



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



الملحق 4: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Antennas Theory		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	COM 35103		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGIII	Semester of Delivery	1
Administering Department	BSc - COMM	College	Al-Mansour University College
Module Leader	Asst. Prof. R. T. Hussain (Ph.D.)	e-mail	Refat.Hussain@muc.edu.iq
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D. in communication Eng.
Module Tutor	Asst. Prof. R. T. Hussain (Ph.D.)	e-mail	Refat.Hussain@muc.edu.iq
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	13-9-2025	Version Number	1.0

Relation with other Modules



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



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 introduce the fundamental mathematical and electromagnetic concepts essential for understanding antenna theory. 2. To provide knowledge of the different types, characteristics, and applications of antennas. 3. To impart an understanding of the principles of antenna design and performance evaluation. 4. To develop knowledge of antenna array theory and its role in enhancing radiation characteristics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate knowledge and understanding of the fundamental principles of antenna theory, including Maxwell's equations, wave propagation, and radiation mechanisms. 2. Analyze and compare different types of antennas in terms of structure, performance, and application areas. 3. Apply appropriate mathematical and computational methods in the design and evaluation of antennas and antenna arrays. 4. Identify, formulate, and solve engineering problems related to antenna design using analytical and simulation-based approaches. 5. Communicate technical concepts and design solutions effectively through reports, presentations, and teamwork activities.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Course introduction (4 hrs) • Working with tutorial (11 hrs) • Theoretical lectures (30 hrs) • Lap (30hrs)
Description	This module introduces the fundamental concepts of antenna theory and design. The course covers the physical principles of radiation, radiation patterns, near- and far-field regions, polarization, directivity, gain, and antenna efficiency. Basic types of antennas are studied, including dipole antennas, loop antennas, and simple aperture antennas, with emphasis on their radiation characteristics and practical applications in communication



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



systems. An introduction to microstrip patch antennas and the basic concepts of antenna arrays is also provided. The course is designed to equip students with the foundational knowledge required for understanding and designing simple antenna structures used in engineering practice.

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	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية



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



		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	6 and 12	LO #1 to #3 and #4 to #6
	Assignments	2	10% (10)	2 and 13	LO #3 to #6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #3, #4 and #6
Summative assessment	Midterm Exam	2hr	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 Electromagnetic Theory and of Communication Systems, and the electrical properties of the transmission medium with Poynting Vector and Flow of Power
Week 2	Radio Channel, Analysis of the ideal dipole, the electric, magnetic fields, and the power of the ideal dipole
Week 3	Antenna types, Fundamental Parameters of Antennas: Radiation Pattern, Bandwidth, Beam Efficiency.
Week 4	Fundamental parameters: Far-Field Conditions and Field Regions, Beam Area, Radiation Power Density.
Week 5	Radiation Power Intensity, Directivity, Gain, Realized Gain, Antenna Efficiency, Antenna Impedance, Antenna Radiation Efficiency.
Week 6	Polarization, Linear polarization, Elliptical polarization, circular polarization, Axial Ratio,
Week 7	Effective Area/ Effective Aperture/ Capture Area, Physical Aperture, effective height
Week 8	The radio communication link, Maximum Directivity, and Maximum Effective Area



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



Week 9	Wire Antenna: Small Dipole, Thin linear antenna.
Week 10	Monopole antenna, small circular and square loop antenna.
Week 11	Arrays Antennas: Two-Element Array
Week 12	Arrays Antennas: N -Element Linear Array, Design Procedure of Arrays Antennas
Week 13	Antenna temperature
Week 14	Microstrip Antennas: Basic characteristics of microstrip antennas, Rectangular Patch antenna, Circular Patch antenna,
Week 15	Feeding methods, methods of analysis, and Design of rectangular patch antennas.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Antenna Manufacturing
Week 2	Antenna Ranges
Week 3	Radiation Patterns Measurements
Week 4	Radiation Patterns Measurements
Week 5	Gain Measurements
Week 6	Directivity Measurements
Week 7	Radiation Efficiency Measurements
Week 8	Impedance Measurements
Week 9	Current Measurements
Week 10	Polarization Measurements
Week 11	Polarization Measurements
Week 12	Scale Model Measurements
Week 13	Scale Model Measurements



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



Week 14	Yagi-Uda antenna design
Week 15	Helical antenna design

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- C.A. Balanis, Antenna Theory: Analysis and Design, 4th Edition, Wiley, 2016. - W.H. Hayt and J.A. Buck, Engineering Electromagnetics, 8th Edition, McGraw-Hill Education, 2012. - D.M. Pozar, Microwave Engineering, 4th Edition, Wiley, 2012.	Yes
Recommended Texts	- W.L. Stutzman and G.A. Thiele, Antenna Theory and Design, 3rd Edition, Wiley, 2013. - J.D. Kraus, Antennas, 2nd Edition, McGraw-Hill, 1988. - Ramesh Garg, Prakash Bhartia, Inder Bahl, and Apisak Ittipiboon, Microstrip Antenna Design Handbook, Artech House, 2001.	No
Websites	- Antenna Theory – https://www.antenna-theory.com : (Comprehensive educational resource on antenna fundamentals, types, arrays, and propagation concepts.) - IEEE Antennas and Propagation Society (APS) – https://aps.ieee.org : (Professional society providing access to technical resources, publications, and conferences in antennas and radio wave propagation.) - Electronics Tutorials – Antennas & Propagation – https://www.electronics-tutorials.ws/antenna/ant_1.html : (Practical tutorials covering antenna basics, propagation mechanisms, and related communication concepts.)	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
-------	-------	---------	---------	------------



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



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.