

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	MOBILE COMMUNICATION NETWORKS		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☐ Seminar
Module Code	MOCN325		
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	2	Semester of Delivery	1
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Dr. Aymen Dawood Salman		e-mail: Aymen.d.salman@uotechnology.edu.iq
Module Leader's Acad. Title	Asst. Lecture	Module Leader's Qualification	Ph.D.
Module Tutor	None		e-mail: None
Peer Reviewer Name	1. Dr. Aymen Dawood Salman		e-mail: Aymen.d.salman@uotechnology.edu.iq
Scientific Committee Approval Date	1 / 4 /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. Understanding Wireless Network Technologies - Learn about WiFi (IEEE 802.11) and its components, including physical and MAC layers. - Study wireless personal area networks like Bluetooth, ZigBee, and UWB. 2 Exploring Ad Hoc and Mobile Networks - Understand Mobile Ad hoc Networks (MANETs) and their characteristics. - Learn about MAC mechanisms, routing protocols, and infrastructure interworking. 3. Analyzing Cellular Communication Systems - Study the fundamentals of GSM, GPRS, and UMTS technologies. - Understand how cellular networks provide connectivity. 4 Examining Advanced Mobile Technologies - Learn about Long-Term Evolution (LTE, LTE-A, LTE D2D, LTE V2X). - Explore the architecture, protocols, and performance enhancements. 5 Understanding Mobile IP and Mobility Management - Learn how Mobile IP supports seamless communication for mobile users. - Understand the challenges of mobility management in mobile networks. 6 Exploring Next-Generation Mobile Networks (5G & 6G) - Analyze the key features, benefits, and use cases of 5G. - Get insights into emerging 6G technologies and their potential impact.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding 1. Explain the fundamental principles of wireless communication and mobile networks. 2. Describe the architecture and protocols of wireless local and personal area networks (WiFi, Bluetooth, ZigBee, UWB). 3. Understand the design and operation of mobile ad hoc networks (MANETs), including routing and medium access control (MAC). 4. Analyze cellular network technologies such as GSM, GPRS, UMTS, and their evolution to LTE and LTE-Advanced. 5. Evaluate next-generation mobile networks (5G & 6G) and their potential

	impact on mobile communications.	
	Cognitive and Analytical Skills	
	6. Compare and contrast different wireless communication standards (IEEE 802.11, LTE, 5G, etc.).	
	7. Assess the advantages and limitations of various mobile communication technologies.	
	8. Critically evaluate routing protocols and MAC schemes in mobile and ad hoc networks.	
	Practical and Technical Skills	
	9. Apply network simulation tools to model and analyze wireless network performance.	
	10. Configure and troubleshoot mobile network components (WiFi, Bluetooth, LTE).	
	11. Develop solutions for mobility management and handover strategies in cellular and ad hoc networks.	
	Communication and Research Skills	
	12. Interpret technical specifications from standards bodies (e.g., IEEE, 3GPP).	
	13. Research emerging mobile technologies and their applications in modern industries.	
	14. Present technical findings in written and oral formats.	
Indicative Contents المحتويات الإرشادية	<u>Wireless Local Area Networks (WiFi, IEEE802.11)</u> • IEEE 802.11 standard, including the physical layer, MAC layer, and access schemes (PCF and DCF) • PHY • MAC • Roaming	[4 hrs]
	<u>Ethernet standards and protocols.</u> • Bluetooth • ZigBee • UWB	[4 hrs]

	<u>Ad hoc Networks</u> • Mobile Ad hoc Network (MANETs) • Characteristics of ad hoc communication • Basics and Application • Medium Access Control (MAC) • Routing Paradigms and Protocols • Interworking with Infrastructure (Addressing Schemes)	[4 hrs]
	<u>Cellular networks</u> • GSM • GPRS • UMTS	[4 hrs]
	<u>Long Term Evolution</u> • LTE • LTE-A • LTE D2D • LTE V2X	[4 hrs]
	<u>Mobile IP</u>	[2 hrs]
	<u>Next Next-generation mobile Networks (5G, 6G)</u>	[4 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Lecture-Based Learning • Deliver theoretical concepts through structured lectures. • Use multimedia presentations, animations, and real-world case studies to enhance understanding. • Invite guest lecturers from the industry to discuss advancements in mobile communication (5G, 6G, IoT). 2. Practical and Hands-On Activities • Conduct lab sessions to explore network simulation tools (e.g., NS-3, Wireshark, MATLAB for wireless systems). • Implemented WiFi, Bluetooth, and LTE configurations in a controlled environment. • Assign projects involving network troubleshooting and performance analysis. 3. Problem-Based Learning (PBL) • Use real-world scenarios (e.g., designing a mobile network for a smart city or optimizing handover in LTE). • Encourage students to identify challenges and propose solutions using industry standards. • Facilitate group discussions and brainstorming to promote critical thinking. 4. Research and Case Studies • Assign literature reviews on recent advancements in 5G, IoT, and MANETs. • Analyze case studies of mobile network deployments (e.g., how 4G/5G is implemented in different countries). • Encourage students to present findings through reports or presentations. 5. Collaborative and Interactive Learning • Organize group projects to design small-scale wireless networks. • Use peer teaching methods, where students explain concepts to each other. • Engage in online discussions and forums for knowledge sharing. 6. Assessment and Continuous Feedback • Conduct quizzes, assignments, and exams to evaluate understanding. • Use practical assessments, such as configuring a wireless network or
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	simulating a mobile communication scenario. Provide continuous feedback to help students improve.
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Student Workload (SWL)					
الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا					
Structured SWL (h/sem)		108	Structured SWL (h/w)		7
الحمل الدراسي المنتظم للطلاب خلال الفصل			الحمل الدراسي المنتظم للطلاب أسبوعيا		
Unstructured SWL (h/sem)		67	Unstructured SWL (h/w)		4
الحمل الدراسي غير المنتظم للطلاب خلال الفصل			الحمل الدراسي غير المنتظم للطلاب أسبوعيا		
Total SWL (h/sem)		175			
الحمل الدراسي الكلي للطلاب خلال الفصل					
Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1- #5 and #6 - #11
	Assignments	2	10% (10)	3 and 12	LO #2 and #5, #7, #11
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5 - #12
Summative assessment	Midterm Exam	2hr	10% (10)	8	LO #1 - #10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المناهج الاسبوعي النظري

	Material Covered
Week 1	- Overview of IEEE 802.11 standard. - Understanding the physical layer (PHY) in WiFi networks.
Week 2	- MAC layer fundamentals and access schemes (PCF and DCF). - Roaming mechanisms in WiFi networks.
Week 3	- Overview of Ethernet standards. - Introduction to Bluetooth technology and its applications.
Week 4	- ZigBee and UWB technologies. - Comparison of different short-range wireless communication standards
Week 5	- Mobile Ad hoc Networks (MANETs) and their characteristics. - Basics and applications of ad hoc communication.
Week 6	- MAC mechanisms and challenges in ad hoc networks. - Routing paradigms and protocols for MANETs.
Week 7	- Addressing schemes in MANETs. - Interworking of ad hoc networks with infrastructure-based networks.
Week 8	Mid-term Exam
Week 9	Cellular Networks – Part 1 (2 hrs) - Introduction to GSM and its architecture. - Understanding GPRS technology and its role in cellular communication
Week 10	Cellular Networks – Part 2 (2 hrs) - UMTS architecture and its evolution from GSM/GPRS. - Comparison of different cellular network generations
Week 11	- Fundamentals of LTE architecture and protocols. - Enhancements introduced in LTE-Advanced (LTE-A).
Week 12	- LTE Device-to-Device (LTE D2D) communication. - LTE Vehicle-to-Everything (LTE V2X) and its applications.
Week 13	- Basics of Mobile IP and its role in seamless communication. - Challenges and solutions in mobility management.
Week 14	- Introduction to 5G technology and its key features. - Use cases and benefits of 5G networks

Week 15	- Emerging concepts in 6G networks. - Potential impact and future applications of 6G.
Week 16	Preparatory week before the final Exam
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Lab Setup & Network Simulation Tools (e.g., NS-3, Wireshark, MATLAB)
Week 2	WiFi Network Analysis: Configuring and Capturing IEEE 802.11 Traffic
Week 3	Bluetooth & ZigBee Communication: Device Pairing and Data Transfer
Week 4	UWB & WPAN Performance Testing
Week 5	MANET Simulation: Configuring Mobile Ad hoc Networks (AODV, DSR Routing)
Week 6	Medium Access Control (MAC) Protocols for Ad hoc Networks
Week 7	GSM Call Setup & Traffic Analysis Using Simulators
Week 8	GPRS & UMTS Packet Transmission and QoS Analysis
Week 9	LTE Network Setup: Exploring LTE Architecture and OFDMA
Week 10	LTE-A and Carrier Aggregation Analysis
Week 11	LTE Device-to-Device (D2D) and V2X Communication
Week 12	Mobile IP & Handoff Simulation Between Networks
Week 13	5G Network Simulation: Analyzing mmWave and Network Slicing
Week 14	6G Vision: AI-Driven Wireless Networks & Edge Computing
Week 15	Lab Exam & Report Submission

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Jochen H. Schiller “Mobile Communications” Second Edition	
Recommended Texts	- Martin Sauter “Communication System for the Mobile Information Society” John Wiley & Sons Ltd. - Data and Computer Communications, William Stallings.	Yes
Websites	Cisco Networking Academy, https://www.netacad.com.	

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.