MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer & Engineering Networks الشبكات الهندسية/**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CYBT204				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level			**Semester of Delivery**	5	
Administering Department			**College**		
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	2/11/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Data Communications & Computer Architecture	**Semester**	3 & 4
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to introduce students to the principles, architectures, and protocols of computer and engineering networks. It focuses on the layered communication models (OSI 7-Layer Reference Model and TCP/IP Suite), data transmission media, data link control protocols, local area networks (LANs), IP addressing (IPv4/IPv6), routing algorithms, transport layer services (TCP/UDP), and application layer protocols. The module further provides practical experience in network design, packet analysis, and network simulation tools (e.g., Cisco Packet Tracer and Wireshark).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand network architectures, topologies, standard OSI 7-layer model, and TCP/IP protocol suite. Comprehend physical layer characteristics, transmission media, and data encoding techniques. Master data link layer protocols, framing, error control, Ethernet standards, switches, and VLANs. Perform IP addressing (IPv4/IPv6), VLSM, CIDR subnetting, and analyze dynamic routing protocols (RIP, OSPF). Understand transport layer concepts, process-to-process communication, TCP connection management, and congestion control. Comprehend core application layer protocols (DNS, HTTP, DHCP, FTP, SMTP). Design, configure, and analyze network topologies using Cisco Packet Tracer and Wireshark.
Indicative Contents المحتويات الإرشادية	The module will cover the following key areas: Introduction to Computer Networks, Topologies, and Layered Architectures (OSI & TCP/IP Models) Physical Layer: Transmission Media, Data Encoding, Multiplexing, and Signal Transmission Data Link Layer: Framing, Error Detection (CRC), Error Correction, and Flow Control Medium Access Control (MAC), Ethernet Standards (802.3), Switches, and VLAN Configuration Network Layer: IPv4 and IPv6 Addressing Schemes, VLSM, CIDR Subnetting, and NAT Routing Concepts, Unicast Routing Algorithms, and Protocols (Distance Vector, Link State, OSPF) Transport Layer: UDP Operations, TCP 3-Way Handshake, Flow Control, and Congestion Control Application Layer Protocols: DNS, HTTP/HTTPS, DHCP, FTP, and Email Protocols (SMTP/POP3/IMAP) Wireless Networks Foundations (IEEE 802.11 Wi-Fi) and Basic Network Security (Firewalls & Encryption)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module will employ a combination of strategies including: Lectures: To provide theoretical foundations on network architectures, protocols, and algorithms.

	Group Discussions: To facilitate understanding through the exchange of networking concepts and real-world scenarios. Problem-Solving Sessions: To practically apply IP subnetting (VLSM), route calculation, and framing algorithms. Practical Lab Sessions: Hands-on experience with network devices, Cisco Packet Tracer simulation, and Wireshark packet capturing. Tutorials: To delve into complex topics like link-state routing algorithms, TCP window mechanisms, and IPv6 transition. Mid-term and final exams: To assess comprehensive theoretical knowledge and analytical skills. Preparatory Week: To give students time to revise and clarify any difficulties before the final exam.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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	5% (5)	5, 10	LO #1, 3 and 5
	Assignments	2	5% (5)	2, 12	LO #2, 4 and 6
	Projects / Lab.	1	10% (10)	Continuous	LO #7
	Report	1	10% (10)	13	LO #3, 5 and 7
Summative assessment	**Midterm Exam**	2 hr	20% (20)	8	LO #1 - 4
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computer & Engineering Networks: Topologies, Network Types (LAN, WAN, MAN), and Layered Architecture.
Week 2	Network Reference Models: OSI 7-Layer Reference Model vs. TCP/IP Protocol Suite.
Week 3	Physical Layer: Transmission Media (Guided/Unguided), Data Encoding, and Multiplexing Techniques.
Week 4	Data Link Layer Basics: Framing, Flow Control, and Error Detection Mechanisms (Parity, Checksum, CRC).
Week 5	Medium Access Control (MAC) Protocols: CSMA/CD, CSMA/CA, and Ethernet Standards (IEEE 802.3).
Week 6	Switched Networks: LAN Switching, Switch Operations, MAC Address Table, and Virtual LANs (VLANs).
Week 7	Network Layer Fundamentals: IP Protocol, IPv4 Packet Format, and Addressing Schemes.
Week 8	Mid-term Exam (الفصل منتصف اختبار) & IP Subnetting (FLSM, VLSM, CIDR, and NAT).
Week 9	IPv6 Addressing: IPv6 Structure, Neighbor Discovery, and IPv4 to IPv6 Transition Mechanisms.
Week 10	Routing Concepts & Algorithms: Static Routing vs. Dynamic Routing, Distance-Vector Routing (RIP).
Week 11	Advanced Routing Protocols: Link-State Routing Concept, Open Shortest Path First (OSPF), and BGP Overview.
Week 12	Transport Layer: User Datagram Protocol (UDP) Architecture, Process-to-Process Port Addressing.
Week 13	Transmission Control Protocol (TCP): Connection Establishment (3-Way Handshake), Reliability, and Flow Control.
Week 14	TCP Congestion Control Algorithms & Quality of Service (QoS) Principles.
Week 15	Application Layer Protocols: DNS, HTTP/HTTPS, DHCP, FTP, and Email Protocols (SMTP, POP3, IMAP).
Week 16	**Preparatory week before the final Exam (النهائي والاختبار التحضير أسبوع).**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered

Week 1	Lab 1: Introduction to Network Hardware, Cable Crimping (UTP/STP RJ45), and Network CLI Diagnostic Commands (ping, traceroute, nslookup).
Week 2	Lab 2: Introduction to Cisco Packet Tracer & Initial Router/Switch Command Line Interface (CLI) Configuration.
Week 3	Lab 3: Implementing IPv4 Addressing, Subnetting (VLSM), and Default Gateway Configuration in Packet Tracer.
Week 4	Lab 4: Configuring Virtual LANs (VLANs), Trunking Protocols (802.1Q), and Inter-VLAN Routing on Switches.
Week 5	Lab 5: Static Routing and Dynamic Routing Protocol Configuration (RIPv2 & OSPF) on Cisco Routers.
Week 6	Lab 6: Wireshark Packet Sniffing & Protocol Analysis (Analyzing Ethernet, IP, TCP 3-Way Handshake, and HTTP Traffic).
Week 7	Lab 7: Revision, System Troubleshooting, Practical Exam, and Network Project Assessment.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Kurose, J. F., & Ross, K. W. (2021). "Computer Networking: A Top-Down Approach" (8th ed.). Pearson.	Yes
Recommended Texts	Tanenbaum, A. S., & Wetherall, D. J. (2014). "Computer Networks" (5th ed.). Pearson.	Yes
Websites	Yes	

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.