

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	IoT Fundamentals		Module Delivery
Module Type	Elective		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	CET3207		
ECTS Credits	5		
SWL (hr/sem)	150		
Module Level	3	Semester of Delivery	
Administering Department	CET	College	EETC
Module Leader	Mahmoud Shuker Mahmoud	e-mail	Mahmoud.shukur@mtu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Mohammed Joudah Zaiter	e-mail	mjzaiter@mtu.edu.iq
Peer Reviewer Name	Dr. Osama Abbas Hussein	e-mail	osama.abbas@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	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the basic principles of the Internet of Things. 2. To study the relationship between IoT and M2M. 3. To deal with using Arduino for IoT implementation. 4. To deal with using Raspberry Pi for IoT implementation. 5. To apply IoT solutions in different fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic concepts, architecture, and components of the Internet of Things (IoT). 2. Identify and describe the various networking technologies and protocols used in IoT systems, such as Wi-Fi, Bluetooth, Zigbee, and MQTT. 3. Explain the role of sensors, actuators, and embedded systems in IoT applications. 4. Gain knowledge of different IoT platforms and frameworks for developing IoT solutions. 5. Demonstrate proficiency in designing and implementing simple IoT applications using Arduino boards. 6. Gain knowledge of using Python with the IoT platforms. 7. Demonstrate proficiency in designing and implementing simple IoT applications using Raspberry Pi boards. 8. Understand the principles of data communication and data management in IoT systems, including data collection, storage, and analysis. 9. Evaluate the impact of IoT on various industries, such as healthcare, transportation, agriculture, and smart cities. 10. Develop skills in integrating IoT devices and systems with cloud platforms and web services. 11. Apply IoT technologies to solve real-world problems and develop innovative IoT applications. 12. Collaborate effectively in teams to design and implement IoT projects or case studies.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - IoT concepts [14 hrs] Introduction to the Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks. Part B – IoT using Arduino [16 hrs] Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors, and Actuators with Arduino,

	Part C – IoT Using Raspberry Pi [16 hrs] Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi, Introduction to Software-defined Network (SDN), SDN for IoT, Data Handling, and Analytics. Part D – IoT Applications [20 hrs] Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT, Case Study: Agriculture, Healthcare, Activity Monitoring.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	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 types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعاً

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)	5, 13	LO #1-5 and 6-10
	Projects / Lab.	2	20% (20)	Continuous	All
	Seminars	1	10% (10)	15	LO # 11, 12
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الأسبوعي النظري	
	Material Covered
Week 1	introduction to the Internet of Things
Week 2	IoT and M2M
Week 3	Introduction to Arduino Programming and Interfacing
Week 4	Implementation of IoT with Arduino
Week 5	Introduction to Raspberry Pi and Interfacing
Week 6	Implementation of IoT with Raspberry Pi
Week 7	Mid Term Exam
Week 8	Data Handling and Analytics
Week 9	Sensor-Cloud
Week 10	Smart Cities and Smart Homes
Week 11	Connected Vehicles
Week 12	Smart Grid
Week 13	Industrial IoT
Week 14	IoT Security
Week 15	IoT Case Study: Agriculture, Healthcare, Activity Monitoring
Week 16	A preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Led Control Using Arduino Board
Week 2	Lab 2: Potentiometer And Ir Sensor Interfacing With Arduino
Week 3	Lab 3: Controlling Two Actuators Using Arduino
Week 4	Lab 4: Creation of Things Speak Account
Week 5	Lab 5: Actuator Controlling Through Cloud
Week 6	Lab 6: Dht11sensor Data To Cloud
Week 7	Lab 7: Iot Based Air Pollution Control System
Week 8	Lab 8: Tds Sensor Interfacing With Arduino
Week 9	Lab 9: Actuator Controlling by Mobile Using Arduino

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press) - Vijay Madiseti, Arshdeep Banga, "Internet of Things: A Hands-On Approach"	
Recommended Texts	Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress,	
Websites	Cisco Netacad course " Introduction to IoT" Learn Key Concepts With Introduction To IoT Course Networking Academy (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.				