MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information					
Module Title	**Electrical Technology**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**UOMU0201023**			☐ **Lecture**	
ECTS Credits	**6**			☒ **Tutorial**	
SWL (hr/sem)	**150**			☒ **Lab**	
				☐ **Seminar**	
Module Level	**1**	**Semester of Deliver**	**1**		
Administering Department	**PM**	**College**	**TE**		
Module Leader	Ali Hasanain	**e-mail**			
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	**1/9/2023**	**Version Number**	**1.0**		

Relation with other Modules			
Prerequisite module	**None**	**Semester**	
Co-requisites module	**None**	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Introduce students to the basic concepts of electrical engineering, including voltage, current, resistance, power, and energy. Teach students how to analyze simple electrical circuits using fundamental laws such as Ohm's Law and Kirchhoff's Laws, and apply circuit analysis tech. Provide a comprehensive understanding of both alternating current (AC) and direct current (DC) systems, including their characteristics, behaviors, and application. Familiarize students with common electrical components such as resistors, capacitors, inductors, diodes, and transistors, including their functions and applications in circuits. Enhance students' mathematical skills necessary for solving electrical engineering problems, including algebra, calculus, and complex number analysis.
Module Learning Outcomes	1 **.** Fundamental Knowledge**:** Demonstrate an understanding of basic electrical engineering concepts, including voltage, current, resistance, power, and energy**.** 2 **.**Circuit Analysis**:** Apply Ohm's Law and Kirchhoff's Laws to analyze and solve simple electrical circuits, both in DC and AC contexts**.**

	3 .Component Identification: Identify and describe the function of common electrical components such as resistors, capacitors, inductors, diodes, and transistors in circuit applications. 4 .Mathematical Proficiency: Utilize mathematical techniques, including algebra and complex numbers, to solve electrical engineering problems effectively. 5 .Practical Skills: Conduct laboratory experiments to build and analyze electrical circuits, demonstrating the ability to apply theoretical knowledge in a practical setting. 6 .Problem-Solving Ability: Develop systematic approaches to solve engineering problems, including the ability to model and simulate electrical systems. 7 .Safety Practices: Recognize and apply safety practices relevant to working with electrical systems and components in both laboratory and real-world environments.
Indicative Contents	**Part A: Symbols and Units:** Define the meaning of units and its importance in engineering science, the Greek Alphabet, the symbols, suffix, acronyms and scientific numbers. The basic units, the derived units, and the available different systems of units. How to write units in official documents. The physical meaning of units. Revision problem classes. [20 hours] **Part B :The Basic Concepts of Electricity Parameters:** The physical meaning of Energy, Work, Displacement, Distance, Force, Acceleration, Torque, and Power. The Potential, Voltage, and Current. The electric circuit 3 parameters, the conventional current and the electronic current, the electric power, the drift velocity, the atomic structure of insulators and conductors. Revision problem classes. [20 hours] Revision Session and Quiz. [1.5 hours] **Part : Analogue DC Circuit Theories:** Resistive networks, voltage and current sources, internal resistance concept, maximum power transfer theory, current and voltage division, Thevenin and Norton equivalent circuits, and other circuit theories. Revision problem classes. [20 hours] Control Systems, Troubleshooting, and Maintenance. [10 hours] Revision Session and Quiz [1.5 hours]
Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to declare the physical comprehension of the units like (Newton Unit) for example, the distinguishing between vector and scalar quantities, 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 practical examples before teaching each new subject to increase the student interest. The student must know the reason of learning each subject and its impact on his future as an engineer.

Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1and #2
	Assignments	2	5% (5)	2 and 12	LO #2 and #3
	Projects / Lab.	6	15% (15)	Continuous	LO #1 and #3
	Report	1	10% (10)	13	LO #3
Summative assessment	Midterm Exam	2hr.	10% (10)	7	LO #1 - #2
	Final Exam	2hr.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Introduction - Basic concepts and units: The international system of units, quantities derived from SI units. Units of force, energy, torque, and power. Abbreviation for multiples & sub-multiples.
Week 2	Electricity & atomic structure of the substance.
Week 3	Current and current density. Coulomb's Law.
Week 4	potential, electromotive force (emf) and potential difference.
Week 5	The relation between energy and heat. Efficiency and percentage efficiency.
Week 6	Analysis of DC circuits: Ohm's law, resistivity & conductivity, temperature effect.
Week 7	Midterm exam +The internal resistance of a source. Equivalent resistance: Series, parallel, (Series- parallel).
Week 8	delta, and star connections. Equivalent voltage source: Series, parallel.
Week 9	Power calculation in DC circuit. Introduction to network theorems, types of sources: independent and dependent voltage sources and their transformation.
Week 10	Kirchhoff’s laws, KVL, KCL, Maxwell’s circulating current (mesh analysis). Nodal analysis, Superposition theorem.
Week 11	Thevenin’s theorem, Norton's theorem, Maximum power transfer theorem. The Photovoltaic

	panel internal resistance, Millman's theorem, Substitution theorem, Reciprocity theorem.
Week 12	Magnetic field. Magnetic fields due to the electric current, magnetic field in a coil. Magnitude and direction of the force on a moving charge in the magnetic field (Motor and Generator principles).
Week 13	Ferromagnetic materials. The magnetization curve (B-H Curve). Permeability, Relative permeability. Magnetic constants: reluctance, magnetic leakage, and fringing. Magnetic circuit: Series, parallel, and (series-parallel). Kirchhoff's laws for the magnetic circuit.
Week 14	Condition for the minimum volume of a permanent magnet, load line of a permanent magnet.
Week 15	The force between two magnetic poles, the magnetic pull between two iron surfaces and (series parallel). Kirchhoff's laws for the magnetic circuit.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)	
Week	**Material Covered**
Week 1	**Lab 1:** Resistor color code
Week 2	**Lab 2:** Ohm's law
Week 3	**Lab 3:** Resistors in series parallel
Week 4	**Lab 4:** Divider Rules
Week 5	**Lab 5:** Kirchhoff's laws
Week 6	**Lab 6:** Delta & star.
Week 7	**Lab 7:** Mesh Method
Week 8	**Lab 8:** Nodal theorem
Week 9	**Lab 9:** Superposition theorem
Week 11	**Lab 10:** Thevenin's theorem
Week 12	**Lab 11:** Norton theorem
Week 13	**Lab 12:** Max. power theorem
Week 14	**Lab 13:** fundamental of Ac
Week 15	**Lab 14:** Oscilloscope

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education.	Yes
Recommended Texts	Digital Fundamentals, T. L. Floyd, Pearson Education Ltd.	Yes
Websites	https://logic.ly/demo/	

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.

Module 1

Code	Course/Module Title	ECTS	Semester
PM 303	**Electrical and Electronic Engineering**	**6**	**6**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	**2**	**78**	**72**

Description

Electrical and Electronic Engineering is a dynamic and rapidly evolving field that focuses on the study, design, and application of electrical systems, devices, and technologies. This discipline plays a critical role in shaping the modern world, as it encompasses a wide range of areas, including power generation and distribution, communication systems, electronics, control systems, and renewable energy.

In Electrical and Electronic Engineering, students delve into the fundamental principles of electricity, circuits, and electromagnetism. They learn how to analyze and design electrical systems, apply mathematical and scientific principles to solve complex problems, and utilize advanced tools and software for simulation and modeling.

The field emphasizes hands-on experience through laboratory work, where students gain practical skills in building, testing, and troubleshooting electrical circuits and devices. They also explore emerging technologies, such as renewable energy sources and sustainable power systems, to address the growing demand for cleaner and more efficient energy solutions.

Through their studies, students develop a strong foundation in engineering principles, critical thinking, problem-solving, and project management. They become adept at designing, implementing, and maintaining electrical and electronic systems that are safe, reliable, and sustainable. Graduates of Electrical and Electronic Engineering programs find diverse career opportunities in industries such as power generation, telecommunications, electronics, automation, and research and development.