



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	Radio Wave Propagation		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	COM 36110		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGIII	Semester of Delivery	
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	13-9-2025	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Antennas Theory – COM 35103	Semester	1
Co-requisites module	None	Semester	



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	47. To introduce the fundamental mathematical and physical concepts related to radio wave propagation. 48. To provide knowledge of the main principles and mechanisms of electromagnetic wave propagation in different media. 49. To explain the different modes of propagation, including ground wave, sky wave, and space wave. 50. To develop an understanding of the practical implications of propagation phenomena for wireless communication systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate knowledge and understanding of the fundamental principles and mechanisms of radio wave propagation in different media. 2. Analyze and interpret the behavior of ground waves, sky waves, and space waves, and their impact on wireless communication systems. 3. Apply mathematical models and problem-solving approaches to predict and evaluate propagation performance under varying environmental conditions. 4. Identify and explain the practical limitations and challenges of propagation phenomena in real-world communication links. 5. Communicate technical findings effectively through written reports, assignments, and collaborative work.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Course introduction (2 hrs) • Working with Power point (15 hrs) • Theoretical lectures (30 hrs)
Description	Fundamental Concepts: propagation at different frequencies; the fundamental equation for free space propagation. Propagation mechanisms: Transmission; Reflection; Absorption; Refraction; Diffraction; Scattering. Factors affecting the radio waves propagation: Shape of the earth; The atmosphere: Troposphere; Tropospheric scatter; Duct propagation; Stratosphere. Electrical properties of the ionosphere; Effect of Earth's magnetic field. Structure of the ionosphere; Characteristics of different layers. Ionosphere fading: interference fading, Polarization fading, Absorption fading, and skip fading. Modes of wave propagation: Ground wave propagation; Space wave propagation. Modes of wave propagation: Sky wave propagation. Interaction with the objects on the ground; propagation within, near, and into buildings.



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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.
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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
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
Formative assessment	Quizzes	2	20% (10)	6 and 12	LO #1 to #3 and #4 to #6
	Assignments	2	10% (5)	2 and 13	LO #3 to #6



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	Projects / Lab.	-	-	-	-
	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	The Wave Equation, propagation at different frequencies, and the fundamental equation for propagation in free space, lossless dielectric, lossy dielectric, and a good conductor medium.
Week 2	Propagation mechanisms: Transmission, Reflection, Absorption.
Week 3	Propagation mechanisms: Refraction, Diffraction, Scattering.
Week 4	Factors affecting the radio waves propagation: Shape of the earth, the atmosphere
Week 5	Troposphere; Tropospheric scatter;
Week 6	Duct propagation; Stratosphere.
Week 7	Electrical properties of the ionosphere: Effect of Earth's magnetic field
Week 8	Structure of the ionosphere; Characteristics of different layers
Week 9	Modes of wave propagation: Ground wave propagation; Space wave propagation.
Week 10	Modes of wave propagation: Sky wave propagation
Week 11	Ionosphere fading: interference fading, Polarization fading, Absorption fading, skip fading
Week 12	Interaction with the objects on the ground; propagation within, near, and into buildings



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Week 13	Radio noise: impulse noise; fluctuation noise; solar radio noise
Week 14	Rain-induced propagation effects, Advanced Propagation Effects
Week 15	Integration with Antenna Design, case studies of propagation in modern wireless communication systems (e.g., satellite links, mobile networks)

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



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	Text	Available in the Library?
Required Texts	- C.A. Balanis, Antenna Theory: Analysis and Design, 4th Edition, Wiley, 2016. - D.M. Pozar, Microwave Engineering, 4th Edition, Wiley, 2012. - J.G. Lee, An Introduction to Radio Wave Propagation, Babani, 1993. - Robert K. Crane, Propagation Handbook for Wireless Communication System Design, CRC Press, 2003.	Yes (two) and two are free and accessible online
Recommended Texts	- Harish, A.R., & Sachidananda, M., Antennas and Wave Propagation, Oxford University Press, 2007. - Richards, J.A., Radio Wave Propagation: An Introduction for the Non-Specialist, Springer, 2008. - Ippolito, L.J., Radio Propagation for Modern Satellite Systems: Theory and Practice, Springer, 2017.	No
Websites	IEEE Xplore Digital Library : https://ieeexplore.ieee.org (Access to research papers in antennas, propagation, and wireless communication). ITU (International Telecommunication Union): https://www.itu.int (Official reports and standards on radio wave propagation and communication systems). NASA Radio Propagation Studies: https://www.nasa.gov (Resources and reports on space communication and propagation effects). Antenna Theory Online Resource: https://www.antenna-theory.com (Educational site with clear explanations on antennas and propagation).	

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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded



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(0 – 49)	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.