Ministry of Higher Education and Scientific Research - Iraq
University of Diyala
College of Artificial Intelligence Engineering Technology
Department of Artificial Intelligence Engineering

الملحق 4: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**AIE 103**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	AI. Eng.		**College**	College of Artificial Intelligence Engineering Technology	
Module Leader	Mustafa Nadhim Ghazal		**e-mail**	mustafa.nadhim@uodiyala.edu.iq	
Module Leader's Acad. Title	Asst. Lect		**Module Leader's Qualification**	MSc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Ali N. Albu-Rghaif		**e-mail**	ali.alb-Rghaif@uodiyala.edu.iq	
Scientific Committee Approval Date	10/11/2025		**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 circuit theory through the application of techniques. 2. To understand Temperature effect of the resistance 3. To understand Ohm's law 4. To understand series and parallel connections. Also, the Delta-Star Transformation 5. To understand voltage, current and power from a given circuit. 6. This course deals with the basic concept of electrical circuits. 7. This is the basic subject for all electrical and electronic circuits. 8. To understand Kirchhoff's current and voltage Laws problems. 9. To perform Superposition, Thevenin and Norton Theorems with Mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits and Summarize what is temperature effect of the resistance. 2. Define Ohm's law and Describe electrical power, charge, and current. 3. Identify the basic circuit elements and Distinguish between series and parallel connections. 4. Explain the two Kirchhoff's laws (Voltage & Current) used in circuit analysis. 5. Explain Delta & Star connections with (Delta to Star) & (Star to Delta) Transformation. 6. Explain the theorems that utilize in circuit analysis.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** Part A - Resistance Circuit elements, Resistance of the material, Temperature Effects. [3 hrs] Part B - Ohm's law Ohm's law, Resistor in series, Resistor in parallel, Kirchhoff's voltage law, Kirchhoff's current law, Delta connection. Star connection, Delta to Star Transformation. Star to Delta Transformation, Current and Voltage Sources. [24 hrs] Part C - Circuit Analysis and Theorems The principle of Superposition, The Thevenin equivalent circuit, The Norton equivalent circuit, Maximum power transfer, The Node Voltage Method, The Mesh Current Method. [18 hrs]

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, homework's and examples. Practical examples helps students to understand the course material.

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% (5)**	**6 and 12**	**LO #1 to #4 and #5 to #6**
	Assignments	**2**	**10% (5)**	**3 and 12**	**LO #2, #3 and #4 to #6**
	Projects / Lab.	**1**	**10% (10)**	**Continuous**	**All**
	Participation & Attendance	**1**	**10% (10)**	**Continuous**	**All**
Summative assessment	**Midterm Exam**	**2hr**	**10% (10)**	**8**	**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	Temperature effect of the resistance
Week 2	Ohm's law
Week 3	Resistor in series
Week 4	Resistor in parallel
Week 5	Kirchhoff 's voltage law
Week 6	Kirchhoff 's current law
Week 7	Delta and Star connection
Week 8	(Delta to Star) and (Star to Delta) Transformation
Week 9	Current and Voltage Sources
Week 10	The principle of Superposition
Week 11	The Thevenin equivalent circuit
Week 12	The Norton equivalent circuit
Week 13	Maximum power transfer
Week 14	The Node Voltage Method
Week 15	The Mesh Current Method
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	DC Voltage & current Measurement
Week 2	Using an Ohmmeter & Resistor Characteristics
Week 3	Ohm’s Law

Week 4	Power in DC Circuit
Week 5	Series Circuits
Week 6	Parallel Circuits
Week 7	Combined Series-Parallel Circuits
Week 8	Kirchhoff's voltage Law
Week 9	Kirchoff's current Law
Week 10	Superposition Theorem
Week 11	Thevenin's Theorems
Week 12	Norton's Theorems
Week 13	Maximum Power Transfer Theorem
Week 14	The Node Voltage Method
Week 15	The Mesh Current Method

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 7th or 10th or 11th Edition.	Yes
Recommended Texts	• Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, McGrawHill, fourth edition, 2009.Behzad Razavi, *Fundamentals of Microelectronics*, John Wiley & Sons, Preview Edition, 2006 • J J Kathy and SA Naser, fundamental of Electrical Engineering, Schaum's outline, Academia International, 2004. • Any other materials available on the web.	No
Websites	https://www.youtube.com/playlist?list=PLHCD1a8slQtJbEKJawJL9qQaY5P9SgCUX	

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.