

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Wireless Sensor Network		Module Delivery	
Module Type	Elective		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CET4207			
ECTS Credits	5.00			
SWL (hr/sem)	150			
Module Level	UGIV	Semester of Delivery		7
Administering Department	CET	College	EETC	
Module Leader	Mahmood Farhan Mosleh		e-mail	drmahmoodfarhan@gmail.com
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Dr. Aseel Hameed Majeed		e-mail	aseel_Alnakkash@mtu.edu.iq
Peer Reviewer Name	Asst. Prof. Alhamzah Taher Mohammed		e-mail	alhamza_tm@mtu.edu.iq
Scientific Committee Approval Date	13/06/2023	Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The aim of the course is to provide students with knowledge and skills for wireless network design, operation and testing, equipment configuration, security considerations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students will know: 1- Electromagnetic signal specifications IEEE802.11 link layer protocol data rates, media access control and logical link control techniques, quality-of-service and security features 2- Wireless network design principles. 3- Perform wireless signal planning and strength measurement. 4- Design wireless network with optimal performance. 5- Plugin and configure wireless network equipment. 6- Build large wireless network with centralized control. 7- Configure wireless network security 8- The necessary skills to design, configure and operate production-grade wireless network.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Introduction</u> Introduction to WSNs, Wireless technology history, modern wireless networks, Advantages, Challenge vs Ad-hoc network. [25 hrs] <u>Part B – Architecture</u> Network architecture, node architecture, types of networks based on its topology, data transfer on media. [25 hrs] <u>Part C – Wi-Fi Protocols</u> IEEE 802.11 (Wi-Fi) protocol design. Wi-Fi physical layer, Wi-Fi data-link layer, Wi-Fi logical link control layer, Wi-Fi quality-of-service (QoS) features, Wi-Fi security features [25 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	
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	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 12	LO #1-8
	Assignments	2	10% (10)	2, 12	LO #1-8
	Projects / Lab.	1	20% (10)	Continuous	
	Report	1	10% (10)	13	LO # 1-8
Summative assessment	Midterm Exam	2 hr	10% (10)	10	LO # 1-4
	Final Exam	4hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1- 2	Course introduction, wireless network introduction. Wireless technology history, modern wireless networks
Week 3-4	Data transfer over wireless media. Electromagnetic waves propagation. Wireless equipment and EM waves specifications. Data modulation and coding schemes, data decoding.
Week 5-6	IEEE 802.11 (Wi-Fi) protocol design. Wi-Fi physical layer: EM signal specifications, data rates, data modulation and coding schemes.
Week 7-8	Wi-Fi data-link layer: data frame structure, media access control, wireless nodes addressing, error detection/correction.
Week 9-10	Wi-Fi logical link control layer: data frame types, control and management frames, multiple network coexistence. Wireless network with multiple access points, roaming.
Week 11-12	Wi-Fi logical link control layer: data frame types, control and management frames, multiple network coexistence. Wireless network with multiple access points, roaming.
Week 13	Wi-Fi security features. 802.1x protocol, WPA/2/3 operation. Network infrastructure security.
Week 14	Wi-Fi centralized architecture. Wireless controller configuration/operation
Week 15	Decentralized Wi-Fi networks (Ad-Hoc, Mesh-type). Introduction to sensor networks. Bluetooth basics

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Node construction.
Week 2	Lab 2: WSNs Topologies.
Week 3	Lab 3: IEEE 802.11 design.
Week 4	Lab 4: Wi-Fi logical link.
Week 5	Lab 5: Wi-Fi quality-of-service measurements.
Week 6	Lab 6: WSNs based on 802.1x protocol.
Week 7	Lab 7: Configuring peer-to-peer network (Wi-Fi Ad-Hoc mode or Bluetooth).

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Wireless Sensor Network, Leonidas J. Guibas, The Morgan Kaufmann Series in Networking, Elsevier, NEW YORK	Yes
Recommended Texts	Kazem Sohraby, Daniel Minoli and Taieb Znati, "Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley & Sons, 2007.	No
Websites	https://kanchiuniv.ac.in/coursematerials/ECE_COURSE_MATERIAL_ODD%20SEMESTER/ECE_COURSE%20MATERIAL_ODD%20SEMESTER/Dr.S.Omkumar_Wireless%20Sensor%20Networks.pdf	

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.