Tunisian Republic
Private Higher School of Engineers of Gafsa
Private Higher Education Institution,
State-approved under N° 05-2013

Course Title:	**Computer Networks**
Course Code:	CSE422
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Amina GHARSALLAH
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

A. Course Identification

1. **Credit hours:**   2 (1-0-2)
2. **Course type**   **a.**   University ☐   College ☐   Department ■   Others ☐   **b.**   Required ■   Elective ☐
3. **Level/year at which this course is offered:**   2.2/3
4. **Pre-requisites for this course :** CSE232, CSE341, Operating Systems, Fundamentals of Computer Science

1. **Mode of Instruction (mark all that apply)**

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..		
2	**Blended**	45		
3	**E-learning**	......	33	78
4	**Distance learning**	......		
5	**Other ()**	......		

2. **Contact Hours (based on academic semester)**

No	Activity	Contact Hours
1	**Lecture**	22.5
2	**Laboratory/Studio**	22.5
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	45

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B. Course Objectives and Learning Outcomes

Course Description
This course offers a comprehensive exploration of computer networking, integrating both theoretical foundations and hands-on practical experience in designing, configuring, and managing efficient networks. Students will develop a deep understanding of network architectures, communication protocols, network security, and emerging technologies. Through real-world applications, critical analysis, and collaborative projects, students will gain practical skills in network configuration, troubleshooting, and performance evaluation.
Course Main Objectives
✓ Gain an in-depth understanding of core networking principles, including network models, protocols, and architecture.   ✓ Critically analyze existing research in networking to identify and formulate relevant research problems.   ✓ Effectively communicate complex technical concepts using visual aids such as slideshows, diagrams, and live demonstrations.   ✓ Collaborate in diverse teams on networking projects, reflecting real-world professional environments.   ✓ Develop strong analytical skills to assess network performance, identify bottlenecks, and implement optimizations.   ✓ Design and develop network applications using appropriate programming languages and frameworks.

1. **Course Learning Outcomes**

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.2	✓ Demonstrate a comprehensive understanding of network models, protocols, and architecture. ✓ Critically analyze research literature to identify and formulate key networking challenges.	PLO.K.2
2	**Skills**	
2.2	✓ Effectively design and present technical content using visual aids such as diagrams, presentations, and live demonstrations. ✓ Work collaboratively on network-related group projects, simulating real-world teamwork dynamics.	PLOS2
2.3	✓ Develop analytical skills to evaluate the performance of computer systems and networks.	PLOS5
2.4	✓ Design and develop network applications using appropriate programming languages.	PLO.S7

C. Course Content

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No	List of Topics	Contact Hours
1	**Chapter 1: Introduction to Computer Networks**	3
	• Overview of Computer Networks • Network Types (PAN, LAN, MAN, WAN) • Network Topologies (Star, Ring, Bus, Mesh, Hybrid)	
2	**Chapter 2: Network Models and Architectures**	3
	• OSI Model • TCP/IP Model • Comparison of OSI and TCP/IP Models	
3	**Chapter 3: Physical Layer and Data Link Layer**	3
	• Transmission Media (Wired and Wireless) • Signal Transmission and Modulation • Ethernet and LAN Protocols • MAC Addresses	
4	**Chapter 4: Network Layer**	6
	• Network Addressing and Subnetting • Routing Algorithms (Distance Vector, Link State) • IP Addressing (IPv4 and IPv6)	
5	**Chapter 5: Transport and Application Layers**	3
	• Transport Layer Services • TCP vs UDP • Congestion Control Mechanisms • Application Layer Protocols (HTTP, FTP, SMTP, DNS)	
6	**Chapter 6: Network Security**	3
	• Basic Concepts of Network Security • Encryption and Decryption Techniques • Firewalls and VPNs	
7	**Chapter 7: Wireless Networks and Emerging Technologies**	6
	• Principles of Wireless Communication • Wireless Network Protocols (Wi-Fi, Bluetooth, LTE) • Cloud Computing • Internet of Things (IoT) • Software-Defined Networking (SDN) • Network Function Virtualization (NFV)	
8	**Workshop 1 : Network Topologies and Configurations**	3
	Objective : Understand and implement different network topologies. **Activities :** • Design and simulate network topologies using network simulation tools (e.g., Cisco Packet Tracer). • Configure basic network devices (switches, routers) for different topologies (star, ring, mesh). • Practice configuring VLANs and understanding MAC addressing	
9	**Workshop 2 : Network Addressing and Subnetting**	3

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No	List of Topics	Contact Hours
	Objective : Master IP addressing and subnetting. **Activities :** - Perform subnetting exercises to create efficient IP address plans. - Configure static and dynamic IP addresses on network devices.	
10	**Workshop 3 : Routing Algorithms and IP Configuration**	
	Objective : Implement and test routing protocols. **Activities :** - Configure and test basic routing protocols (RIP, OSPF) on routers. - Perform routing table analysis and troubleshoot routing issues.	3
11	**Workshop 4 : Configuring a DNS Server and Deploying a Web Server.**	
	Objective : Know how to configure a DNS Server **Activities :** - Install and configure a local DNS server. - Set up forward and reverse search zones. - Configure a web server (Apache, Nginx) on a local network. - Create and host a simple web page.	3
12	**Workshop 5 : Network Security Basics**	
	Objective : Implement fundamental network security measures. **Activities :** - Configure firewall rules and test their effectiveness. - Set up a VPN and understand its components. - Implement basic encryption techniques and secure communication protocols (SSL/TLS).	3
13	**Workshop 6 : IoT integration**	
	Objective : Explore wireless networking and IoT. **Activities :** - Connect IoT devices to a network. - Implement practical scenarios with sensors and actuators. - Implement IoT project (e.g., smart home, smart city).	3
	Total	**45**

D. Teaching and Assessment

1. **Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods**

Code	Course Learning Outcomes	Teaching strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
K.2	✓ Demonstrate a comprehensive understanding of network models, protocols, and architecture. ✓ Critically analyze research literature to identify and formulate key networking challenges.	- Lectures - Class discussions - Assignments	Assignments, Quizzes, Exams,
2.0	**Skills**		
S.2	✓ Effectively design and present technical content	- Lectures	

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Code	Course Learning Outcomes	Teaching strategies	Assessment Methods
	using visual aids such as diagrams, presentations, and live demonstrations. ✓ Work collaboratively on network-related group projects, simulating real-world teamwork dynamics.	- Class discussions - Assignments	Assignments, Quizzes, Exams, Assignments, Reports, Quizzes, Exams,
S.5	✓ Develop analytical skills to evaluate the performance of computer systems and networks.		
S7	✓ Design and develop network applications using appropriate programming languages.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	15%
2	Quizzes, Homework assignments	Random	10%
3	MID-term	8	25%
4	Final Exam	16	50%

E. Student Academic Counseling and Support

Arrangements for the availability of faculty and teaching staff for individual student consultations and academic advice :
1- Office hours 2- Blackboard interface

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1. James F. Kurose & Keith W. Ross. Computer Networking: A Top-Down Approach. 8th Edition, Pearson, 2022. ISBN: 978-0136681557 2. Andrew S. Tanenbaum & David J. Wetherall. Computer Networks. 6th Edition, Pearson, 2019. ISBN: 978-0132126953 3. William Stallings. Data and Computer Communications. 10th Edition, Pearson, 2013. ISBN: 978-0133506488. 4. Douglas E. Comer. Internetworking with TCP/IP, Vol. 1: Principles, Protocols, and Architecture. 6th Edition, Pearson, 2013. ISBN: 978-013608530
Essential References Materials	1. **Cisco Networking Academy.** *CCNA Lab Manual.* Cisco Press, 2021 2. Cisco Packet Tracer Labs: (www.netacad.com)
Electronic Materials	1. **Cisco Networking Academy:** *CCNA Online Learning Resources & Packet Tracer Labs* (www.netacad.com) 2. **MIT OpenCourseWare:** *Computer Networks & Internet Technologies* (ocw.mit.edu)

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Other Learning Materials	NA

2. Facilities Required

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **Internet access**
Technology Resources	**Data projector**

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students, course coordinator, Alumni, Employers	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, quality department	Direct
Quality of Learning resources	Faculty, Program Leaders,	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders,	Direct, Indirect

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	07/02/2024