General Information

Course Code	ITEC-251	Level/ Year	4th / 2nd	Required (R)/ Selected Elective (SE)			R
Credit Hours	Theory		2	Lab	1	Total	3
Prerequisites	Nil						
Course Coordinator	Dr. Ali Tahir						

Course Description

This is an entry-level course in data communication and networking. This course explains the students with the fundamentals of data communications and networking in detail. The topics include fundamentals of data communications: essential elements of data communications: simplex, half-duplex and full duplex transmission, basic concepts of networking: network criteria, network applications and benefits. Configurations, and categories of networks: line configuration, network topologies (mesh, star, tree, bus, ring, hybrid), internetwork or internet, types of network connection, intranet, and extranet. Introduction to OSI and TCP/IP network models: The OSI Model, The OSI layers, TCP/IP Protocol Suite in detail. Physical layer and media: analog and digital signals, periodic and non-periodic signals, signal parameters, time and frequency domains concepts, transmission impairment, transmission media: guided media, unguided media, circuit, and packet switching. Data link layer control: framing, error control and flow control, error detection and correction techniques: VRC, LRC, CRC, checksum, and Hamming code techniques. Wired LAN (Ethernet), IP addressing, subnetting, supernetting. networking and internetworking devices, and VLANs. Students will be trained on the existing components and products related to Cisco such as wireless networking, switches, routers, bridges, gateways, repeaters, hubs, cellular communication, and satellite communication.

Course Objectives

- Understand the fundamental concepts of data communication and networking.
- Outline the layering concepts, network models e.g., Open System Interconnect (OSI) and the Internet Model (TCP/IP).
- Study the concepts of analog and digital transmission, flow control, and error control, error detection and correction techniques in detail.
- Identify various types of transmission media, network devices, and performance assessment parameters for each guided and unguided media and connecting device. Also, discuss Ethernet and wireless networks.
- Apply the skills acquired concerning physical (MAC) and logical addressing (IP), subnetting and supernetting, network topologies, and VLANs.

Course Contents

List of Topics	Weeks
UNIT 1: Introduction to Data Communication & Computer Networks	1,2, 3
UNIT 2: Network Models & Networking Devices	4, 5, 6
UNIT 3: Signals, Multiplexing, and Switching	7, 8, 9
UNIT 4: Error Detection & Correction, Wired LAN, and IP Addressing	10, 11, 12
UNIT 5: Transmission Media, and VLANs	13, 14, 15

Textbook

Behrouz A Forouzan, Data Communications and Networking, 6th Edition, 2022, ISBN-13: 978-1-26-436335-3.

Reference Materials

- William Stallings," Data and Computer Communication", Pearson Education, 10th Edition, 2014, ISBN-13: 9781292014388.
- James Kurose, "Computer Networking: A Top-Down Approach", Pearson, 8th Edition, 2021, ISBN-13: 9780136681557.
- Larry Peterson, "Computer Networks: A Systems Approach", Morgan Kaufmann, 6th Edition, 2022, ISBN-13: 9780128182000 Andrew Tanenbaum, "Computer Networks", 6th Edition, 2021, ISBN 13: 9781292374062.

Course Learning Outcomes

CLO	Description	Cognitive Domain	Mapped PI
CLO#01	**Define** the fundamental concepts related to data communication, computer networks, and both guided and unguided transmission media.	Remembering	PI 1.1
CLO#02	**Explain** the principles of network topologies, layered architectures, the OSI and TCP/IP models, as well as analog and digital transmission.	Understanding	PI 1.2
CLO#03	**Identify** the network devices and technologies, multiplexing methods, and switching techniques.	Remembering	PI 1.3
CLO#04	**Compare** various error detection and correction methods, classful and classless IP addressing schemes, and the different generations of Ethernet technology.	Analyzing	PI 2.2
CLO#05	**Implement** and evaluate subnets, supernets, VLANs, & network topologies, and configure network devices such as switches, and routers to fulfill an organization's networking needs.	Applying	PI 2.3 PI 2.4
CLO#06	**Identify** the emerging trends e.g., SDN, and related ethical issues.	Analyzing	PI 4.1 PI 4.4

CLO-PI-SO Mapping

	SOs					
CLOs	**SO1**	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**
CLO#01	PI 1.1	-	-	-	-	-
CLO#02	PI 1.2	-	-	-	-	-
CLO#03	PI 1.3	-	-	-	-	-
CLO#04	-	PI 2.2	-	-	-	-
CLO#05	-	PI 2.3 PI 2.4	-	-	-	-
CLO#06	-		-	PI 4.1 PI 4.4		

Approvals

Prepared by Course Coordinator	Dr. Ali Tahir		
Approved by Track Leader	Dr. Ali Tahir	**TL Signature**	
Last updated	August 18, 2024		