	Ministry of Higher Education and Scientific Research - Iraq University of Technology-Iraq Department of Computer Science	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	PRINCIPLES OF NETWORKS			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Tutorial**	
Module Code	PRNE125				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation with Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Information Theory	**Semester**	1
Co-requisites module	Coding Theory	**Semester**	2
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	The module "Principles of Computer Networks" aims to provide students with a comprehensive understanding of the fundamental principles, concepts, and technologies underlying computer networks. It focuses on the following key aims: 1. Introducing Network Fundamentals: The module aims to familiarize students with the basic principles and concepts of computer networks. This includes understanding the layered network architecture, network protocols, data encapsulation, and the role of each layer in the network stack. 2. Exploring Network Protocols: Students will learn about various network protocols, such as TCP/IP (Transmission Control Protocol/Internet Protocol), UDP (User Datagram Protocol), HTTP (Hypertext Transfer Protocol), DNS (Domain Name System), and others. The aim is to provide an in-depth understanding of these protocols, their functionalities, and their role in enabling communication and data transfer across networks. 3. Understanding Network Design and Architecture: The module aims to develop students' knowledge and skills in designing and implementing computer networks. It covers topics such as network topologies, network hardware components, network addressing, subnetting, and network security considerations. The objective is to enable students to design efficient and secure network architectures. 4. Examining Network Technologies: The module aims to introduce students to a range of network technologies commonly used in computer networks. This may include LAN (Local Area Network), WAN (Wide Area Network), wireless networks, network virtualization, cloud networking, network management, and emerging technologies. The objective is to familiarize students with different network technologies and their applications. 5. Analyzing Network Performance and Troubleshooting: Students will learn about network performance evaluation, monitoring, and troubleshooting techniques. The module aims to provide students with the skills to diagnose and resolve network-related issues, optimize network performance, and ensure reliable network operation.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	some common learning outcomes you can expect from such a course: 1. Understand the fundamental concepts and components of computer networks, including protocols, topologies, and architectures. 2. Describe the various types of network devices, such as routers, switches, and hubs, and explain their functionalities. 3. Demonstrate knowledge of the different layers of the OSI (Open Systems Interconnection) model and the TCP/IP (Transmission Control Protocol/Internet Protocol) suite.		

	4. Explain the process of data encapsulation and decapsulation at each layer of the networking stack. 5. Analyze and compare different network topologies and their advantages and disadvantages. 6. Configure and troubleshoot basic network services, such as IP addressing, subnetting, and DNS (Domain Name System). 7. Understand the principles of network routing and switching, including routing protocols and switching techniques. 8. Design and implement simple local area networks (LANs) and wide area networks (WANs) using appropriate networking technologies and protocols.
Indicative Contents المحتويات الإرشادية	Here are some indicative contents that you may find in such a course: Introduction to Computer Networks: Definition and importance of computer networks Network types (LAN, WAN, MAN, PAN) Network topologies (bus, star, ring, mesh) Network Architectures: OSI (Open Systems Interconnection) model TCP/IP (Transmission Control Protocol/Internet Protocol) model Comparison and relationship between OSI and TCP/IP models Network Protocols:Overview of important protocols (TCP, IP, UDP, HTTP, FTP, SMTP, DNS) Protocol stack and packet encapsulation Addressing schemes (MAC addresses, IP addresses) Network Devices and omponents: Network interface cards (NICs) Routers, switches, and hubs Modems and gateways Network Technologies: Ethernet and IEEE 802.3 standards Wireless networks (Wi-Fi, Bluetooth, cellular networks) Network security (firewalls, VPN, encryption) Network Layer: IP addressing and subnetting Routing algorithms (distance-vector, link-state) Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6) Transport ayer: Transport Control Protocol (TCP) User Datagram Protocol (UDP) Flow control and congestion control Application Layer: Domain Name System (DNS) Hypertext Transfer Protocol (HTTP) File Transfer Protocol (FTP) Email protocols (SMTP, POP3, IMAP)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Here are some strategies you can consider: 1. Lecture-Based Instruction: Conducting traditional lectures can be a valuable strategy for introducing computer network concepts and theories. Provide clear explanations, examples, and visual aids to help students grasp the fundamental concepts. 2. Active Learning: Encourage active participation of students in the learning process. Instead of relying solely on lectures, incorporate interactive activities such as group discussions, case studies, hands-on experiments, and simulations. This allows students to apply their knowledge and enhances their understanding of network principles. 3. Real-World Examples: Relate abstract network concepts to real-world applications and scenarios. Use examples from everyday life, such as home networks, online gaming, or social media platforms, to help students connect theoretical concepts to practical situations. This fosters engagement and helps students see the relevance of the subject matter. 4. Visual Aids and Multimedia: Utilize visual aids, diagrams, and multimedia resources to illustrate complex network concepts. Visual representations can

	enhance understanding and retention of information. You can use slides, videos, animations, or online interactive tools to demonstrate networking protocols, topologies, and communication processes. 5. Hands-on Labs: Provide opportunities for students to gain practical experience through hands-on labs. Set up a network lab environment where students can configure routers, switches, and other networking equipment. This hands-on approach allows students to troubleshoot network issues, implement network configurations, and reinforce theoretical concepts. 6. Collaborative Projects: Assign group projects that require students to design and implement small-scale networks. This promotes teamwork, problem-solving skills, and practical application of network principles. Students can work together to develop network designs, configure devices, and troubleshoot network problems, fostering a deeper understanding of the subject matter. 7. Assessments: Use a variety of assessment methods to evaluate students' knowledge and skills. Alongside traditional exams, consider incorporating practical assessments, such as network troubleshooting exercises or network design projects. This ensures that students demonstrate not only their theoretical understanding but also their ability to apply network principles in real-world scenarios. 8. Online Resources: Make use of online resources, such as virtual labs, interactive tutorials, and educational websites, to supplement classroom learning. Online platforms can provide additional practice exercises, simulations, and resources that students can access outside of class to reinforce their understanding and explore networking concepts at their own pace.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	80	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative Assessment	**Quizzes**	2	10% (10)	5, 10,12	LO #1, 2, and 8
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10%(10)	Continuous	

	Report	1	10% (10)	13	LO # 5, and 8
Summative Assessment	**Midterm Exam**	1hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computer Networks
Week 2	Network Classification: • LAN,MAN and WAN
Week 3	➢ Network topologies: • Mesh, Star, Bus and Ring • The advantages and disadvantages of each topology.
Week 4	Transmission Media: Wired Transmission • Magnetic Media, Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable and Fiber Optics, Cabling Summary,
Week 5	Transmission Media: Wireless Transmission • Radio Transmission, • Microwave Transmission • Infrared and Milimeter waves • Light wave transmission and Wireless LAN Media Summary
Week 6	internetwork (Internet)
Week 7	Mid Exam
Week 8	The advantages and disadvantages of computer Network Components: • NIC, Repeater HUB, Bridge, Router, BRouter, GATEWAY Data Flow
Week 9	Design Issues for The Layer • Reference Model • The OSI Reference model • The Relationship of Services to Protocols • The Physical Layer, The Data Link Layer, The Network Layer, The Transport Layer, The Session Layer The Presentation Layer, The Application Layer, Data Transmission in the OSI Model,
Week 10	The TCP/IP Reference Model,
Week 11	Comparison of the OSI and TCP Reference Models,

Week 12	Network Protocols: Overview of important protocols (TCP, IP, UDP, HTTP, FTP, SMTP, DNS)
Week 13	Protocol stack and packet encapsulation
Week 14	Addressing schemes (MAC addresses, IP addresses)
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Networking Concepts • Lab Introduction and Overview • Setting up the Network Lab Environment
Week 2	Familiarization with Networking Tools (Ping, Traceroute, Packet Tracer)
Week 3	Basic Network Configuration (IP addressing, subnetting)
Week 4	Ethernet and LANs • Ethernet Fundamentals and Standards • LAN Topologies and Media • Ethernet Frame Format and Switching • Lab: Building a Local Area Network (LAN) using Ethernet Switches
Week 5	Internet Protocol (IP) and Routing • IP Addressing and Subnetting • IP Routing Principles and Algorithms • Routing Protocols (RIP, OSPF) • Lab: Configuring IP Addresses and Basic Routing on Routers
Week 6	Transport Layer Protocols • Introduction to Transport Layer • Transmission Control Protocol (TCP) • User Datagram Protocol (UDP) Lab: Analyzing TCP and UDP Traffic
Week 7	Wireless Networks • Wireless Networking Principles • Wi-Fi Standards and Modes

	• Wireless Security (WEP, WPA, WPA2) Lab: Setting up a Wireless Network

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Computer Networking: A Top-Down Approach Featuring the Internet, 3/e By James F. Kurose · 2005, Pearson Education	No
Recommended Texts	Leon-Garcia, Alberto, Widjaja, Indra. ISBN.Communication Networks: Fundamental Concepts and Key Architectures. McGraw Hill, 2004, 2nd edition.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.