	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al-Anbiyaa College of Advanced Technologies Department of Electrical Engineering Techniques	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	DC Electrical Circuits			**Module Delivery**	
Module Type	Core			☒Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	EET1101				
ECTS Credits	8				
SWL (hr./sem)	200				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Electrical Engineering Techniques		**College**	College of Advanced Technologies	
Module Leader	Majli Nema Hawas		**e-mail**	majli.nema@uowa.edu.iq	
Module Leader's Acad. Title	Assist. Prof. Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Majli Nema Hawas		**e-mail**	majli.nema@uowa.edu.iq	
Peer Reviewer Name	Assist. Prof. Dr. Ali M Mohsen		**e-mail**	ali.mohsen@uowa.edu.iq	
Scientific Committee Approval Date	23\1\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. To develop a thorough understanding of the scientific principles that govern DC electrical circuits, including voltage, current, resistance, and power relationships. 2. To apply scientific laws, such as Ohm's law and Kirchhoff's laws, to accurately analyze and solve electrical circuits. 3. To explore the scientific properties and behavior of circuit components, including resistors and understand their impact on circuit performance. 4. To enhance problem-solving skills by scientifically analyzing complex circuit configurations and proposing appropriate solutions. 5. To investigate the scientific principles underlying circuit design and evaluation, including the selection of components based on scientific criteria and the assessment of circuit performance using scientific measurements. 6. To study the scientific aspects of transient and steady-state behavior in circuits, including the analysis of DC and AC circuits, and interpret scientific data represented by voltage and current waveforms. 7. To utilize scientific simulation tools and modeling techniques for scientific exploration, experimentation, and validation of circuit behavior. 8. To emphasize the importance of adhering to scientific safety protocols when working with electrical circuits, ensuring compliance with scientific guidelines and standards. 9. To establish connections between scientific principles and practical scenarios, highlighting the scientific relevance of electrical circuits in real-world scientific applications and technological advancements. 10. To foster scientific critical thinking skills in evaluating circuit configurations, proposing scientifically-based design improvements, and scientifically assessing limitations and potential risks associated with circuit operation.		
Module Learning Outcomes	1. Understand fundamental concepts in electrical circuits (voltage, current, resistance, power, energy) and their relationships.		

مخرجات التعلم للمادة الدراسية	2. Apply circuit analysis techniques (Ohm's law, Kirchhoff's laws, network theorems) to analyze and solve circuits. 3. Identify and describe characteristics of circuit components (resistors, capacitors, inductors, operational amplifiers). 4. Analyze series and parallel circuits, calculate equivalent resistances, and understand voltage/current division. 5. Apply circuit theorems and techniques (superposition, nodal analysis, mesh analysis, source transformation) for circuit simplification and analysis. 6. Analyze transient and steady-state responses of circuits under DC and AC conditions. 7. Analyze DC circuits using phasor notation, impedance, and understand reactance and complex power. 8. Utilize circuit simulation software for modeling, simulating, and analyzing circuits. 9. Understand electrical safety practices and ethical considerations in working with circuits. 10. Apply critical thinking and problem-solving skills to analyze and solve circuit problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Circuit Theory 1. 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 reduction, Introduction to mesh and nodal analysis. [14 hrs.] 2. RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor, use of Bode plots, use of differential equations and their solutions. Time response (natural and step responses). Introduction to second order circuits. [14 hrs.] 3. Revision problem classes [6 hrs.] Part B - Analogue Electronics 4. Fundamentals: Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [16 hrs.] 5. Components and active devices: Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [14 hrs.]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Two main strategies 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 type of simple experiments involving some sampling activities that are interesting to the students. 1. Theory-Based Lectures: Traditional classroom lectures are used to present theoretical concepts, principles, and theories related to electrical engineering. Professors or instructors explain complex ideas, provide examples, and engage students in discussions to foster understanding. 2. Laboratory Experiments: Laboratory sessions are an integral part of electrical engineering education. Students engage in hands-on experiments, using equipment, instruments, and software tools to apply theoretical knowledge, analyze data, and gain practical skills. This helps them understand the practical aspects of electrical engineering and reinforces theoretical concepts.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10 % (10)	5,10	LO # 1,2,8 and 9
	Assignments	3	10% (10)	2,8,12	LO # 3,4,6 and 7
	Lab.	14	10 % (10)	Continuous	All
	Report	14	10 % (10)	14	LO # 1-14
Summative assessment	**Midterm Exam**	2 hr.	10 % (10)	7	LO # 1-7
	Final Exam	4 hr.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• Introduction to DC circuits and circuit elements. • Voltage, current, and resistance (Ohm's Law).
Week 2	• Kirchhoff's Laws. • Series and parallel circuits. • Circuit analysis techniques: Node voltage method.
Week 3	• Circuit analysis techniques: Mesh current method. • Superposition theorem.
Week 4	• Thevenin's theorem. • Norton's theorem
Week 5	• Maximum power transfer theorem. • Capacitors in DC circuits: Charging and discharging.
Week 6	• Inductors in DC circuits: Transients and time constants.
Week 7	• Transients in RC circuits • Capacitive and inductive reactance
Week 8	• Transients in RL circuits • Natural response and forced response
Week 9	• Transients in LC circuits • Resonance in series and parallel circuits
Week 10	• Mesh analysis with dependent sources
Week 11	• Network theorems: Millman's theorem, reciprocity theorem
Week 12	• Introduction to three-phase circuits
Week 13	• Delta-star transformation
Week 14	• Three-phase circuits: Delta and star connections
Week 15	• Review and revision
Week 16	Preparatory week before the final Exam
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• Introduction to laboratory equipment and safety procedures. • Measurement of voltage, current, and resistance using multimeters.
Week 2	• Verification of Ohm's Law and Kirchhoff's Laws in series and parallel circuits. •Measurement of power and energy.
Week 3	• Superposition theorem verification, Thevenin's and Norton's theorem verification
Week 4	• Maximum power transfer demonstration. • Charging and discharging of capacitors in RC circuits.
Week 5	• Transient response of RL circuits. • Measurement of inductance and time constants.
Week 6	• Circuit simulation using software tools.

	• Design and simulation of basic circuits.
Week 7	• Transient response of RC circuits. • Measurement of capacitive reactance.
Week 8	• Transient response of RL circuits. • Measurement of inductive reactance.
Week 9	• Transient response of LC circuits. • Resonance in series and parallel circuits.
Week 10	• Mesh analysis with dependent sources.
Week 11	• Delta-star transformation demonstration.
Week 12	• Troubleshooting and debugging techniques.
Week 13	• Measurement of power in three-phase circuits
Week 14	• Three-phase circuits: Delta and star connections.
Week 15	• Final project: Design, implementation, and testing of a complex circuit. • Final project demonstration and presentation. • Course review and feedback.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electrical and Electronic Technology, Tenth Edition, Revised by, John Hiley, Keith Brown, Lan McKenzie Smith,2021 Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-andengineering/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.

رئيس القسم/ وكالة

Assist. Prof. Dr. Ali Basem

التاريخ : 23/1/2026

استاذ المادة

Asst. Prof. Dr. Majli Nema Hawas

التاريخ: 23-1-2026