

	Ministry of Higher Education and Scientific Research - Iraq Al-Naji University College of Engineering Department of Cybersecurity Engineering	
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Electrical Circuits Analysis			Module Delivery	
Module Type	S			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	CSE1203				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UG I		Semester of Delivery		
Administering Department	CSE		College	7294	
Module Leader	Dr. Mohammed Ali Tawfeeq		e-mail	mohammed.tawfeeq@alnaji-uni.edu.iq	
Module Leader's Acad. Title	Professor		Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)		e-mail	E-mail	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date	11/06/2023		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 Objectives أهداف المادة الدراسية	1. Understand basic DC circuit technology. 2. Analyze circuits with methods of analysis and star-delta transformation. 3. Application of Network Theorems in DC circuits. 4. Understand basic AC circuit technology. 5. Apply circuit analysis methods and theorems in AC and R, L, and C circuits. 6. Calculate and discriminate various power types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. Summarize what is meant by a basic electric circuit. 3. Discuss the series and parallel DC circuits. 4. Explain the two Kirchhoff's laws used in circuit analysis. 5. Discuss voltage and current divider rules used in circuit analysis. 6. Discuss various methods of circuit analysis (branch, mesh, node). 7. Discuss various network theorems (Thevenin, Norton, superposition, maximum power transfer). 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors with AC circuits. 10. Identify the methods of analysis and network theorems in AC circuits. 11. Identify the power analysis and the power triangle in AC (P, Q, and S).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network theorems, Introduction to methods of analysis (branch, mesh and nodal analysis). [14 hrs] AC circuits – Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers., average and RMS values. Capacitance and inductance, energy storage elements, application of network theorems and methods of analysis in AC. Power and the power triangle (P, Q, and S). [14 hrs] Revision problem classes [2 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: 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 اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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 #8
	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
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

Summative assessment	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fundamentals of DC circuits: current, voltage, circuit components, conductors & insulators, semiconductors.
Week 2	Fundamentals of DC circuits: Ohms law , dc power, energy, efficiency.
Week 3	Series Circuits: Kirchhoff's voltage law, voltage divider rule, voltage regulation.
Week 4	Parallel Circuits: Kirchhoff's current law, current divider rule, power distribution.
Week 5	Network Theorems: Thevenins theorem , Norton's theorem , applications.
Week 6	Network Theorems: Superposition theorem, maximum power transfer, applications.
Week 7	Methods of Analysis: Branch Current analysis, Mesh analysis.
Week 8	Methods of Analysis: Nodal method analysis, Y & Δ conversion.
Week 9	AC fundamentals: definitions, sinusoidal waveform , phase relation, peak values, rms value & average values.
Week 10	The Basic Elements and Phasors: Response of inductors & capacitors in ac circuits, average power & P.F.
Week 11	The Basic Elements and Phasors: complex numbers, polar & rectangular forms.
Week 12	Series and Parallel AC Circuits: The R-L-C circuit in series, impedance diagram, voltage division.
Week 13	Series and Parallel AC Circuits: The R-L-C in parallel, admittance, current division.
Week 14	Network Theorems (AC): Application of circuit theories for ac circuits, Thevenin's theorem, and Norton's theorem.
Week 15	Power (AC): AC power: Real, Reactive and Apparent power, the power triangle, P.F. and P.F. correction.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Fundamentals of circuit lab& instruments, how to write the lab report.
Week 2	Applying & proving Ohms law, dc power, maximum power transfer.
Week 3	Applying & proving Kirchhoff's laws: kcl , kvl.
Week 4	Network theorems.
Week 5	Ac circuits fundamentals: sinusoidal signal generation, measuring & control of time base, frequency, peak values, rms value & average values.
Week 6	The R-L-C circuit in series and parallel, application & measurements. AC power & power factor.
Week 7	Application of network theorems and methods of analysis in AC.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	INTRODUCTORY CIRCUIT ANALYSIS, 5th Edition By : ROBERT L. BOYLESTAD , Prentice Hall	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering https://mdl.coie-nahrain.edu.iq	

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.

