



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Computer Networks		Module Delivery
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CYS217		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	2	Semester of Delivery	
Administering Department	Dept. of Cybersecurity	College	College of Information Technology
Module Leader	Dr. Omar A. Hammood	e-mail	omer.abd@uofallujah.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Omar A. Hammood	e-mail	omer.abd@uofallujah.edu.iq
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Scientific Committee Approval Date	25-5-2026	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. To deepen students' understanding of modern computer network architectures, protocols, and enterprise networking concepts. 2. To develop students' knowledge of Local Area Networks (LANs), switching technologies, and Virtual Local Area Networks (VLANs). 3. To enhance students' ability to design and implement IPv4 and IPv6 addressing and subnetting schemes. 4. To introduce routing concepts, routing protocols, and packet forwarding mechanisms in computer networks. 5. To explain the operation of transport and application layer protocols used in modern network communications. 6. To familiarize students with common network services such as DNS, DHCP, HTTP, FTP, and SSH. 7. To introduce wireless networking technologies and foundational network security mechanisms used in modern networks. 8. To develop students' practical skills in configuring, analyzing, and troubleshooting computer networks using network simulation and diagnostic tools. 9. To prepare students for advanced studies in Network Security, Secure Communication Protocols, Cybersecurity, and Network Administration.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the architecture, components, and operation of modern computer networks and communication protocols. 2. Analyze the operation of switching technologies, network devices, and communication media within enterprise networks. 3. Design IPv4 and IPv6 addressing schemes, including subnetting and address allocation. 4. Configure basic Local Area Networks (LANs), Virtual Local Area Networks (VLANs), and static routing using network simulation tools. 5. Analyze the operation of common transport and application layer protocols, including TCP, UDP, DNS, DHCP, HTTP, HTTPS, FTP, and SSH, through protocol inspection and packet analysis. 6. Evaluate the performance of computer networks using packet capture, monitoring, troubleshooting, and diagnostic techniques. 7. Apply foundational network security mechanisms including ACLs, NAT, firewalls, and VPN technologies to support secure network operations. 8. Use network simulation and network analysis tools (such as Cisco Packet Tracer and Wireshark) to implement, test, analyze, and troubleshoot small and medium-sized computer networks.

	9. Analyze network traffic, packet structures, and protocol behavior using packet capture and diagnostic tools to support network administration and cybersecurity investigations.
Indicative Contents المحتويات الإرشادية	● Review of Computer Network Fundamentals ● Network Architectures and Communication Models ● Ethernet Technologies and LAN Design ● Network Switching Concepts and Operations ● Virtual Local Area Networks (VLANs) and Trunking ● IPv4 Addressing, Subnetting, CIDR, and VLSM ● Introduction to IPv6 Addressing and Configuration ● Routing Concepts and Static Routing ● Introduction to Dynamic Routing Protocols (RIP and OSPF) ● Transport Layer Protocols (TCP and UDP) ● Application Layer Protocols (DNS, DHCP, HTTP/HTTPS, FTP, SMTP, and SSH) ● Wireless Local Area Networks (WLANs) and Wi-Fi Technologies ● Network Address Translation (NAT) and Access Control Lists (ACLs) ● Fundamentals of Network Security (Firewalls, VPNs, IDS/IPS) ● Network Traffic Analysis and Protocol Inspection ● Network Performance Monitoring and Troubleshooting ● Practical Network Configuration, Analysis, and Simulation using Cisco Packet Tracer and Wireshark ● Case Studies and Small Network Design Project

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module is delivered through a combination of interactive lectures, guided discussions, practical laboratory sessions, and problem-solving activities. Students develop theoretical knowledge and practical networking skills through hands-on exercises using network simulation and analysis tools such as Cisco Packet Tracer and Wireshark. Learning is supported by case studies, network design activities, protocol analysis, troubleshooting exercises, and self-directed study to prepare students for advanced networking and cybersecurity modules.

Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	#1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	#3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	#5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	#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	NETWORK PERFORMANCE (Bandwidth, Throughput, Latency (Delay), Jitter, Bandwidth-Delay Product, Packet loss)
Week 2	IPv4 and IPv6 Addressing, Datagram Structure, Fragmentation, and MTU
Week 3	IP Address Subnetting
Week 4	The Network Core (Packet Switching, Circuit Switching)
Week 5	Forwarding, Routing, Data Plane, and Control Plane
Week 6	Routing Algorithms: The Link-State (LS) Routing Algorithm
Week 7	Routing Algorithms: The Distance-Vector (DV) Routing Algorithm
Week 8	Midterm exam

Week 9	Connection-Oriented Transport: TCP (Connection, Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Sequence Numbers, Flow Control, and Congestion Control)
Week 10	UDP and Transport Layer Multiplexing/Demultiplexing (UDP header, checksum, and sockets)
Week 11	Link Layer Fundamentals, Framing, Error Detection and Correction, and Cyclic Redundancy Check (CRC)
Week 12	Ethernet, MAC Addressing, ARP, Switching, and VLANs
Week 13	Wireless LANs (IEEE 802.11), WLAN Architecture, Medium Access, WPA2/WPA3 Security
Week 14	DNS Architecture, Namespace, Process, Records, Caching, and Reverse DNS
Week 15	NAT (Static vs Dynamic, PAT), DHCP (DHCP DORA, Lease)

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Packet Tracer Review and Enterprise Network Topologies
Week 2	IPv4 Addressing and Advanced Subnetting Exercises
Week 3	IPv6 Address Configuration and Connectivity Testing
Week 4	Switch Configuration, MAC Address Tables, and VLAN Creation
Week 5	VLAN Trunking and Inter-VLAN Communication
Week 6	Static Routing Configuration and Route Verification
Week 7	Dynamic Routing with OSPF
Week 8	Practical Midterm Examination
Week 9	Wireshark Fundamentals and Ethernet Frame Analysis
Week 10	IPv4, ICMP, ARP, and Routing Packet Analysis
Week 11	TCP Three-Way Handshake and UDP Traffic Analysis
Week 12	DNS, DHCP, HTTP, HTTPS, FTP, and SSH Traffic Analysis
Week 13	NAT, ACL Configuration, and Traffic Filtering
Week 14	Wireless Network Configuration and Security Fundamentals
Week 15	Packet Forensics, Traffic Analysis and Incident Investigation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Computer Networking: A Top-Down Approach (8th Edition), by James F. Kurose, Keith W. Ross, 2000.	Yes

	2. Routing and Switching Essentials Companion Guide	
Recommended Texts	1. Data and Computer Communications, William Stallings, 2013. 2. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, 2011.	Yes
Websites		

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.				