

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	المسيطرات الدقيقة		Module Delivery	
Module Type	اختيار 1		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MIET4106			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGIV	Semester of Delivery		7
Administering Department	Type Dept. Code	College	Faculty of Engineering Techniques	
Module Leader	Ehsan najeh shamran		e-mail	ehsannajeh1992@gmail.com
Module Leader's Acad. Title	Assis. Lect.	Module Leader's Qualification	M.Sc.	
Module Tutor	Ehsan najeh shamran		e-mail	E-mail
Peer Reviewer Name	Ehsan najeh shamran	e-mail	ehsannajeh1992@gmail.com	
Scientific Committee Approval Date	20/3/2026	Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Programming and Applications (C++ programming)	Semester	Five
	MIET3105		MIET3105
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 familiarize oneself with the various types of Arduino boards. 2. To acquire proficiency in programming Arduino using the C/C++ language. 3. To gain expertise in programming Arduino with MATLAB software. 4. To differentiate between digital and analog inputs on Arduino. 5. To enhance students' understanding of interfacing analog sensors with Arduino. 6. To enhance students' understanding of interfacing digital sensors with Arduino. 7. To master the process of interfacing an LCD with Arduino. 8. To effectively program hardware interrupts and PWM on Arduino. 9. To educate students on generating different waveforms using Arduino. 10. To instruct students on utilizing Arduino's power-saving sleep modes. 11. To develop programs for data transmission and reception using Arduino. 12. To interface Arduino with WiFi, ZigBee, and Bluetooth technologies. 13. To interface Arduino with GPS and GSM modules. 14. To utilize the Arduino programming platform for Health Monitoring based on IoT.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Familiarizing oneself with the various types of Arduino boards. 2. Attaining proficiency in programming Arduino using the C/C++ language. 3. Acquiring expertise in programming Arduino using MATLAB software. 4. Distinguishing between digital and analog inputs in Arduino. 5. Enhancing students' understanding of interfacing analog sensors with Arduino. 6. Improving students' comprehension of interfacing digital sensors with Arduino. 7. Educating students on interfacing an LCD with Arduino. 8. Learning program hardware interrupts and PWM on Arduino. 9. Educating students on generating diverse waveforms using Arduino. 10. Instructing students on effectively utilizing Arduino's power-saving sleep modes. 11. Developing programs for data transmission and reception using Arduino. 12. Using Arduino with WiFi, ZigBee, and Bluetooth technologies. 13. Establishing interfaces between Arduino and GPS and GSM modules. 14. Employing the Arduino programming platform for IoT-based Health Monitoring.
Indicative Contents المحتويات الإرشادية	<u>Indicative Contents including the following:</u> - Arduino types, Programming Language in C/C++ and MATLAB [6 hrs]. - Instruction set for Digital and Analog Inputs of Arduino [2 hrs]. - Programming Analog and Digital Sensors, LCD, Hardware interrupts, PWM, [8 hrs]. - Programming Arduino to get sine, square, and triangle waves [2 hrs]. - Programming Arduino to utilize Power Saving Sleep Modes [2 hrs]. - Programming Arduino for data Transmission /Reception for two Arduinos, WiFi, ZigBee, Bluetooth, GPS, and GSM, and using IoT to transmit the sensor data to remote locations [8 hrs].

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The primary approach employed for delivering this module aims to foster the active engagement of students in programming various types of microcontrollers based on the Arduino platform. Simultaneously, it aims to enhance their programming skills and deepen their understanding of microcontrollers in medical applications. The module will incorporate classroom sessions, lectures, and hands-on laboratory experiments to accomplish this. The laboratory exercises will include the utilization of some components used in medical applications, ensuring an intriguing learning experience for the students.
-------------------	---

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	5, 8	LO # 1-4, and 5-7
	Assignments	2	5% (5)	5, 12	LO # 1-4, and 5-10
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	14	All
Summative assessment	Midterm Exam	2 hr	20% (20)	12	LO # 1-11
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Arduino
Week 2	Arduino Programming Language in C/C++ (part 1)
Week 3	Arduino Programming Language in C/C++ (part 2)
Week 4	Arduino Programming based on MATLAB Software
Week 5	Digital and Analog Inputs of Arduino
Week 6	Interfacing Analog Sensors with Arduino Interfacing Digital Sensors with Arduino
Week 7	Midterm exam
Week 8	Interfacing LCD with Arduino
Week 9	Hardware Interrupt and PWM of Arduino
Week 10	Waveforms Generation based on Arduino
Week 11	Arduino Power Saving Sleep Modes
Week 12	Data Transmission/Reception based on Arduino
Week 13	Interfacing Arduino with WiFi, ZigBee, and Bluetooth
Week 14	Interfacing Arduino with GPS and GSM
Week 15	IoT-based Arduino for Health Monitoring Preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Identify the types of microcontroller platforms and the difference between them
Week 2	Lab 2: Random number generation based on the Arduino platform and IDE software
Week 3	Lab 3: Blinking LED based on Arduino platform and IDE software
Week 4	Lab 4: interfacing Arduino with a push-button switch
Week 5	Lab 5: interfacing Arduino with Potentiometer
Week 6	Lab 6: interfacing Arduino with Light-Dependent Resistor (LDR)
Week 7	Lab 7: interfacing Arduino with Temperature sensor LM35
Week 8	Lab 8: interfacing Arduino with Ultrasound sensor
Week 9	Lab 9: interfacing Arduino with Servo motor

Week 10	Lab 10: Generating PWM based on the Arduino platform and IDE software
Week 11	Lab 11: Generating Square wave based on the Arduino platform and IDE software
Week 12	Lab 12: Generating triangle wave based on the Arduino platform and IDE software
Week 13	Lab 13: Generating text on LCD based on the Arduino platform and IDE software
Week 14	Lab 14: Generating symbols on LCD based on the Arduino platform and IDE software
Week 15	Lab 15: Data Transmission/Reception between two Arduinos

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Arduino Cookbook , by Michael Margolis, March 2011: First Edition. Michael Margolis and Nicholas Weldon. Printed in the United States of America.	No
Recommended Texts	Arduino Applied: Comprehensive Projects for Everyday Electronics, by Neil Cameron Edinburgh, UK, 2019 by Neil Cameron	No
Websites	https://www.arduino.cc/	

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.


د.د. هارون عبد الكاظم
الحيد

عميد الكلية : أ.د. هارون عبد الكاظم شهد

التاريخ : 2026 / 3 / 20



رئيس القسم : أ.د. محمود شاكر نصر

التاريخ : 2026 / 3 / 20



اسم التدريسي: م.م احسان ناجح شمرا

التاريخ : 2026 / 3 / 20