MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mobile Communications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**CET4103**				
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	CET		**College**	EETC	
Module Leader	Alhamzah Taher Mohammed		**e-mail**	alhamza_tm@mtu.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Zahraa Abbas Hamza		**e-mail**	Zahraaabbasct91@gmail.com	
Peer Reviewer Name	Dr. Osama Abbas Hussein		**e-mail**	osama.abbas@mtu.edu.iq	
Scientific Committee Approval Date	13/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Digital Communications**	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	It is aimed at students on the fourth stage definition - Concepts and terminology used in cellular systems - The study of developments in the generation cellular system - How to design cells - How to cover all the cell by signal and at all spaces - Types of modulation signal in Cellular Communications - Wireless systems construction, design and processing of interference signals - Multiple Access Techniques
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Identify concepts and terms used in cellular systems 2- Explain the internal structural study of the cells 3- Explain the signal analysis and how coverage in each cell 4- compare between all generations and how they evolve 5- Discuss the Hand off Strategies 6- Design cellular system 7- Modulate a digital signal and demodulation as Multiple Access 8- Discuss the how to cover the signal to all the cells 9- Explain how can small number of channels can accommodate large number of random users 10- Design, planning and analysis of the signals for sending and receiving
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - **Introduction to Wireless Communication System (10 hr)** - **The Cellular Concept-System Design Fundamentals (24 hr)**

	- **Traffic Engineering (10 hr)** - **Large scale path loss (15 hr)** - **Multiple Access Techniques (15 hr)**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 11	(LO #1, 4) ,(LO#2,3,5,6,7,8)
	Assignments				
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	14	LO #6, 7 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	8	LO # 1-6
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Evolution of mobile communications, Mobile Radio System around the world
Week 2	Types of Wireless communication System
Week 3	Trend in Cellular radio and personal communication, 1^{st} , 2^{nd} ,3^{rd} 4^{th} ,5^{th} generations
Week 4	Cellular system, Hexagonal geometry cell and concept of
Week 5	frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio
Week 6	Channel & co-channel interference reduction factor,
Week 7	S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference
Week 8	Handoff Strategies
Week 9	Trunking and Grade of Service,
Week 10	Improving Coverage & Capacity in Cellular System-cell splitting, Cell sectorization
Week 11	Free Space Propagation loss equation, Path-loss of NLOS and LOS systems,
Week 12	Link budget design
Week 13	Frequency Division Multiple Access (FDMA). Time Division Multiple Access (TDMA).
Week 14	Wi-Fi, WiMAX, ZigBee Networks
Week 15	Software Defined Radio, UWB Radio
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Digital Communications-BPSK Modulation ,
Week 2	QPSK modulation, 16 QAM Modulation
Week 3	Implement Communication System Compute the system's BER & Computing the Symbol Error Rate (cellular terms)
Week 4	Wireless link , path loss calculation
Week 5	Link budget design
Week 6	Frequency Division Multiple Access (Multiplexing & DeMultiplexing)
Week 7	Time Division Multiple Access(Multiplexing & DeMultiplexing)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	- Mischa Schwartz, Mobile Wireless Communications, Cambridge University Press 2005	No
Recommended Texts	- J. G. Proakis, Digital Communications, 4th ed. NY: McGraw Hill, 2000	No
Websites		

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.