Ministry of Higher Education and
Scientific Research – Iraq
AL-Mustaqbal University
Department of Electrical Engineering techniques

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**DC ELECTRICAL CIRCUITS**	**Module Delivery**	
Module Type	CORE	✓ **Theory**	
Module Code	ATU23011	**Lecture**	
ECTS Credits	6	✓ **Lab**	
SWL (hr/sem)	150	**Tutorial**	
		Practical	
		✓ **Seminar**	

Module Level	1	**Semester of Delivery**	1
Administering Department	DEPARTMENT OF ELECTRICAL ENGINEERING TECHNIQUES	**College**	AL-MUSTAQBAL UNIVERSITY
Module Leader	سجى محسن عبود	**e-mail**	
Module Leader's Acad. Title	مدرس مساعد	**Module Leader's Qualification**	MSC.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	None	**e-mail**	None
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	1
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-Understanding the Fundamentals: The primary objective of a DC circuits course is to provide students with a solid foundation in the fundamental principles of direct current (DC) circuits. This includes concepts such as voltage, current, resistance, Ohm's law, power, and energy. 2-Analyzing Circuit Components: Students will learn how to analyze and work with various circuit components. They will understand their behavior in DC circuits and be able to calculate their effects on voltage, current, and power. 3-Circuit Laws and Theorems: Students will become familiar with important laws and theorems governing DC circuits, including Ohm's law, Kirchhoff's laws (KCL and KVL), Thevenin's theorem, Norton's theorem, and maximum power transfer theorem. They will gain proficiency in applying these principles to solve complex circuit problems. 4-Circuit Simulation and Design: The course may involve introducing students to circuit simulation software. They will learn how to use simulation tools to analyze and design DC circuits, verify their calculations, and gain practical insights into circuit behavior. 5-Problem-Solving Skills: An important objective is to develop students' problem-solving skills in the context of DC circuits. They will learn how to analyze circuit diagrams, formulate appropriate strategies, and apply their knowledge to solve a variety of circuit problems efficiently.

	6-Laboratory Skills: The course includes hands-on laboratory experiments to provide students with practical experience in building, testing, and troubleshooting DC circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Fundamental Knowledge: Students will acquire a solid understanding of the fundamental concepts and principles of direct current (DC) circuits, including voltage, current, resistance, power, and energy. 2-Circuit Analysis Skills: Students will develop the ability to analyze DC circuits using various techniques such as applying Kirchhoff's laws, performing nodal and mesh analysis, and utilizing circuit theorems like Thevenin's and Norton's theorem. They will gain proficiency in solving complex circuit problems and calculating circuit parameters. 3-Circuit Design and Simulation: Students will be able to design and simulate DC circuits, using appropriate components and considering design constraints. They will learn to use circuit simulation software to verify their designs, analyze circuit performance, and troubleshoot circuit issues. 4-Laboratory Skills: Through hands-on laboratory experiments, students will develop practical skills in building, testing, and troubleshooting DC circuits. They will become proficient in using measuring instruments, interpreting experimental data, and ensuring safety precautions while working with electrical circuits. 5-Critical Thinking and Analysis: The course will promote critical thinking and analytical skills among students. They will learn to evaluate different circuit solutions, analyze circuit behavior, and make informed decisions based on their understanding of DC circuits. By the end of the course, students will possess a comprehensive knowledge of DC circuits, enabling them to analyze, design, and troubleshoot a wide range of electrical circuits. They will be prepared for further studies in electrical engineering or related fields and equipped with skills that can be applied in professional practice.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Part A – General Electric System. Constituent parts of an electrical system (source, load, communication & control), Current flow in a circuit, Electromotive force and potential difference, Electrical units. Ohm's law, Resistors, Resistivity, Temperature rise & Temperature coefficient of resistance, Voltage & Current sources [8 hrs] • Part B DC circuits. Series circuits, Parallel circuits. Kirchhoff's laws. Power and energy [14 hrs] • Part C Network Theorems . Star-delta & delta-star transformation. Sources transformations Mesh analysis. Nodal analysis. Superposition theorem. Thevnin's theorem. Norton's theorem. Maximum power transfer theorem. [32 hrs] • Revision problem classes [6 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1-**Hands-on Experiments:** Engage students in practical experiments to deepen their understanding of circuits. 2-**Simulation Software:** Use circuit simulation software for virtual circuit design and analysis. 3-**Problem-solving Exercises:** Include various problem-solving exercises to apply circuit analysis techniques. 4-**Group Projects:** Assign collaborative projects for circuit design and construction. 5-**Real-world Applications:** Discuss practical applications of circuits in different devices and systems. 5-**Interactive Discussions:** Encourage student participation and critical thinking through open-ended questions.

	6-**Conceptual Understanding:** Focus on intuitive understanding alongside mathematical analysis. 7-**Assessment Variety:** Use diverse assessment methods to gauge student understanding. 8-**Office Hours and Support:** Offer individualized assistance through office hours or online support.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.12
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
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**	4	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	7	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	9	10% (10)	Continuous	All
	Report	8	10% (10)	2, 12	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-8
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
1	**Introduction to Measurement Devices**
2	**Color of Resistance**
3,4	**Ohm's Law and Resistance in Series and Parallel**
5,6	**Star& Delta Connection**
7	**Kirchhoff's Law**
8	**MID-TERM EXAM**
9,10	**Super Position Theorem**
11,12	**Thevenin's Theorem**
13,14	**Norton's Theorem & Maximum Power Transfer**
15	Review

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Charles K. Alexander, Matthew N.O. Sdiku Fundamentals of Electrical Engineering, 4th Edition, 2009	Yes

Recommended Texts	Tony R. Kuphaldt, Lessons In Electric Circuits, Volume I - DC 5th edition, Pearson Education 2002	No
Websites	Direct Current (DC) https://www.allaboutcircuits.com/textbook/direct-current/	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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.