

MODULE DESCRIPTION FORM



Module Information				
Module Title	Electrical Circuits		Module Delivery	
Module Type	Basic		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☐ Seminar	
Module Code	LAER110			
ECTS Credits	5			
SWL (hr/sem)	95 H/Sem.			
Module Level	1	Semester of Delivery		2
Administering Department	Laser &	College	College of Engineering	
Module Leader	MOAMEL ALWAN		e-mail	alwanmoamel@gmail.com
Module Leader's Acad. Title	Master.		Module Leader's Qualification	Master.
Module Tutor	Zahraa Hussein Najm		e-mail	zahraa2003hhhooo@gmail.com
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Scientific Committee Approval Date		Version Number	1.0	

Relation with other Modules			
Prerequisite module	MDER 110	Semester	1
Co-requisites module	MDER 120	Semester	2

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To define and explain the fundamental concepts of sinusoidal AC waveforms, impedance, phasors, and the behavior of R, L, and C elements in AC circuits. 2. • analyze AC circuit techniques, including complex numbers, mesh and nodal analysis, source conversion, and delta–star transformations in solving circuit problems. 3. • To design and evaluate AC circuits by assessing power components (P, Q, S), power factor, and overall circuit performance using appropriate analytical methods.
Module Learning Outcomes	

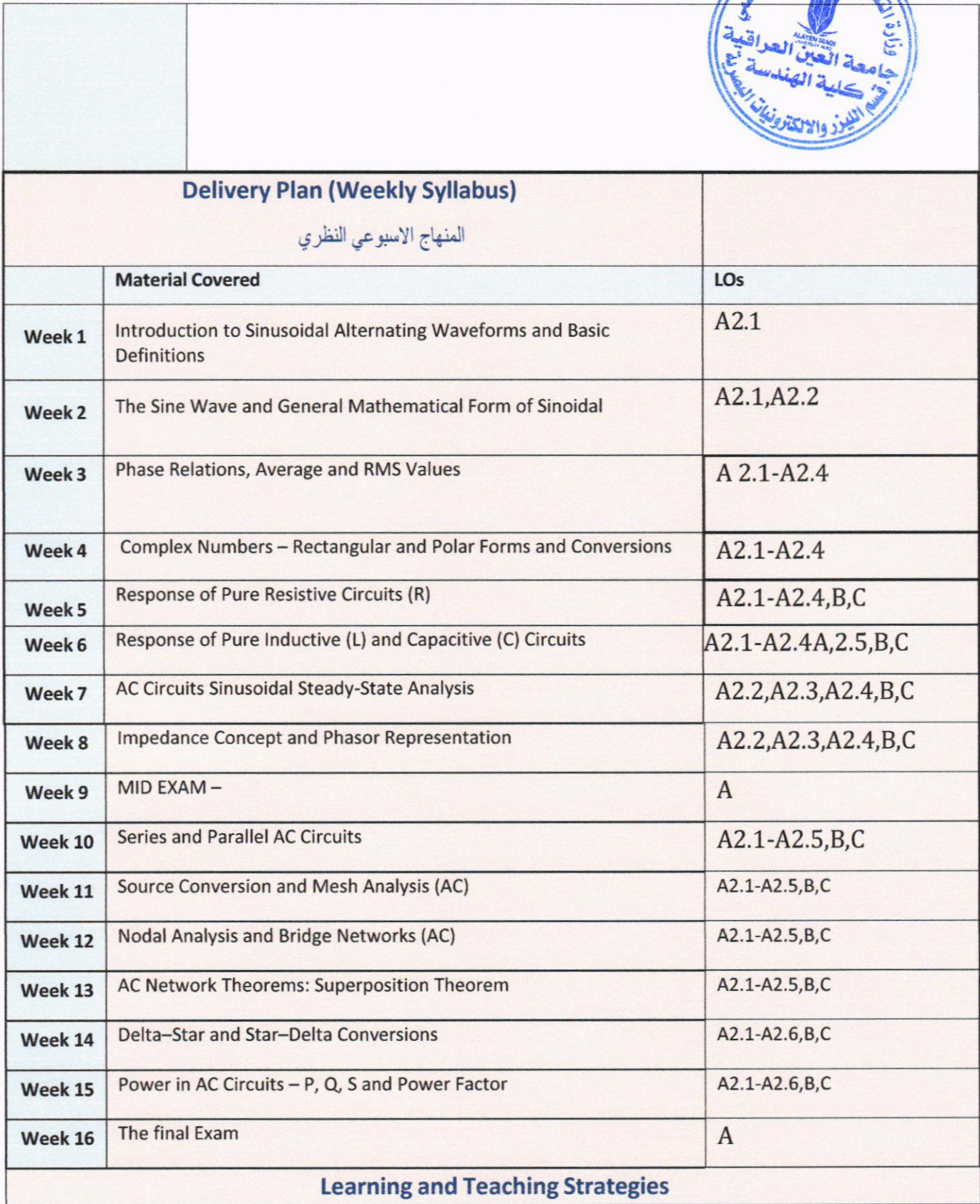
A	A2	A2.1: Define the Sinusoidal Alternating Waveforms A 2.2 Memorize, Sinusoidal AC Voltage Characteristics and Definitions
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		A2.3 Understand the General Format for the Sinusoidal Voltage or Current. And Phase Relations, Average Value Effective (RMS) Value A2.4 Classify the rules and circuit A 2.5: Explain the operation of series, parallel, and series-parallel DC And AC circuits, applying Kirchhoff's Laws, voltage divider, and current divider rules. A 2.6 Use the Rules (• Source Conversions (AC), Mesh Analysis (AC), Nodal Analysis (AC), Bridge Networks (AC) and Delta–Star and Star–Delta Conversions)
	A 3	A 3.1 Name of the basic device for Ac A 3.2 Explain the device and circuit.(Ac principles, including , Kirchhoff's Laws, Source Conversions , and Nodal Analysis) A 3.3 Apply circuit analysis methods, rules, and theorems A3.4 Calculate the experimental result
B	B2	B.2.1 Communicate effectively – graphically with a range of audiences using contemporary tools. B.2.2 Communicate verbally and in writing with a range of audiences using contemporary tools.
	B3	B.3.1 Acquire and apply new knowledge. B.3.2 Practice the strategies of searching for information in life – long self-learning
C	C1	C.3.1 Utilize contemporary technologies C.3.2 Make use of codes of practice and standards, quality guidelines, C.3.3 Utilize health and safety requirements

		C.3.4 Show environmental issues and risk management principles.
	Indicative Contents	Part A – Sinusoidal Fundamentals and Mathematical Tools (16 hrs) • Sinusoidal Alternating Waveforms • Sinusoidal AC Voltage Characteristics and Definitions • The Sine Wave • General Format for the Sinusoidal Voltage or Current • Phase Relations • Average Value • Effective (RMS) Value • Complex Numbers • Rectangular Form • Polar Form (8 hrs + 8 hrs) SM Part B – AC Circuit Response and Network Analysis (24 hrs) • Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current (8 hrs) • Series AC Circuits, Impedance and Phasor Diagram, Series Configuration (8 hrs) • Parallel AC Networks (4 hrs) • Series–Parallel AC Networks with Illustrative Examples (4 hrs) Total = 24 hrs SM Part C – AC Analysis Methods and Power (20 hrs) • Methods of Analysis (AC) • Source Conversions • Mesh Analysis (8 hrs) • Nodal Analysis • Bridge Networks (AC) • Delta–Star Conversions (8 hrs) • Power in AC • Apparent Power • Inductive Circuits and Reactive Power (4 hrs) • Power Triangle • Total P, Q, and S • Power Factor (8 hrs) • Total = 20 hrs







Strategies	• Presentations • Brainstorm • Tutorial and graphics • Problem solving • Research and reporting • Problem Solving • Report & discussion assessment		
			
Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	4.13
Unstructured SWL (h/sem)	33	Unstructured SWL (h/w)	2.2
Total SWL (h/sem)	95		

Method of Assessment	Week (Schedule)	Value
Final Exam	16	50%
Exercises	4,8,15	10%
Midterm Exam	9	10%
Assignments	3, 5, 6, 7, 8, 9, 12, 13,14,15	10%
Quizzes	4, 7, 11,15	10%
Attendance	Every week	10%

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر		
	Material Covered	LOs
Week 1	Measurement of Sinusoidal Waveforms and RMS Value	A 3.1
Week 2	Introduction to AC Lab Instruments (Function Generator, Oscilloscope, AC Voltmeter, Multimeter)	A3.2-3.4
Week3	Phase Difference Measurement using Oscilloscope	A3.2-3.4
Week 4	Verification of Impedance in Pure Resistive Circuit (R)	A3.2-3.4,B,C
Week 5	Response of Inductive Circuit (L)	A3.2-3.4B,C
Week6	Response of Capacitive Circuit (C)	A3.2-3.4B,C
Week7	Mesh Analysis Method	A3.2-3.4 B,C
Week 8	Series-Parallel AC Network Analysis	A3.2-3.4,B,C

Week 10	Verification of Nodal Analysis in AC Circuits	A3.1,A3.5,B,C
Week 11	Delta–Star Conversion Experiment	A3.1,A3.5,B,C
Week 12	Measurement of Average Power and Power Factor	A3.1,A3.5,B,C
Week13	Power Triangle Verification (P, Q, S)	A3.1,A3.5,B,C
Week14		A3.1,A3.5,B,C



Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Charles K. Alexander and Matthew N.O. Sadiku, Fundamentals of Electric Circuits	Yes
Recommended Texts	Boylestad, R. L., & Nashelsky, L. Electronic Devices and Circuit Theory (11th ed.). Pearson	Yes
Websites	Microsoft Math Soft MathCad Autograph	

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.

