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 I**			**Module Delivery**	
Module Type	**Core**				
Module Code	**COM 23106**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	1	
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	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	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. Enabling student to know how to treat with mathematical equations of vector for different types of coordinates. 2. Enabling student to know how to plot the components for different coordinates. 3. Apply vector calculus to electric and potential fields due to various charge distributions. 4. Compute static electric field and electric force. 5. Compute potential, , Electric flux density, Capacitance using Poisson's and Laplace's equations 6. Compute Energy Expended in Moving a Point Charge
Indicative Contents المحتويات الإرشادية	1. Course introduction (4 hrs) 2. Theoretical lectures (24 hrs)
Description	Review of vector calculus. Coulomb's law and electric field intensity: Coulomb's law, electric field intensity filed of n-point charges, field of a continuous and volume charge distributions, fields the charge and sheet charge, streamlines and sketches of fields. Electric flux density and Gauss's law: Electric flux density, Gauss's law, application of Gauss's law, divergence, Maxwell's first equation. Energy and potential: Energy expanded in moving appoint charge in an electric field; definition of potential difference and potential; potential field of appoint charge and system of charges; potential gradient; dipole. Conductors, dielectrics and capacitance: Current and current density; continuity of current; conductor properties and boundary conditions, nature of dielectric materials; boundary conditions for perfect dielectric materials; capacitance.

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 #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	**Review of Vector Analysis:** Scalars and vectors, Unit vector, Vector addition and subtraction, Position and distance vectors, Dot product, Cross product, Scalar triple product, Vector triple product, Components of a vector,
Week 2	Cartesian co-ordinate system, Circular cylindrical co-ordinate system, Spherical co-ordinate system, transformation from one co-ordinate to other co-ordinate systems
Week 3	**Static Electric Fields**: Coulomb's law, Electric field intensity,
Week 4	Field Arising from a Continuous Volume Charge Distribution
Week 5	Electric field due to point charges, Electric Field due to Line Charge,
Week 6	Electric Field due to Sheet of Charge
Week 7	Electric Flux Density, Streamlines and Sketches of Fields,
Week 8	Gauss' law and its applications, Divergence theorem,
Week 9	Energy Expended in Moving a Point Charge in an Electric Field,
Week 10	Definition of Potential Difference and Potential,
Week 11	The Potential Field of a Point Charge, The Potential Field of a System of Charges,
Week 12	Potential gradient, Electric dipole, Energy Density in the Electrostatic Field
Week 13	**Conductors, Dielectrics**: Current and current density, Ohm's law in point form, Continuity equation,
Week 14	Properties of Conductor, Semiconductors and Dielectric Materials,
Week 15	Conductor-dielectric boundary condition, Dielectric-dielectric boundary condition, Polarization in dielectrics,

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.