Ministry of Higher Education and Scientific Research - Iraq
Al-Mansour University College
Department of Communication Engineering

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electromagnetic Fields II**			**Module Delivery**	
Module Type	**Core**				
Module Code	**COM 241112**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	2	
Administering Department	BSc - COMM		**College**	Al-Mansour University College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	2024/9/1		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	COM 23106: Electromagnetic fields I	**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	Study of electromagnetic fields is basically concerned with study of charges at rest and in motion. Electromagnetic principles serve as fundamentals for detailed and in-depth study of communication engineering and are indispensable for analysis and understanding of various subjects in communication engineering like antennas, waves propagation, microwaves, radar and so on.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Derive forces and torques in magnetic fields, forces due to current carrying conductors and their inter-relationship with magnetic field 2. Compute Capacitance, Capacitance of two wire line. 3. Compute Magnetic boundary conditions 4. Analyze Time varying fields. 5. Analyze Maxwell's equations in different forms (point & integral) and apply them to diverse engineering problems 6. Compute Magnetic flux and magnetic flux density.
Indicative Contents المحتويات الإرشادية	1. Course introduction (4 hrs) 2. Theoretical lectures (24 hrs)
Description	Poisson and Laplace's equations. Steady magnetic field: Boit-savart law, amperes law, curl; stokes theorem; magnetic flux, magnetic flux density, scalar and vector magnetic potentials. Magnetic forces and materials: Force on moving charge, force on differential current elements. Force between current differential elements, force and torque on a closed circuit, magnetization and permeability, magnetic boundary conditions, magnetic condition, magnetic circuit. Time-varying fields and Maxwell's equations: Faraday's law, displacement current; Maxwell's equations in point form; Maxwell's equations in integral form, wave equations, wave propagation in different media.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	**In this course, students are guided by:** • Using different examples. • Using different styles of discussion that aim to connect the theoretical and practical sides. • Asking questions and giving exercises that require analysis and conclusions related to lectures. • Encourage students to participate in discussions and do the practical work. • Encourage students to work in groups.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**48**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**3.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**52**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**3.5**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
	Quizzes	**2**	**5% (10)**	**6 and 12**	**LO #1 to #3 and #4 to #6**
	Assignments	**2**	**5% (10)**	**2 and 13**	**LO #3 to #6**
	Projects / Lab.				
	Report	**2**	**10% (20)**	**13**	**LO #3, #4 and #6**
	Midterm Exam	**1hr**	**10% (10)**	**9**	**LO #1 - #5**
	Final Exam	**3hr**	**50% (50)**	**16**	**All**
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Poisson's and Laplace's equations:** Poisson's equation, Laplace's equation, Uniqueness theorem,
Week 2	Solution of Poisson's and Laplace's equation, Application of Poisson's and Laplace's equations
Week 3	Capacitance, Capacitance of two wire line
Week 4	**Steady Magnetic Fields:** Biot-Savart's law, Ampere's law,
Week 5	Curl operation, Stoke's theorem
Week 6	Magnetic flux and magnetic flux density,
Week 7	Scalar and vector magnetic potentials,
Week 8	Steady magnetic field produced by current carrying conductors
Week 9	**Magnetic forces, materials and inductance:** Force on a moving charge, Force on a differential current element,
Week 10	Force between differential current elements,
Week 11	Nature of magnetic materials, Magnetization and Permeability,
Week 12	Magnetic boundary conditions,
Week 13	Magnetic circuit, Inductance and mutual inductances
Week 14	**Time varying fields and Maxwell's equations:** Faraday's law, Transformer and motional electromotive forces, Displacement current,
Week 15	Maxwell's equations in point form, Maxwell's equations in integral form,

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• W. H. Hayt, J. A. Buck, "Engineering Electromagnetics", McGraw Hill Education • M.N.O. Sadiku, S.V. Kulkarni, "Principles of Electromagnetics", Oxford University	Yes
Recommended Texts	• Joseph A. Edminister, Mahmood Nahvi, "Electromagnetics", Schaum's Outline Series • Steven W. Ellingson, "Electromagnetics", Blacksburg, Virginia	Yes

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
	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
	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.