MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**AC Electrical Circuits**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**UOMU0207023**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department			**College**	NETC	
Module Leader	Mohammed Rehma		**e-mail**	mohammed.rahma@uomus.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name					
Scientific Committee Approval Date		01/10/2024	**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. To develop problem solving skills and understanding of AC circuits theory and AC circuits analysis through the application of techniques. 2. To understand voltage, current and power from a given AC circuit. 3. This course deals with the basic concept of AC electrical circuits. 4. To understand Poly Phase Circuits. 5. To understand Resonance circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the principles of sinusoidal signals and phasors. 2. Explain how sinusoidal signals behave when interact with AC circuits elements. 3. Learn the various terms associated with AC electrical circuits. 4. Learn the behavior of capacitors and inductors when connected to AC sources. 5. Learn the basics of circuits connections (series, parallel, and Y-Δ connections). 6. Describe the operation of RC, RL, and RLC circuits. 7. Explain the basic rules of AC electric circuits analysis, such as Ohm's law, voltage and current division rules, and Kirchhoff's laws. 8. Explain circuits analysis methods, such as nodal and meth analysis methods. 9. Explain circuits analysis theorems, such as Thevenin's and Norton's theorems, in addition to superposition principle and maximum average power transfer. 10. Explain Poly Phase Circuits. 11. Explain Resonance circuits.
Indicative Contents المحتويات الإرشادية	<u>Basic Concepts</u> Sinusoidal signals and their properties, Phasors, phasor representations, and time domain signals vs phasor domain signals. <u>AC Circuits Elements</u> Resistors, capacitors, and inductors: voltage-current relationship, impedance and admittance, equivalent circuits of capacitors and inductors as a function of signal frequency. <u>Basic Laws, Analysis Methods, and Theorems in AC</u> Series and parallel connections, Ohm's law, Kirchhoff's laws, Voltage and current division rules. Nodal analysis and Mesh analysis. Thevenin's and Norton's theorems, in addition to superposition principle. <u>AC power Analysis</u> Active power, reactive power, apparent power, power triangle, power factor correction. instantaneous and average power, maximum average power transfer. <u>Resonance:</u> Series resonance, quality factor, selectivity, bandwidth, parallel resonance.

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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
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 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Sinusoidal signals and their properties.
Week 2	Phasors: phasor representation, derivatives and integrals of sinusoids in phasor domain,
Week 3	AC Circuits Elements: V-I relationship of resistors, capacitors, and inductors.
Week 4	Series and parallel circuits: series circuits, voltage divider rule, current divider rule.
Week 5	Kirchhoff's Laws.
Week 6	Circuit Analysis – Nodal and mesh methods.
Week 7	**Mid-term Exam.**
Week 8	Superposition principle, and source transformation.
Week 9	Thevenin's and Norton's Theorems.
Week 10	AC Power Analysis: Instantaneous and average power, maximum average transferred power,
Week 11	AC Power Analysis: Active power, reactive power, apparent power, power factor.
Week 12-13	Resonance: Series resonance, quality factor, selectivity, bandwidth, parallel resonance, derive resonance frequency for many circuits
Week 14-15	Basic intro to three phase systems, balance load, unbalance load, power in three phase circuits.
Week 16	**Final Exam.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Series RL circuits.
Week 2	Lab 2: Series RC circuits.
Week 3	Lab 3: Parallel RL circuits.
Week 4	Lab 4: Parallel RC circuits.
Week 5	Lab 5: Series RLC circuits.
Week 6	Lab 6: Parallel RLC circuits.
Week 7	Lab 7: Superposition theorem
Week 8	Lab 8: Maximum average AC power transfer.
Week 9	Mid-term exam
Week 10	Measure AC Power

Week 11	Lab 11: Maximum average AC power transfer.
Week 12	Series Resonance
Week 13	Parallel Resonance
Week 14	Measure power in three phase circuits
Week 15	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	- Introductory to circuit analysis by Boylestad.	Yes
Recommended Texts	Fundamentals of Electric Circuits by C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education Electric circuits, Pearson Education by Nilsson, James William Textbook of Electrical Technology-Volume I (Basic Electrical Engineering), by Theraja, B. L. A.	No
Websites		

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.