Course Specification
(Bachelor)

Course Title:	Computer Network Architecture
Course Code:	CEN 1405
Program:	Bachelor in Computer Engineering
Department:	Computer Engineering
College:	Faculty of Computer and Information Technology
Institution:	University of Tabuk
Version:	1.0
Last Revision Date:	27 July 2022

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A. General information about the course:

1. Course Identification

1. Credit hours: (4)

2. Course type

A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required			☐ Elective	

3. Level/year at which this course is offered: (8/4)

4. Course general Description:

This course provides a comprehensive introduction to computer networks with focus on the functions performed at each layer of the network architecture and common layer protocol standards. Topics covered include: Introduction to computer networks and layered architectures: connectivity, topology, circuit and packet switching, TCP/IP and ISO models; Application layer: DNS, SMTP, FTP, HTTP; Transport layer: TCP and UDP, error control, congestion and flow control; Network layer: Internetworking, addressing and routing algorithms and protocols; Data link layer: Framing, error detection and correction, PPP, medium access control and LANs; Physical layer: coding, multiplexing and transmission media.

5. Pre-requirements for this course (if any):

CEN 1402

6. Co-requisites for this course (if any):

N/A

7. Course Main Objective(s):

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of computer networks,
- Develop a solid conceptual understanding of the essentials and design issues underlying a wide spectrum of modern computer network technologies with focus on the Internet model.
- Provide students with an opportunity to gain practical insights and hands-on experience on using networking hardware, software and tools.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	-	-
3	Hybrid ● Traditional classroom ● E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	30
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe how computer networks are organized with the concept of layered approach.	K1	Lectures, textbooks, provided handouts, references.	Exams, quizzes, assignments, and the project.
1.2	Define and explain the different types and characteristics of a Computer Network.	K1		
1.3	Distinguish between OSI and TCP/IP models.	K3		
1.4	Create network addressing schemes using subnetting.	K5		
1.5	Explain network fundamentals and technologies.	K4		

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	**Design and implement computer networks with routers and switches.**	**S2, S3**	Lectures, textbooks, provided handouts, references.	Exams, quizzes, assignments, and the project.
2.2	**Design logical sub-address blocks with a given address block.**	**S3**		
2.3	**Setup various servers such as DNS and DHCP.**	**S3**		
2.4	**Design and implement VLAN, configure SSH and Telnet protocols, and setup wireless LANs.**	**S3, S4**		
3.0	**Values, autonomy, and responsibility**			
3.1	**The ability to demonstrate work within a team**	**V2**		

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to computer networks.** **Lab: Introduction to Cisco Packet Tracer: Familiarize students with the simulation tool**	5
2.	**Layered architectures: ISO and Internet models.** **Lab: Basic Router Configuration: Configuring routers with basic settings.**	5
3.	**Application layer overview, DNS, SMTP, FTP, Telnet, and HTTP Protocols** **Lab: Basic Switch Configuration: Setting up and configuring switches**	5
4.	**Standard Client-Server Protocols.** **Lab: IP Addressing and Subnetting: Practice subnetting and assigning IP addresses.**	5
5.	**Transport Layer: Overview & process to process deliver, TCP and UDP.** **Lab: Static Routing: Implementing and testing static routes between routers**	5
6.	**Transport Layer: Congestion control protocols.** **Lab: Dynamic Routing Protocols (e.g., RIP or OSPF): Configuring routers to use dynamic routing protocols.**	5
7.	**Transport Layer: Error and flow control protocols** **Lab: VLAN Configuration: Setting up Virtual LANs to segregate network traffic**	5

8.	**Network Layer: Internetworking, Addressing and Routing.** **Lab: Inter-VLAN Routing: Enabling communication between different VLANs.**	5
9.	**Network layer protocols, Unicast routing.** **Lab: Access Control Lists (ACLs): Implementing basic access control for network security.**	5
10.	**Network layer protocols: multicast routing.** **Lab: NAT (Network Address Translation): Configuring NAT to enable private IP addresses to access the internet.**	5
11.	**Data Link Layer: overview, Flow and error control.** **Lab: DHCP (Dynamic Host Configuration Protocol): Setting up a DHCP server to dynamically assign IP addresses.**	5
12.	**Data link control protocols: PPP and HDLC, Medium access control** **Lab: IPv6 Configuration: Introducing and configuring IPv6 on the network.**	5
13.	**link control protocols: Local area networks.** **Lab: Wireless LAN Configuration: Setting up a basic wireless network with security features.**	5
14.	**link control protocols: Wireless LANs.** **Lab: Troubleshooting Network Issues: Identifying and resolving common networking problems.**	5
15.	**Physical Layer: coding, multiplexing and transmission media.** **Lab: Network Design Project: Hands-on experience in designing a small network, considering all the learned concepts.**	5
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Two Assignments	5,14	10%
2.	Two Quizzes	4,9	10%
3.	Two Midterm Exam	7,12	30%
4.	Project	14	10%
5.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	▪ **Data and Computer Communications, W Stallings, Prentice Hall, ISBN: 0-02-415425-3** ▪ **Introduction to Networks Companion Guide, Cisco Press, ISBN 13: 9780136633679**

Supportive References	▪ Computer Communications and Networking Technologies, M. A. Gallo and W. M. Hancock, Brooks/Cole (Thomson Learning), ISBN: 0-534-37780-7 ▪ Data Communications and Networking, Behrouz A. Forouzan, McGraw-Hill Higher Education, ISBN: 0072967757.
Electronic Materials	
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom, Laboratory**
Technology equipment (projector, smart board, software)	**Data show**
Other equipment (depending on the nature of the specialty)	**TBA**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Teaching	Faculty, Program Leaders, and Advisory Board	Both Direct and Indirect
	Students	Indirect
Effectiveness of Students Assessment	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Both Direct and Indirect
Quality of Learning Resources	Faculty, Students, and Advisory Board	Indirect
The Extent to which CLOs have been Achieved	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Direct (as in section B) and Indirect/Surveys
	Students	Indirect
Other	-	-

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	