

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Electrical Fundamentals		Module Delivery
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	MECT 105		
ECTS Credits	6		
SWL (hr/sem)	180		
Module Level	UGx11 1	Semester of Delivery	1
Administering Department	Mechatronics	College	Engineering Technologies
Module Leader	Morteza Abbas Imran	e-mail	mortezaabbas@hilla-unc.edu.iq
Module Leader's Acad. Title	Assistant lecturer	Module Leader's Qualification	MSc
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	10/3/2026	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 Aims أهداف المادة الدراسية	1. Introduce fundamental principles of circuit theory commonly used in engineering science applications. 2. To understand voltage, current, resistance, impedance. 3. To understanding Techniques and principles of electrical circuit analysis including basic concepts like Ohm's law. 4. This course deals with the basic electric circuit analysis techniques, resistive circuits, circuits with DC and sinusoidal sources, energy and power. 5. This is the basic subject for all electrical and electronic circuits. 6. To understand Kirchhoff's current and voltage Laws problems. 7. To perform mesh and Nodal analysis and superposition theorem.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems. 2. To develop an understanding of the fundamental laws and elements of electric circuits. 3. To learn the energy properties of electric elements and the techniques to measure voltage and current. 4. To be able to understand basic electrical properties as well as understand waveforms, signals and RLC circuits. 5. To develop the ability to apply circuit analysis to DC and AC circuits.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The primary approach to be employed in teaching this module aims to promote active engagement of students in the exercises, while also enhancing their ability to think critically. This objective will be accomplished through a combination of interactive classes, tutorials, and the inclusion of captivating sampling activities that pique the students' interest.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	107	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Systems of Units, Charge and Current, Voltage, Power and Energy, The Resistance, Ohm's law, Effect of Temperature on Resistance, Conductance and Conductivity
Week 2	Reading Resistor Colour Code, Nodes, Branches, Loops, and Kirchhoff's Current Law (KCL)
Week 3	Kirchhoff's Voltage Law (KVL), Series Resistors and Voltage Division, and Parallel Resistors and Current Division
Week 4	Wye-Delta Transformations: Delta to Wye Conversion; Wye to Delta Conversion
Week 5	Methods of Analysis: Nodal Analysis; Nodal Analysis with Voltage Sources
Week 6	Methods of Analysis: Mesh Analysis; Mesh Analysis with Current Sources, supposition theorem

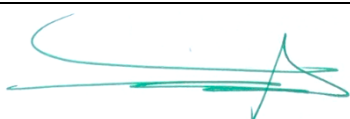
Week 7	Source Transformation; Thevenin's Theorem
Week 8	Norton's Theorem; Maximum Power Transfer
Week 9	Capacitors and Inductors: Capacitors; Capacitors in series; Capacitors in Parallel
Week 10	Capacitors and Inductors: Inductors; Inductors in series; Inductors in Parallel
Week 11	Sinusoids and Phasors
Week 12	Phasor Relationships for Circuit Elements (Resistance, Inductance and Capacitor)
Week 13	Impedance and Admittance; Impedance Combinations (Series and Parallel)
Week 14	AC Power Analysis: Instantaneous and Average Power; Maximum Average Power Transfer
Week 15	AC Power Analysis: Apparent Power and Power Factor; Complex Power; Power Factor Correction
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Electrical Laboratory: Lab Safety, Tools, DC Sources, Metering, Resistors Color Code, Groups Arrangement and Report Preparing
Week 2	Ohm's Law
Week 3	Resistance connected in series
Week 4	Resistance connected in parallel
Week 5	Resistance connected in series and parallel
Week 6	Kirchhoff's Current Law
Week 7	Kirchhoff's Voltage Law
Week 8	Current Divider Rule and Voltage Divider Rule
Week 9	Nodal Analysis
Week 10	Mid Semester Lab. Exam
Week 11	Thevenin's Theorem
Week 12	Norton's Theorem
Week 13	RLC in series
Week 14	RLC in Paralell
Week 15	Final Semester Lab. Exam

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Introductory Circuit Analysis by Robert L. Boylestad.	yes
Recommended Texts	Fundamentals of Electric Circuits by Charles K. Alexander, A Textbook of Electrical Technology by B.L. Theraja	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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.



العميد

أ.د. هارون عبد الكاظم شهد



رئيس القسم

أ.د. حسين فاضل حمدان



مدرس المادة

م.م مرتضى عباس عمران