MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information					
Module Title	**Electrical and Electronic Engineering**			**Module Delivery**	
Module Type	**Basic**			**☒ Theory**	
Module Code	**PM 303**			**☐ Lecture**	
ECTS Credits	**6**			**☐ Tutorial**	
SWL (hr/sem)	**150**			**☒ Practical**	
				☐ Seminar	
Module Level	**3**	**Semester of Deliver**	**6**		
Administering Department	**PM and AM**	**College**			
Module Leader	**Safwan Assaf Hamoodi** The file (module description form of electrical and electronic engineering) prepared by Prof. Dr. Haitham M. Wadullah	**e-mail**	**Safwan79azb@ntu.edu.iq**		
Module Leader's Acad. Title	**Assist. Prof**	**Module Leader's Qualification**	**M.Sc**		
Module Tutor	**Prof. Dr. Haitham M. Wadullah**	**e-mail**	**Dr.haitham@ntu.edu.iq**		
Peer Reviewer Name	**Name**	**e-mail**	**E-mail**		
Scientific Committee Approval Date	**1/6/2023**	**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	**.1** Building a foundation for studying electrical calculations in both AC and DC circuits, and familiarizing students with the various theories used in these calculations **.2** Gaining a comprehensive understanding of electrical principles and concepts, such as voltage, current, resistance, and power. This knowledge will be applied to the analysis of electrical circuits and systems

	Developing practical skills in electrical measurements and testing by using various instruments and equipment. Students will learn how to accurately measure electrical parameters, interpret the results, and troubleshoot electrical systems **.3** Applying the acquired knowledge to the operation and maintenance of electrical machines, including motors and generators. Students will also explore the fundamentals of power systems, including power generation, transmission, and distribution. **.4**
Module Learning Outcomes	Mastery of electrical circuit theory: Students will acquire a comprehensive understanding of the fundamental principles of electrical circuit theory, encompassing key concepts such as voltage, current, resistance, and power. They will be proficient in applying this knowledge to analyze and solve basic electrical circuits. **.1** Proficiency in electrical measurements and testing: Students will develop expertise in utilizing electrical instruments and equipment for precise measurements and thorough testing of electrical parameters. They will learn to interpret measurement outcomes accurately and effectively troubleshoot electrical systems to identify and rectify faults. **.2** Application of electrical machines and power systems: Students will explore the principles and workings of electrical machines, including motors and generators, gaining insight into their applications and performance characteristics. Additionally, they will develop a foundational understanding of power systems, encompassing power generation, transmission, and distribution aspects, enabling them to comprehend the broader context of electrical engineering. **.3**
Indicative Contents	Part A: Fundamentals of Electrical Principles, Measurements, and Instruments [20 hours] Introduction to Electrical Machines, Power Systems, Safety, and Direct Current Circuits [20 hours] Revision Session and Quiz [1.5 hours] Part B: 4. Alternating Current Circuits, Circuit Theory, and Analogue Electronics [20 hours] Control Systems, Renewable Energy, Troubleshooting, and Maintenance [10 hours] Revision Session and Quiz [1.5 hours] Revised Description: Part A of the course focuses on building a strong foundation in electrical engineering. Students will start by understanding the basic principles of

	electricity, along with electrical measurements and the use of instruments. They will then explore electrical machines, power systems, and safety considerations in the context of direct current circuits. A revision session and quiz will help reinforce the learned concepts.

Learning and Teaching Strategies	
Strategies	**.1** Active Participation: Actively participate in class discussions to engage with the subject matter and deepen your understanding. **.2** Problem-Solving Skills: Develop and enhance your problem-solving skills, as they are essential in Electrical and Electronic Engineering. **.3** Practical Application: Gain hands-on experience through laboratory sessions and projects, allowing you to apply theoretical concepts to real-world scenarios. **.4** Collaborative Learning: Foster collaborative learning by actively engaging in group discussions and study sessions with your peers. **.5** Utilize Learning Resources: Make effective use of various resources such as textbooks, online tutorials, video lectures, and educational websites to supplement your learning and broaden your knowledge. **.6** Time Management: Manage your time effectively by creating a study schedule and dedicating specific time slots for studying Electrical and Electronic Engineering. **.7** Regular Review and Recap: Continuously review previously covered topics to reinforce your understanding and ensure long-term retention of the learned material.

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.	9	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	D.C motors, construction, commutator, types of D.C motors
Week 2	Back e.m.f, speed equation, speed control
Week 3	Load Toque Requirement, types Load Torque
Week 4	Starting of D.C motor, starter connection, torque of D.C motors
Week 5	Speed-torque characteristics of each type of D.C motor
Week 6	Examples to evaluate the starting current of D.C motor with and without starter, speed control
Week 7	Single phase induction motor, split-phase, capacitor-start, shaded-pole type
Week 8	3-phase induction motor, construction, synch. Speed, slip.
Week 9	Control of three-phase induction motor using voltage frequency control.
Week 10	Starting of 3-phase induction motor, star-delta method, step down transformer
Week 11	Torque characteristic, max torque
Week 12	3-phase system, star and delta connection, line current, line voltage, phase current and voltage
Week 13	Instruments and measurements, ammeters, voltmeter, ohmmeter, kw - h meters.
Week 14	Contactors, relays, timers
Week 15	Thermal overload, starter (contactor +timer)
Week 16	Final Examination

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	Lab 1: Basic wiring diagram for electrical measurements
Week 2	Lab 2: Measurement of inductive reactance of comp. windings
Week 3	Lab 3: Test of current, voltage and solid-state relay
Week 4	Lab 4: Test and calibrate pressure switch and thermostat
Week 5	Lab 5: Test of overload and defrost.
Week 6	Lab 6: Start-up compressor with solid state relay.
Week 7	Lab 7: Start-up compressor with current relay
Week 8	Lab 8: Rotor Voltage Control of Induction Motor
Week 9	Lab 9: Frequency Control of Induction Motor
Week 11	Lab 10: slip power control by dc converter of Induction Motor
Week 12	Lab 11: Single phase Dismantling of induction motor
Week 13	Lab 12: Make fault on voltage and current relay, effect of faults
Week 14	Lab 13: damage, notice the effects
Week 15	Lab 14: Dismantling of induction motor

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**.1** "Electric Machinery and Power System Fundamentals" by Stephen J. Chapman **.2** "Electricity and Electronics for HVAC" by Rex Miller and Mark R. Miller **.3** "Principles of Electric Machines and Power Electronics" by P.C. Sen **.4** "Electrical Power Systems: Design and Analysis" by Mohamed E. El-Hawary	
Recommended Texts	**.1** "Electrical Wiring Residential" by Ray C. Mullin and Phil Simmons **.2** "Industrial Electrical Troubleshooting" by Lynn Lundquist **.3** "Electrical Safety Handbook" by John Cadick, Mary Capelli - Schellpfeffer, and Dennis Neitzel **.4** "Digital Control Systems" by Benjamin C. Kuo **.5** "Electromechanical Energy Conversion" by David J. Braun	
Websites	(www.allaboutcircuits.com) (www.electrical4u.com) (www.khanacademy.org)	

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
AM 303	**Electrical and Electronic Engineering**	**6**	**3**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	**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.