المرحلة: الثالثة

الفصل الدراسي: الخامس

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Antenna and Wave Propagation**			**Module Delivery**	
Module Type	**C**			☐ **Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☒**Practical** ☒**Seminar**	
Module Code	**ITC210090**				
ECTS Credits	**7.00**				
SWL (hr/sem)	**175**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	MTCE		**College**	COE	
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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EMF3	**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. This course is designed to provide an overview of the fundamental principles associated with microwave and RF antennas and propagation effects. 2. It covers the theory of radiation in addition to EM Wave Propagation in Lossless Dielectrics, Lossy Dielectrics, and Good Conductors. 3. To provide the knowledge of basic understanding of antenna operation through the application of Maxwell's equations. 4. To introduce the students with various types of antennas and their performance Characteristics. 5. To design different antenna types such as dipoles, monopoles, loop antennas and antenna arrays. 6. To develop the students' ability to apply modern mathematical techniques to the solutions of antenna problems. 7. To learns the various propagation mechanisms/impairments and the basic models of propagation. Atmospheric and weather effects are also reviewed
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Understand the radiation mechanism of EM waves by antennas and their radiation patterns. 2. Explain the fundamental parameters of antennas, such as: gain, impedance, and efficiency. 3. Analyze the power radiated by different antennas and their radiation characteristics. 4. Have practical experience in designing and testing antennas. 5. Compare important classes of antennas and their properties. 6. Know the basic propagation models and propagation mechanisms/impairments for radio waves. 7. Explain the propagation behavior in practical scenarios and how to apply propagation models to advanced representative problem.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Fundaments</u> - Maxwell's Equations - Maxwell's Equations for a time-varying field – Explain briefly the fundamentals of Maxwell's Equations [10 hrs] - EM-Wave Propagation – Plane Wave, Poynting Vector and Power Flow. Reflection of Plane Wave at Normal and oblique Incidences. [30 hrs]

	Part B – Antenna theory and design - Introduction to Antennas, definition, antenna principles, circuit theory description, and antenna radiation zones. [20 hrs] - Antenna types – Dipole Antenna, Monopole Antenna, Loop Antenna in addition to Antenna Array. [30 hrs]

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10

Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Maxwell's Equations for a time-varying field.
Week 2	Plane Wave, and EM-Wave Propagation.
Week 3	Plane Wave, and EM-Wave Propagation.
Week 4	Poynting Vector and Power Flow.
Week 5	Reflection of Plane Wave at Normal Incidence.
Week 6	Reflection of Plane Wave at Oblique Incidence.
Week 7	Mid-term Exam1.
Week 8	Introduction to Antennas.
Week 9	Introduction to Antennas.
Week 10	Introduction to Antennas.
Week 11	Dipole Antenna.
Week 12	Monopole Antenna.
Week 13	Loop Antenna.
Week 14	Antenna Array.
Week 15	Mid-term Exam2.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Antenna Parameters.
Week 2	Lab 2: Introduction to HFSS software.
Week 3	Lab 3: Planer Transmission Lines and Waveguides.
Week 4	Lab 4: Planer Transmission Lines and Waveguides.
Week 5	Lab 5: Planer Transmission Lines and Waveguides.
Week 6	Lab 6: Planer Transmission Lines and Waveguides.
Week 7	Lab 7: Dipole Antenna.

Week 8	Lab 8: Monopole Antenna.
Week 9	Lab 9: Loop Antenna.
Week 10	Lab 10: Reflector Antenna.
Week 11	Lab 11: Lens Antenna.
Week 12	Lab 12: Patch Antenna.
Week 13	Lab 13: Antenna Array.
Week 14	Lab 14: Antenna Array.
Week 15	Mid-term Exam.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- "*Antennas and Wave Propagation*" - J.D. Kraus, RJ. Marhefka and Ahmad S. Khan. TMH, New Delhi, 4'h ed., (Special Indian Edition), 2010. 2- Ballany , *"Antenna Theory "* , John Wiley & Sons, second edition , 2003	Yes
Recommended Texts	1. A.R.Harish, M.Sachidanada, "*Antennas and Wave propagation",* Oxford University Press, 2007.22 2. Constantine A. Balanis, "*Antenna Theory Analysis and Design",* John Wiley, 2nd Edition 2007. 3. C.Jordan E and Balmain, "*Electromagnetic waves and Radiating Systems",* Pearson Education / PHI, 2006	
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Networks I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ITC210101**				
ECTS Credits	**5.0**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	MTCE		**College**	COE	
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	16/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course typically aim to provide students with a fundamental understanding of networking principles, protocols, and technologies. Here are some common module objectives: 1- Understanding Networking Concepts: The module aims to familiarize students with the basic concepts and terminology used in computer networks. This includes topics such as network topologies, network models (like OSI and TCP/IP), network components (routers, switches, etc.), and network addressing. 2- Understanding Network Protocols and Standards: Students learn about various network protocols and standards that enable communication between devices. This includes protocols like TCP/IP, ARP, ICMP others. The module aims to provide an understanding of their functionalities, addressing schemes, and how they facilitate reliable data transmission. 3- Understanding Network Architecture and Design: This objective focuses on teaching students how to design and implement computer networks. 4- Understanding Network Management and Troubleshooting: Students learn about techniques and tools for managing and monitoring computer networks. They explore network administration tasks, such as configuring devices, managing network resources, and troubleshooting common network issues. 5- Apply concepts listed above by designing a small network.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Understand the main components and working principles of Computer Networks, 2) Understand the networking devices, 3) Understand the Computer Networks Model Layers, 4) Understand Subnetting and Network Design, 5) Understand the Forwarding and Routing Techniques 6) Understand the Physical Routing between nodes 7) Understand the Logical Routing between nodes 8) Understand the Structure of the IP Datagram 9) Understand the Network Testing Tools 10) Understand Internet Architecture
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Computer Networks Fundamentals [12 hrs.]** This part will give a brief description to computer network fundamentals for topics like topologies, types, client-server messages and network layers

	Part B – Network Connectivity [10 hrs.] This part will discuss networking devices with respect to the layers and passing messages taken in the previous part **Part C – Addressing and Routing [30 hrs.]** This part will discuss deeply all the IP classes, subnetting, supernetting and route summarization. Also will clarify the routing types i.e. static and dynamic **Part D – Network Testing [8 hrs.]** After designing any network, the students will be able to test the connectivity between the connected devices, this will be done through the use of **PING** and **Tracert** Tools

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1 #2 and #6, #7
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #8
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	15	LO #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week no.	Material Covered
Week 1	Introduction to Computer Networks Types
Week 2	Types of Connections and Networking Terms
Week 3	Networking Devices (Hub, Bridge, Switch and Router)
Week 4	Network Layers (OSI and TCP/IP) Protocol Suite
Week 5	Addressing (Physical and Logical Addressing)
Week 6	Classfull and Classless Addressing*
Week 7	Mid-term Exam
Week 8	Subnetting Part I
Week 9	Subnetting Part II
Week 10	Delivery and Forwarding
Week 11	Internet Protocol Version 4 (IPv4) Part I
Week 12	Internet Protocol Version 4 (IPv4) Part II
Week 13	Address Resolution Protocol (ARP)
Week 14	Internet Control Message Protocol (ICMP)
Week 15	Seminar Discussion
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week no.	Material Covered
Week 1	Introduction to Computer Networks
Week 2	Types of Network Cabling Part I
Week 3	Wireless Devices
Week 4	Introduction to Packet Tracer Simulation
Week 5	Setting Addresses and Network Masks
Week 6	Proposing a LAN Scenario
Week 7	Mid-term Exam
Week 8	Proposing a WAN Scenario
Week 9	Static Routing Scenario Part I

Week 10	Static Routing Scenario Part II
Week 11	Virtual Local Area Network Setup
Week 12	IP Packet Sniffing tool
Week 13	Address Resolution Protocol Cases
Week 14	Ping and Tracert Tools
Week 15	Report Discussion
Week 16	Review

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	TCP/IP Protocol Suite. Behrouz A. Forouzan, 4th Edition, Mc-Graw Hill, 2010	Yes
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

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Code	**Course/Module Title**	**ECTS**	**Semester**
CNT5	Computer Networks I	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2/2	63	62
Description			
This module explores the principles, concepts, and technologies associated with computer networks. It provides students with a comprehensive understanding of how computer networks function, how they are designed, and how they can be effectively utilized in various applications. Students should be familiar with commonly used notions and protocols in computer networks and be able to design and implement a simple network.			

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Communications**			**Module Delivery**	
Module Type	**C**			☐ **Theory** ☒**Lecture** ☐ **Lab** ☒**Tutorial** ☒**Practical** ☒**Seminar**	
Module Code	**ITC210110**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	MTCE		**College**	COE	
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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CMF4	**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. Understanding the components of the digital communication system. 2. To prepare the mathematical background for communication signal analysis. 3. The student will learn about theoretical bounds on the rates of digital communication systems. 4. The student will demonstrate an understanding of digitization using sampling, quantization, PCM, DPCM, delta modulation, and adaptive delta modulation. 5. Utilize the principles of time division multiplexing and apply different pulse modulation techniques. 6. Explaining the various schemes used to transmit digital signals, including frequency shift keying (FSK), phase shift keying (PSK) and amplitude shift keying (ASK). 7. Introducing the PSK and ASK-based quadrature amplitude modulation (QAM) technologies. 8. Describing the concepts of line coding.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate a thorough understanding of the underlying technical principles and standards of digital communications. 2. Understand the fundamentals of digital communication, focusing on information sent as a sequence of digits that are first converted to an analog form by modulation at the transmitter and then converted back into digits by demodulation at the receiver. 3. Constantly increase their communication and technological literacy by considering how new and evolving technology may affect the assumptions underlying architectures and systems. 4. Understanding and demonstrating knowledge of digital modulation systems, discussing the multiplexing process and line coding
Indicative Contents المحتويات الإرشادية	• Introduction to digital communication[2hrs] • Sampling[10hrs] • Quantization[10hrs] • Introduction to digital modulation[3hrs] • Different modulation and demodulation techniques used in pulse amplitude modulation(PAM), pulse position modulation (PPM), pulse width modulation (PWM), delta modulation (DM), pulse code modulation (PCM) and Differential PCM.[15hrs] • Multiplexing process in the frequency (FDM) and time domains (TDM).[15hrs] • Phase shift keying (PSK), amplitude shift keying (ASK), frequency shift keying FSK signal and describing the quadrature amplitude modulation (QAM) systems.[15hrs] • Baseband data transmission-line coding[10hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Offering helpful tips for studying more about the topics included in the module's content. A sequence of lectures and other learning resources, including slide sets, notes, online videos, instructional sheets with model solutions, numerical and design problems with model solutions, are used to do this.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Elements Of Digital Communication Systems: Models of digital communication systems
Week 2	• Analog signal representation in digital form • Issues in digital transmission. • Advantages of Digital Communication System.
Week 3	• Sampling theorem • Types of sampling- impulse sampling and natural sampling • Baseband sampling
Week 4	• Quantization • State quantization noise
Week 5	**Pulse**-Code Modulation (PCM): • PCM generation. • PCM detection.
Week 6	• Construction, testing, and evaluation of a PCM-based analog-to-digital converter (ADC) and digital-to-analog converter (DAC). • Determining the PCM system's Nyquist sampling frequency and outlining the impacts of aliasing during sampling.
Week 7	• Differential PCM system (DPCM). • Delta modulation, and its drawbacks, adaptive delta modulation. • Noise in PCM and DM systems.
Week 8	Mid-term Exam
Week 9	Describing different modulation techniques used in pulse amplitude modulation (PAM), pulse position modulation (PPM), and pulse width modulation (PWM).
Week 10	Describing different demodulation techniques used in pulse amplitude modulation (PAM), pulse position modulation (PPM), and pulse width modulation (PWM).
Week 11	Describing the many transmission techniques for digital signals, such as amplitude shift keying (ASK), phase shift keying (PSK), and frequency shift keying (FSK).
Week 12	Introducing the PSK and ASK-based quadrature amplitude modulation (QAM) technologies.
Week 13	Bandwidth efficiency for different M-ary digital modulation techniques.
Week 14	Multiplexing process both in the frequency (FDM) and time domains (TDM)

Week 15	Baseband data transmission-line coding
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Basic signals
Week 2	Lab 2: Sampling process
Week 3	Lab 3: Aliasing effect
Week 4	Lab 4: PCM
Week 5	Lab 5: Simulation PCM using Simulink
Week 6	Lab 6: PAM
Week 7	Lab 7:PPM & PWM
Week 8	Lab 8: ASK & PSK
Week 9	Lab 9: FSK
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	Modern Digital and Analog Communication Systems (The Oxford Series in Electrical and Computer Engineering) 4th Edition, by B. P. Lathi and Zhi Ding .	
Recommended Texts	Ziemer & Tranter, Principles of Communications - Systems, Modulation, and Noise, 7th edition, 2014.	
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
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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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Media Graphic Design**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ITC210120**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	MTCE		**College**	COE	
Module Leader			**e-mail**	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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	VDT3	**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. Understanding the principles of graphic design: Students should learn about the basic principles of graphic design, such as color theory, typography, composition, and hierarchy. 2. Developing software skills: Students should have hands-on experience with software commonly used in graphic design for digital media, such as Adobe Photoshop, Illustrator, or InDesign. 3. Applying design principles to digital media: Students should learn how to apply design principles to digital media, such as social media graphics, website design, and digital advertising. 4. Understanding the importance of user experience: Students should learn about the importance of user experience (UX) in digital design and how to create designs that are both visually appealing and user-friendly. 5. Creating a design portfolio: Students should have the opportunity to create a portfolio of their work that demonstrates their skills and abilities in graphic design for digital media. 6. Staying up-to-date with industry trends: Students should be aware of current trends and emerging technologies in the field of graphic design for digital media and be able to adapt their skills accordingly. 7. Collaborating with others: Students should have opportunities to work collaboratively on projects with other students, as well as learn how to communicate effectively with clients and team members in a professional setting. 8.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply design principles to create visually appealing graphics for digital media. 2. Demonstrate proficiency in using software commonly used in graphic design for digital media, such as Adobe Photoshop, Illustrator, or InDesign. 3. Create designs that are optimized for various digital media platforms, including social media, websites, and digital advertising. 4. Develop an understanding of user experience (UX) design principles and apply them to create designs that are both visually appealing and user-friendly. 5. Build a portfolio of work that showcases proficiency in graphic design for digital media. 6. Stay up-to-date with industry trends and emerging technologies in graphic design for digital media. 7. Communicate effectively with clients and team members in a professional setting. 8. Collaborate with others to create effective designs and provide constructive feedback to peers. 9. Develop problem-solving skills to address design challenges in digital media. 10. Evaluate and critique design work with an understanding of design principles, industry standards, and client needs.

Indicative Contents المحتويات الإرشادية	**Introduction to Graphic Design (2 hours)** Introduction to graphic design principles, history, and applications Basic design software tools and techniques **Color Theory and Typography (2 hours)** Introduction to color theory and color systems Principles of typography and font selection **Designing for Print (2 hours)** Overview of print design principles and techniques Creating a print design project using Adobe InDesign **Layout Design (2 hours)** Introduction to layout design Understanding grids and composition **Designing for the Web (4 hours)** Overview of web design principles and techniques Creating a web design project using Adobe Photoshop and Adobe Dreamweaver **Digital Imaging and Photo Editing (4 hours)** Introduction to digital imaging Understanding resolution and file formats **Image Editing and Manipulation (4 hours)** Introduction to image editing and manipulation software (e.g. Adobe Photoshop) Techniques for cropping, resizing, color correction, and other image adjustments **Vector Graphics and Illustration (8 hours)** Introduction to vector graphics and illustration software (e.g. Adobe Illustrator) Techniques for creating logos, icons, and other vector-based designs **Branding and Identity Design (4 hours)** Overview of branding and identity design principles and techniques Creating a branding and identity project for a hypothetical client **Design for Social Media (4 hours)** Overview of social media design principles and techniques Creating a social media design project using Adobe Photoshop and other tools

	Motion Graphics and Animation (4 hours) Introduction to motion graphics and animation software (e.g. Adobe After Effects) Techniques for creating simple animations and motion graphics **Interactive Design (4 hours)** Overview of interactive design principles and techniques Creating an interactive design project using Adobe XD or other software **3D Design and Modeling (4 hours)** Introduction to 3D design and modeling software (e.g. Blender, SketchUp) Techniques for creating simple 3D models and designs **Designing for Mobile Devices (4 hours)** Overview of mobile design principles and techniques Creating a mobile design project using Adobe XD or other software **Design for Advertising (8 hours)** Overview of advertising design principles and techniques Creating an advertising design project for a hypothetical client

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to introduce new concepts and theories related to graphic design and digital media. Lectures can be supplemented with visual aids and multimedia presentations to enhance student engagement. 2. Demonstrations: Instructors can demonstrate software and techniques used in graphic design and digital media to help students understand how to apply design principles to digital media. 3. Hands-on Projects: Students can work on hands-on projects to apply what they have learned in class. This can include creating digital media designs for social media, websites, digital ads, and other platforms. 4. Group Projects: Collaborative group projects can provide students with the opportunity to work together to create a comprehensive digital media design project. 5. Critiques: Regular critiques of student work can help students receive feedback on their designs and improve their skills. Critiques can be conducted in class or online, and can include peer-to-peer critiques as well as instructor feedback.

	6. Guest Speakers: Inviting guest speakers from the industry can provide students with real-world insights into the graphic design and digital media field and help them stay up-to-date with emerging trends and technologies. 7. Online Learning: Incorporating online learning resources, such as online tutorials and video lectures, can provide students with additional resources to supplement their in-class learning. 8. Case Studies: Examining case studies of successful graphic design and digital media campaigns can help students understand how design principles are applied in the real world. 9. Industry Workshops: Bringing in industry professionals to lead workshops on specific topics, such as digital advertising or branding, can provide students with specialized knowledge and skills. 10. Self-Directed Learning: Encouraging students to engage in self-directed learning, such as reading industry publications or experimenting with new software, can help them stay motivated and passionate about graphic design and digital media. 11.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2
	Assignments	2	10% (10)	2 and 12	LO #6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	LO #5, #4
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to graphic design principles, history, and applications Basic design software tools and techniques
Week 2	Introduction to color theory and color systems Principles of typography and font selection
Week 3	Overview of print design principles and techniques Creating a print design project using Adobe InDesign
Week 4	Introduction to layout design Understanding grids and composition
Week 5	Overview of web design principles and techniques Creating a web design project using Adobe Photoshop and Adobe Dreamweaver
Week 6	Introduction to digital imaging Understanding resolution and file formats
Week 7	Introduction to image editing and manipulation software (e.g. Adobe Photoshop) Techniques for cropping, resizing, color correction, and other image adjustments
Week 8	Midterm exam
Week 9	Introduction to vector graphics and illustration software (e.g. Adobe Illustrator) Techniques for creating logos, icons, and other vector-based designs
Week 10	Overview of branding and identity design principles and techniques Creating a branding and identity project for a hypothetical client
Week 11	Overview of social media design principles and techniques Creating a social media design project using Adobe Photoshop and other tools
Week 12	Introduction to motion graphics and animation software (e.g. Adobe After Effects) Techniques for creating simple animations and motion graphics
Week 13	Overview of interactive design principles and techniques Creating an interactive design project using Adobe XD or other software
Week 14	Introduction to 3D design and modeling software (e.g. Blender, SketchUp) Techniques for creating simple 3D models and designs
Week 15	Overview of mobile design principles and techniques Creating a mobile design project using Adobe XD or other software
Week 16	Overview of advertising design principles and techniques Creating an advertising design project for a hypothetical client

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Experiment 1: Introduction to Adobe Photoshop • Introduction to the Photoshop interface and tools • Basic photo editing techniques, including cropping, resizing, and color correction • Introduction to layers and layer masks
Week 2	Experiment 2: Introduction to Adobe Illustrator • Introduction to the Illustrator interface and tools • Basic vector drawing techniques, including creating shapes and paths • Working with type in Illustrator
Week 3	Experiment 3: Image Editing and Manipulation • Working with layers and layer masks in Photoshop • Advanced photo editing techniques, including retouching and compositing • Applying filters and effects to images
Week 4	Experiment 4: Vector Graphics and Illustration • Creating vector graphics in Illustrator • Advanced vector drawing techniques, including using the Pen tool and working with anchor points • Combining vector graphics with raster graphics in digital media design
Week 5	Experiment 5: Layout and Design • Designing layouts for digital media, including social media graphics and website design • Understanding visual hierarchy in digital media design • Creating effective designs for digital media
Week 6	Experiment 6: User Experience (UX) Design • Understanding user experience (UX) and its importance in digital media design • Designing for mobile devices and responsive design • Usability and accessibility in digital media design
Week 7	Experiment 7: Digital Advertising • Understanding digital advertising and its role in digital media design • Designing effective digital ads for various platforms

	• Ad optimization for digital media
Week 8	Experiment 8: Animation and Motion Graphics • Introduction to animation and motion graphics in digital media • Basic animation techniques in After Effects • Creating motion graphics for digital media
Week 9	Experiment 9: Web Design • Understanding web design and its role in digital media • Basic web design techniques in Photoshop or XD • Creating effective web designs for digital media
Week 10	Experiment 10: Branding and Identity • Understanding branding and identity in digital media design • Creating a brand identity system for digital media • Applying brand identity to digital media design
Week 11	Experiment 11: Social Media Graphics • Understanding social media and its importance in digital media design • Designing effective social media graphics for various platforms • Social media content planning and optimization
Week 12	Experiment 12: Advanced Image Editing • Advanced photo editing techniques in Photoshop, such as compositing and color grading • Creating photo manipulations and digital art • Advanced retouching techniques
Week 13	Experiment 13: Advanced Illustration • Advanced vector drawing techniques in Illustrator, such as using the Mesh tool and creating gradients • Creating complex illustrations for digital media design • Combining vector graphics with raster graphics in digital media design
Week 14	Experiment 14: Advanced Layout and Design • Advanced layout and design techniques for digital media • Creating complex layouts for digital media design, such as magazine spreads or website wireframes • Incorporating visual hierarchy and user experience (UX) principles into designs
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Designing for Digital" by Chris Noessel	
Recommended Texts	"The Non-Designer's Design Book" by Robin Williams.	
Websites	https://www.canva.com/designschool/	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Numerical Analysis**			**Module Delivery**	
Module Type	B			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	ITC200110				
ECTS Credits	4.00				
SWL (hr/sem)	100				
Module Level	3		**Semester of Delivery**	6	
Administering Department	MTCE		**College**	COE	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MAT2	**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	Numerical analysis is used to solve mathematical equations that are difficult to solve or require a long time to solve. The aim of studying numerical analysis is: • Save time and effort, especially in equations that need a lot of repetition in order to reach the result or solution. • The ability to collect, classify, tabulate, represent and interpret quantitative and numerical data. • Generalizing numerical mathematical operations on symbolic expressions. • The ability to build mathematical models and implement engineering constructions. • Using different thinking methods and the ability to judge the validity and reasonableness of the solution.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn the meaning of numerical analysis and familiarity with mathematical models and methods of solving them, then learn to solve nonlinear equations using numerical analysis methods List the various terms associated with electrical circuits. 2. Learn to solve equations by iterative methods. 3. Learn to solve the linear system by numerical analysis methods. 4. Learn to find the infinite differences. 5. Recognize interpolation and fit curves. 6. Learning to find derivatives. 7. Solving integrals using numerical analysis methods. 8. Learn to solve differential equations with some numerical analysis methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - **Approximation and round of errors** Studying types of error, Exact and approximate solutions, truncation, round of error, relative error, absolute, applications **[3 hrs] + [2 hrs] Practical** Part B – **numerical solution of systems of linear Equations** Gaussian Elimination, Error Analysis, Iteration Methods **[3 hrs]+[2 hrs] Practical** Part C – **Root finding for nonlinear Equations** The Secant Method, Muller's Method, Bisection method, Newton Method , Simple Iterative Method ,The Numerical Evaluation of Multiple Roots, Roots of Polynomials **[6 hrs]+[4 hrs] Practical** Part D - **Interpolation** Linear Interpolation, Quadratic Interpolation, Newton forward and backward interpolation formula, Lagrange interpolation formula, Inverse Lagrange interpolation , Finite Differences and Table-Oriented Interpolation Formulas **[6 hrs] + [4 hrs] Practical** Part E – **Linear algebraic equations** Jacobi , Gauss Siedal , Gauss Elimination , Cramer's rule, matric inversion **[6 hrs] + [4 hrs] Practical** Part F - **Curve fitting** First and second order, Applications **[6 hrs] + [4 hrs] Practical** Part G - **Numerical differentiation** Forward, backward, central, Divided difference errors **[6 hrs] + [4 hrs] Practical** Part H - **Numerical Integration** Elements of numerical integration, Composite rule ,Trapezoidal Rule , Simpson rule **[3 hrs] + [2 hrs] Practical** Part I - **Numerical solution of ordinary differential equations** Euler method. modified Euler method , Range Kutta methods, Adam's method **[6 hrs] + [4 hrs] Practical**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy the student that will be adopted to be able to solve mathematical models that represent different physical and engineering models numerically and to find the best fit for the experimental data and the breadth of the student's engineering picture.

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	4
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	5% (5)	3 and 9	LO #1, #2 and #7, #8
	Assignments	2	5% (5)	5 and 11	LO #3, #4 and #9, #10
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	5% (5)	12	LO #1 - #12
Summative assessment	**Midterm Exam**	2hr	25% (25)	6 and 13	LO #1 - #4 and LO #5- #10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Approximation and round of errors
Week 2	numerical solution of systems of linear Equations
Week 3	Part 1 : Root finding for nonlinear Equations
Week 4	Part 2 : Root finding for nonlinear Equations
Week 5	Part 1: Interpolation
Week 6	**Mid-term Exam** Part 2: Interpolation
Week 7	Part 1 : Linear algebraic equations
Week 8	Part 2 : Linear algebraic equations
Week 9	Part 1 : Curve fitting
Week 10	Part 2 : Curve fitting
Week 11	Part 1: Numerical differentiation
Week 12	Part 2: Numerical differentiation
Week 13	**Mid-term Exam** Numerical Integration
Week 14	Part 1 :Numerical solution of ordinary differential equations
Week 15	Part 2 :Numerical solution of ordinary differential equations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: **Approximation and round of errors**
Week 2	Lab 2: numerical solution of systems of linear Equations
Week 3	Lab 3: Root finding for nonlinear Equations
Week 4	Lab 4: Root finding for nonlinear Equations
Week 5	Lab 5: Interpolation
Week 6	Lab 6: Interpolation
Week 7	Lab 7: Linear algebraic equations
Week 8	Lab 8: Linear algebraic equations
Week 9	Lab 9: Curve fitting
Week 10	Lab 10: Curve fitting
Week 11	Lab 11: Numerical differentiation
Week 12	Lab 12: Numerical differentiation
Week 13	Lab 13: Numerical Integration
Week 14	Lab 14 :Numerical solution of ordinary differential equations
Week 15	Lab 15:Numerical solution of ordinary differential equations

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	K, Atkinson, Elementary numerical analysis, john Wiley, 2009.	No
Recommended Texts	H, John Mathens, "Numerical Methods for Mathematics", john Wiley & sons, 1994 K, Atkinson," Elementary numerical analysis", john Wiley & sons, 2009. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 7th or 10th or 11th Edition. George W. and Collins, II, 2003, Fundamental Numerical Methods and Data Analysis	No
Websites	Websites specialized in the study of the article.	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Space Science I**			**Module Delivery**	
Module Type	**E**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ITC200121**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department			**College**	COE	
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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EPH1	**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 provide students with an understanding of the fundamental principles underlying space science, including the laws of motion, gravitation, electromagnetism, and thermodynamics. 2. To introduce students to the physics of the space environment, including topics such as the Earth's magnetic field, the solar wind, and the interactions between the solar wind and the Earth's magnetosphere. 3. To develop students' knowledge of the properties and behavior of celestial bodies, including planets, moons, asteroids, and comets, and the physical processes that govern their formation and evolution. 4. To familiarize students with the tools and techniques used in space science research, including telescopes, spacecraft, and remote sensing. 5. To provide students with an understanding of current theories and models of the universe. 6. To develop students' ability to analyze and interpret data from space science experiments and observations, and to communicate their findings effectively. 7. To encourage students to think critically about the role of space science in society and the potential impact of space exploration on the environment and human life.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Module 1: Introduction to Space Science • Understand the basic principles of physics that underlie space science • Explain the scientific method and its application to space science • Describe the major subfields of space science and their contributions to our understanding of the universe Module 2: Gravity and Motion in Space • Explain the laws of motion and how they apply to objects in space • Calculate the force of gravity between two objects and use it to predict their motion • Analyze the motion of planets, moons, and other celestial bodies using Kepler's laws of planetary motion Module 3: Electromagnetism and Space Weather • Describe the electromagnetic spectrum and its role in space science • Explain the Sun's influence on space weather and its impact on Earth's environment • Analyze the behavior of charged particles in magnetic fields, including the Earth's magnetosphere Module 4: Properties of Celestial Bodies • Explain the formation and evolution of the solar system and its components • Describe the physical properties of planets, moons, asteroids, and comets • Analyze the geological processes that shape the surfaces of celestial bodies and their implications for habitability

	Module 5: Applications and Implications of Space Science • Describe the practical applications of space science in fields such as communications, navigation, and national security • Analyze the potential environmental and ethical implications of space exploration and colonization • Evaluate the role of space science in shaping our understanding of ourselves and our place in the universe
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Introduction to Space Physics (6 hours)</u>** Overview of the course and its objectives Brief history of space exploration and the space environment Introduction to space physics and its relevance to space exploration **<u>Orbital Mechanics (9 hours)</u>** Newton's laws of motion and gravitation Kepler's laws of planetary motion Orbital elements and parameters **<u>Electromagnetism (6 hours)</u>** Electric and magnetic fields Lorentz force and the motion of charged particles in magnetic fields **<u>Magnetosphere and Radiation Belts (6 hours)</u>** Magnetosphere Van Allen radiation belts **<u>Thermodynamics (6 hours)</u>** First and second laws of thermodynamics Heat transfer in space and spacecraft thermal control **<u>Optics (6 hours)</u>** Electromagnetic radiation and the electromagnetic spectrum Telescopes and other instruments for observing the universe **<u>Plasma Physics (6 hours)</u>** Plasma behavior and characteristics Plasma instabilities and waves

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Lectures are an effective way to introduce students to new concepts and provide an overview of a topic. Lectures should be interactive and engaging to keep students interested and focused. 2. Discussions: Discussions allow students to ask questions and share their thoughts and opinions on a topic. Group discussions can be used to encourage collaboration and critical thinking among students. 3. Multimedia resources: Videos, animations, and interactive simulations can be used to enhance lectures and provide visual aids to help students understand complex concepts. 4. Field trips: Visiting a nearby space center or observatory can provide students with a firsthand experience of space science and inspire them to learn more about the subject. 5. Online resources: Using online resources like virtual tours or online databases can help students access information quickly and easily, and can also be used to supplement in-class learning. 6. Case studies: Case studies can be used to illustrate how space science concepts are applied in real-world scenarios, such as space missions or commercial space ventures. 7. Assessment and feedback: Regular assessments, such as quizzes or exams, can help students track their progress and identify areas where they need to improve. Providing feedback on assignments and assessments can also help students understand their strengths and weaknesses and make improvements.

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	4
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)	5 and 10	LO #2, #5 and #7
	Assignments	2	20% (10)	2 and 12	LO #2, #5 and #6, #7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Overview of the course and its objectives
Week 2	Brief history of space exploration and the space environment
Week 3	Introduction to space physics and its relevance to space exploration
Week 4	Newton's laws of motion and gravitation
Week 5	Kepler's laws of planetary motion
Week 6	Orbital elements and parameters
Week 7	Electric and magnetic fields
Week 8	Lorentz force and the motion of charged particles in magnetic fields
Week 9	Magnetosphere
Week 10	Van Allen radiation belts
Week 11	First and second laws of thermodynamics
Week 12	Heat transfer in space and spacecraft thermal control
Week 13	Electromagnetic radiation and the electromagnetic spectrum
Week 14	Telescopes and other instruments for observing the universe
Week 15	Plasma behavior and characteristics
Week 16	Plasma instabilities and waves

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	لايوجد

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	"Introduction to Space Physics" by Margaret G. Kivelson and Christopher T. Russell	
Recommended Texts	"Plasma Physics and Controlled Fusion" by Francis F. Chen	
Websites	MIT OpenCourseWare: https://ocw.mit.edu/courses/aeronautics-and-astronautics/	

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.

المرحلة: الثالثة

الفصل الدراسي: السادس

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Networks II**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210102**				
ECTS Credits	**6.0**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	MTCE		**College**	COE	
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	16/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer network 2 (CNT5)	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of this module typically focus on providing students with a comprehensive understanding of various networking protocols and their functionalities. Here are some common objectives covered in this module: 1. Dynamic Routing Protocols Overview: Students learn about the major dynamic routing protocol suites used in computer networks, such as the RIP and OSPF. 2. Application Layer Protocols: Students are introduced to various application layer protocols used for specific network services. This can include protocols like HTTP (Hypertext Transfer Protocol), DNS (Domain Name System), FTP (File Transfer Protocol), SMTP (Simple Mail Transfer Protocol), DHCP (Dynamic Host Configuration Protocol) and more. The objective is to understand their functionalities and how they enable specific network applications. 3. Security Protocols: This objective focuses on introducing students to security protocols used in computer networks, such as IPsec (Internet Protocol Security) and VPN (Virtual Private Network). Students gain an understanding of their role in ensuring secure communication, encryption, and authentication. 4. Network Administration Skills: Students learn the environment of Network Administration using a virtual networks by simulating the resources sharing and users' privileges through policies and users rights. 5. Emerging Protocol Technologies: The module may cover emerging protocol technologies or advancements, such as SDN (Software-Defined Networking) and others. Students explore these technologies to understand their features, benefits, and potential impact on future networks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Understand the main components and working principles of Computer Networks Protocols, 2) Understand the Dynamic Routing Protocols, 3) Understand the Application Layer Protocols, 4) Understand Network security Issues,

	5) Understand Network Administration path, 6) Viewing some new emerging techniques like SDN and MPLS 7) Ability to design and build a Hypothesis Intranet 8) Ability to understand how the (WWW) World Wide Web works
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A –Network Protocols [36 hrs.]** This part will describe too many protocols by lightning the structure of each protocol with the consideration to each field inside it **Part B – Network Security [10 hrs.]** This part will discuss some important security issues related to computer networks like the use of firewall and proxy servers, also the use of VPN through any network **Part C – Network Administration [10 hrs.]** This part will concentrate on the topics related to network administration especially on the remote servers login **Part D – Emerging Protocols [4 hrs.]** This part will take the new emerging protocols like SDN and MPLS, also this part will be done through students seminars

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted for this module is the Discussions and Debates: Classroom discussions and debates can stimulate critical thinking and active engagement with network protocol concepts. Instructors can pose thought-provoking questions, encourage students to share their perspectives, and facilitate discussions around protocol design choices, performance trade-offs, or emerging trends.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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)	5 and 10	LO #2 , #3, #4, #5
	Assignments	2	10% (10)	2 and 12	LO #6 and #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	15	LO #8
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week no.	Material Covered
Week 1	Internet Protocol Version 6 (IPv6)
Week 2	Dynamic Routing Protocols (RIP) Routing Information Protocol
Week 3	Dynamic Routing Protocols (OSPF) Open Shortest Path First)
Week 4	Application Layer Protocols (DHCP) Dynamic Host Configuration Protocol
Week 5	Application Layer Protocols (DNS) Domain Network System
Week 6	Application Layer Protocols (FTP) File Transfer Protocol
Week 7	Mid-term Exam
Week 8	Application Layer Protocols (HTTP) Hyper Text Transfer Protocol
Week 9	Application Layer Protocols (SMTP) Simple Mail Transfer Protocol
Week 10	Application Layer Protocols (TELNET) Protocol
Week 11	Application Layer Protocols (RDP) Remote Desktop Protocol
Week 12	Network Security: (VPN) Virtual Private Networks
Week 13	Network Security: Firewall and Proxy Servers
Week 14	Emerging Protocol Technologies: (SDN) Software-Defined Networking and Multi-Protocol Label Switching
Week 15	Seminar Discussion
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week no.	Material Covered
Week 1	How Internet Works
Week 2	Packet Tracer RIP Experiment
Week 3	Packet Tracer OSPF Experiment
Week 4	Packet Tracer DHCP Experiment
Week 5	Packet Tracer DNS Experiment
Week 6	Packet Tracer FTP Experiment
Week 7	Mid-term Exam
Week 8	Packet Tracer HTTP Experiment
Week 9	Packet Tracer SMTP Experiment
Week 10	Packet Tracer TELNET Experiment
Week 11	Packet Tracer VPN Experiment
Week 12	Installation of Active Directory using Virtual Box Simulation
Week 13	Authentication and Authorization Experiment
Week 14	Sever Backup Types
Week 15	Report Discussion
Week 16	Review

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	TCP/IP Protocol Suite. Behrouz A. Forouzan, 4th Edition, Mc-Graw Hill, 2010	Yes
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
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Code	**Course/Module Title**	**ECTS**	**Semester**
CNT6	Computer Networks II	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2/2	63	87
Description			
This module explores the concepts for computer network protocols. It provides students with a comprehensive understanding of how computer networks protocols function, how they are designed, and how they can be effectively utilized in various applications. After ending this course, the Student should have enough skills for designing and implementing Intranets.			

4MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Signal Processing**			**Module Delivery**	
Module Type	**C**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**ITC210140**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	MTCE		**College**	COE	
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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electronic (ECT3)	**Semester**	Three
Co-requisites module	Communication Fundamental and Engineering Mathematics II (CMF2, EMT4)	**Semester**	Four

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Give the student a clear view about the principles of digital signal processing, the difference between digital and continues signals, filter kinds, and its applications.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Review of discrete signals and systems, 2. Discrete Fourier series, 3. Discrete Fourier transform, 4. Convolution and correlation, 5. Discrete and fast Fourier transform, 6. Z- transform, 7. Framework for digital filter design, 8. Finite impulse response digital filter design, 9. Infinite impulse response digital filter design, Applications of filter banks in audio & image processing. 10. Noise calculation
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part A: **Theory** 1. **Introduction (2 hours)** 1. Basic elements of Digital Signal Processing, 2. Need of Digital Signal Processing over Analog Signal Processing, 3. A/D and D/A conversion, 4. Sampling continuous signals and spectral properties of sampled signals 2. **Discrete-time Signals and System (3 hours)** 1. Elementary discrete-time signals, 2. Linearity, Shift invariance, Causality of discrete systems, 3. Recursive and Non-recursive discrete-time systems, 4. Convolution sum and impulse response, 5. Linear Time-invariant systems characterized by constant coefficient difference equations, 3. **Z-Transform (5 hours)** 1. Definition of the z-transform, 2. One-side and two-side transforms, ROC, Left-side, Right-sided and two-sided sequences, Region of convergence, Relationship to causality, 3. Inverse z-transform-by long division, by partial fraction expansion, 4. Z-transform properties-delay advance, Convolution, Parseval's theorem, 4. **Discrete Fourier Transform (6 hours)** 1. Definition and applications, Frequency domain sampling and for reconstruction, Forward and Reverse transforms, Relationship of the DFT to other transforms, 2. Properties of the Discrete Fourier Transform: Periodicity, Linearity and Symmetry Properties, Multiplication of two DFTs and Circular Convolution, Time reversal, Circular time shift and Multiplication of two sequences circular frequency shift, Circular correlation and Parseval's Theorem, 5. **Implementation of Discrete-time System (5 hours)** 1. Structures for FIR and IIR, Direct Form, Cascaded and parallel form, Lattice for FIR,

	2. Conversion between direct form and lattice and vice verse, Lattice and lattice-ladder for IIR, 3. Frequency response, 4. Digital filters, finite precision implementations of discrete filters, 5. Representation of Numbers; fixed point and floating binary point, Effect of Rounding and truncation; Limit cycle oscillations effect, 6. **IIR Filter Design (4 hours)** 1. IIR Filter Design: IIR filter design by classical filter design using low pass approximations Butterworth, Chebychev, Inverse Chebyshev, Elliptic and Bessel-Thompson filters, 2. IIR filter design by Impulse-invariant method, Bilinear Transformation Method, Matched z-transform method, 3. IIR lowpass discrete filter design using bilinear transformation 7. **FIR Filter Design (5 hours)** 1. FIR filter design by Fourier approximation, 2. Gibbs phenomena in FIR filter design, Design of Linear Phase FIR filters using window function, Applications of window functions to frequency response smoothing, 3. Window functions, Rectangular, Hamming, Blackman and Kaiser windows, 4. Design of linear phase FIR filter by the frequency sampling method, 5. FIR filter design using the Remez exchange algorithm, 8. **Digital Filter Implementation (3 hours)** 1. Implementations using special purpose DSP processors, 2. Bit-serial arithmetic, pipelined implementations, 3. Distributed arithmetic implementations. Part B: **Practical** 1. Study the behavior of a simple digital notch filter. **(5 houre)** 2. Response of a recursive digital. **(4 houre)** 3. Scaling, dynamic range and noise behavior of a recursive digital filter, observation of nonlinear finite precision effects. **(4 houre)** 4. Response of a non-recursive digital filter, Implementation in Impulse Invariant and Bilinear Transformation. **(5 houre)** 5. Band pass filters implemented using cascade second order sections and wave or ladder filters, Comparison of implementations. **(5 houre)** 6. Design of FIR filter using window method, Comparison of FIR filter for different windowing method. **(4 houre)**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**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 classe interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.**

Commented [L1]:

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	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 Discrete Signals and Systems
Week 2	Convolution and Correlation
Week 3	Discrete Fourier Series (DFS)
Week 4	Discrete Fourier Transform (DFT)
Week 5	Fast Fourier Transform I
Week 6	Fast Fourier Transform II
Week 7	Mid-term Exam
Week 8	Z Transform I
Week 9	Z Transform II

Week 10	Digital Filters Realization
Week 11	Finite Impulse Response Digital Filter Design (FIR)
Week 12	Infinite Impulse Response Digital Filter Design (IIR) I
Week 13	Infinite Impulse Response Digital Filter Design (IIR) II
Week 14	Advanced DSP.
Week 15	Midterm Exam. (2)
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Discrete Signals
Week 2	Lab 2: Convolution and Correlation
Week 3	Lab 3: Discrete Fourier Series
Week 4	Lab 4: Discrete Fourier Transform
Week 5	Lab 5: Fast Fourier Transform
Week 6	Lab 6: Fast Fourier Transform
Week 7	Lab 7: Test I
Week 8	Lab 8: Z Transform I
Week 9	Lab 9: Z Transform II
Week 10	Lab 10: Digital Filters
Week 11	Lab 11: FIR design
Week 12	Lab 12: IIR design
Week 13	Lab 13: IIR design
Week 14	Lab 14:
Week 15	Lab 15:

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	" Digital Signal Processing Practical Approach", By Emmanuel and Barrie, 2001	Yes
Recommended Texts	Digital Signal Processing with Computer Applications", John Wiley & Sons , 1997 By PAUL A. LYNN.	No
Websites		

Grading Scheme مخطط الدرجات				
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	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Information Theory and Coding**			**Module Delivery**	
Module Type	**C**			☐**Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☒**Practical** ☒**Seminar**	
Module Code	**ITC210150**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CMF4+STP3	**Semester**	4 & 3
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. Introducing the principles of information theory and coding techniques. 2. Give an overview of coding theory and practice. 3. Study of source coding, channel coding and error correction methods. 4. Define channel capacities and properties using Shannon's Theorems. 5. Introduction to ciphering and deciphering methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Formulate the fundamental concepts of information theory such as entropy, mutual information, channel capacity. 2. Calculate the information content of a random variable from its probability distribution. 3. Relate the joint, conditional, and marginal entropies of variables in terms of their coupled probabilities. 4. Define channel capacities and properties using Shannon's Theorems. 5. Generalize the discrete concepts to continuous signals on continuous channels. 6. Elaborate on the principles of channel coding and data transmission. 7. Construct efficient codes for data on imperfect communication channels.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Introduction to Information Theory[2hrs]</u> - Definition of information measure - Entropy of symbols - Conditional entropies - Chain Rule for entropy. - Fundamental measure of information content. <u>Source coding theorem; prefix, variable-, and fixed-length codes[6hrs]</u> - Symbol codes - The binary symmetric channel - Capacity of a noiseless discrete channel - Error correcting codes. <u>Channel Classification and Capacity[10hrs]</u> - Channels types - Noise - Properties of Channel Capacity - Channel Coding Theorem - Efficiency of symmetric and non-symmetric discrete channels - Channel redundancy <u>Continuous information; density; noisy channel coding theorem (part I) [10hrs]</u> - Signal-to-noise ratio

	- Power spectral density - Gaussian channels - Relative significance of bandwidth and noise limitations Continuous information; density; noisy channel coding theorem (part II) [8hrs] - The Shannon rate limit and efficiency for noisy continuous channels. - Huffman coding Introduction to Error Control Coding (part I) [4hrs] - Introduction - Types of errors - Types of codes Introduction to Error Control Coding (part II) [2hrs] - Linear Block Codes: Matrix description Introduction to Error Control Coding (part III) [6hrs] - Error detection and correction - Standard arrays and table look up for decoding - Hamming codes Cyclic Codes (Part I) [4hrs] - Binary Cyclic Codes - Algebraic structures of cyclic codes Cyclic Codes (Part II) [4hrs] - Encoding using an (n-k) bit shift register - Syndrome calculation Convolution Codes[4hrs] - Convolution Codes - Time domain approach - Transform domain approach

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Forming groups consisting of 3 to 4 students assigned to build and analyze a specific coding method suggested by the module leader or by other groups. Discussing the accomplished assignment through a seminar, so that students can view the different coding systems and expand their knowledge.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Information Theory
Week 2	Source coding theorem; prefix, variable-, and fixed-length codes
Week 3	Channel Classification and Capacity
Week 4	Continuous information; density; noisy channel coding theorem.(part I)
Week 5	Continuous information; density; noisy channel coding theorem.(part II)
Week 6	Revision
Week 7	Midterm Exam. (1)
Week 8	Introduction to Error Control Coding (part I)
Week 9	Introduction to Error Control Coding (part II)

Week 10	Introduction to Error Control Coding (part III)
Week 11	Cyclic Codes (Part I)
Week 12	Cyclic Codes (Part II)
Week 13	Convolution Codes
Week 14	Revision
Week 15	Midterm Exam. (2)
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Matlab (Concepts)
Week 2	Matlab (Entropy)
Week 3	Matlab (Channels)
Week 4	Matlab (coding theorem)
Week 5	Matlab (coding theorem)
Week 6	Matlab (coding theorem)
Week 7	Midterm Exam. (1)
Week 8	Matlab (Error detection and correction
Week 9	Matlab (Error detection and correction)
Week 10	Matlab (Error detection and correction
Week 11	Matlab (Error detection and correction)
Week 12	Matlab (Error detection and correction
Week 13	Matlab (Error detection and correction)
Week 14	Revision
Week 15	Midterm Exam. (2)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	[1] "Fundamentals in Information Theory and Coding" Borda, Monica, Springer 2011 [2] “Essentials of error-control coding”, J.C. Moreira, 2006	Yes

Recommended Texts	[1] “Information Coding Techniques”, J.S. Chitode, 1st edition,2008 [2] "Elements of information theory", T.M. & Thomas, J.A. (2006). New York: Wiley.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microprocessors**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210080**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Mobile Communications and Computing Engineering (MCCE)	**College**	University of Information Technology and Communications (UOITC)/College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		16/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Digital Systems Design II	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course introduces the programming, architecture and interfacing of the Intel 80x86 microprocessors for students who had previous knowledge in both computer hardware and software. A student, after successfully passing this course will be able to: ● Understand the main components and working principals of the Intel 80x86 microprocessor. ● Program and debug in assembly language. ● Understand the basic computer architecture. ● Understand the memory organization and memory interfacing. ● Perform input/output device programming in assembly. ● Understand the hardware and software interrupts and their applications. ● Understand the properties and interfacing of the parallel and serial ports.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Understand the main components and working principles of the Intel 80x86 microprocessor, 2) Program and debug in assembly language, 3) Understand the basic computer architecture, 4) Understand interrupts and their applications, 5) Perform input/output device interfacing/programming in assembly, 6) Understand the memory organization, design, and interfacing, 7) Understand the properties and interfacing of the parallel and serial ports,
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. General Architecture [7 hrs] Addressing Modes [7 hrs] Instruction sets Data movement [4 hrs] Instruction sets Arithmetic Instructions [4 hrs] Program Control Instructions [7hrs] Revision problem classes [3 hrs] Part B – Microprocessors H/W and Interfacing Hardware Specifications [6 hrs]. Microprocessor timing [4 hrs] Memory Interface [6 hrs] Basic I/O Interface [6 hrs] Interrupts [6 hrs]

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the Microprocessor and Computer
Week 2	8086 Microprocessor Architecture
Week 3	Addressing Modes
Week 4	Instruction Set (Data Movement Inst.)
Week 5	Instruction Set (Logic and Arithmetic Inst.)
Week 6	Instruction Set (Program Control Instructions)
Week 7	Mid-term Exam
Week 8	8086/8088 Hardware Specifications (part 1)
Week 9	8086/8088 Hardware Specifications (part 2)
Week 10	Timing and Clocking
Week 11	Memory Types
Week 12	Memory Design and Interface (part 1)
Week 13	Memory Design and Interface (part 2)
Week 14	Basic I/O Interface
Week 15	Interrupts
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to 8086 Emulator
Week 2	Lab 2: Addressing Modes I
Week 3	Lab 3: Addressing Modes II
Week 4	Lab 4: Arithmetic Instructions
Week 5	Lab 5: Logical, Shift, and Rotate Instructions
Week 6	Lab 6: Transfer Control Within a Program
Week 7	Mid-term Exam
Week 8	CALL & RET Instructions
Week 9	Interrupts Handling
Week 10	Input/Output Instructions
Week 11	Robot Virtual Device
Week 12	Thermometer Virtual Device

Week 13	Traffic Light Virtual Device
Week 14	Steeper Motor Virtual Device
Week 15	Review 1
Week 16	Review 2

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Brey, Barry B. The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit Extensions: Architecture, Programming, and Interfacing. Pearson Education India, 2009.	Yes
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Space Science II**			**Module Delivery**	
Module Type	**E**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**SSC6**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	MTCE		**College**	COE	
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	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	SSC5	**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. Understand the basic concepts of space communication engineering 2. Identify the key elements of a space communication system 3. Understand the principles of antenna operation 4. Identify the different types of antennas used in space communication 5. Calculate antenna gain and directivity 6. Understand the concept of link budget analysis 7. Calculate the signal-to-noise ratio (SNR) and link margin 8. Analyze the impact of noise temperature and system noise figure on the link budget 9. Understand the principles of error control coding 10. Identify the different types of error control codes used in space communication 11. Analyze the performance of different error control codes in the presence of noise and interference 12. Analyze the performance of low-noise amplifiers (LNAs) and power amplifiers in space communication
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students will understand the basic concepts of space communication engineering and be able to identify the key elements of a space communication system. 2. Students will be able to describe the communication requirements of different types of space missions. 3. Students will understand the principles of antenna operation and be able to identify the different types of antennas used in space communication. 4. Students will be able to calculate antenna gain and directivity. 5. Students will understand the concept of link budget analysis and be able to calculate the signal-to-noise ratio (SNR) and link margin. 6. Students will be able to analyze the impact of noise temperature and system noise figure on the link budget. 7. Students will understand the principles of error control coding and be able to identify the different types of error control codes used in space communication. 8. Students will be able to analyze the performance of different error control codes in the presence of noise and interference. 9. Students will understand the key components of a spacecraft communication subsystem and be able to identify the different types of transponders, transmitters, and receivers used in space communication. 10. Students will be able to analyze the communication challenges of synthetic aperture radar (SAR) missions.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction to Space Communication Engineering (3 hours)** Basic concepts of space communication engineering and Key elements of a space communication system **Antenna Fundamentals (6 hours)** Principles of antenna operation Types of antennas used in space communication Antenna gain and directivity **Link Budget Analysis (9 hours)** Concept of link budget analysis Signal-to-noise ratio (SNR) and link margin Impact of noise temperature and system noise figure on the link budget **Error Control Coding (6 hours)** Types of error control codes used in space communication Performance analysis of error control codes in the presence of noise and interference **Spacecraft Communication Subsystems (6 hours)** Types of transponders, transmitters, and receivers used in space communication Performance analysis of low-noise amplifiers (LNAs) and power amplifiers in space communication **Space-Based Internet and Broadband Communication (3 hours)** Principles of space-based internet and broadband communication **Free-Space Optical Communication (6 hours)** Principles of free-space optical communication Communication requirements of laser communication terminals (LCTs) **Interference and Spectrum Management (6 hours)** Impact of radio frequency interference (RFI) on space communication Types of RFI and their sources

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Lectures are a common teaching strategy for presenting new concepts and theories. In this course, lectures can be used to introduce students to the basic concepts and principles of space communication engineering 2. Case studies: Case studies can be used to illustrate the application of communication engineering in real-world space missions. For example, students can analyze the communication requirements and challenges of a specific space mission and design a communication system that meets those requirements. 3. Problem sets: Problem sets can be used to reinforce the concepts and principles covered in the lectures. For example, students can solve problems related to link budget analysis, modulation techniques, and error control coding. 4. Online resources: Online resources such as videos, simulations, and interactive tutorials can be used to reinforce the concepts and principles covered in the course. For example, students can use online simulations to analyze the performance of different modulation techniques or error control codes. 5. Assessments: Assessments such as quizzes, exams, and projects can be used to evaluate students' understanding of the concepts and principles covered in the course. For example, students can take a final exam that covers all the topics covered in the course, or they can submit a final project that demonstrates their ability to design and simulate a communication system for a specific space mission.

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
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)	5 and 10	LO #2, #3 and #5
	Assignments	2	20% (10)	2 and 12	LO #2, #3 and #4, #5
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Basic concepts of space communication engineering and Key elements of a space communication system
Week 2	Principles of antenna operation
Week 3	Types of antennas used in space communication
Week 4	Antenna gain and directivity
Week 5	Concept of link budget analysis
Week 6	Signal-to-noise ratio (SNR) and link margin
Week 7	Impact of noise temperature and system noise figure on the link budget
Week 8	Types of error control codes used in space communication
Week 9	Performance analysis of error control codes in the presence of noise and interference
Week 10	Types of transponders, transmitters, and receivers used in space communication
Week 11	Performance analysis of low-noise amplifiers (LNAs) and power amplifiers in space communication
Week 12	Principles of space-based internet and broadband communication
Week 13	Principles of free-space optical communication
Week 14	Communication requirements of laser communication terminals (LCTs)
Week 15	Impact of radio frequency interference (RFI) on space communication
Week 16	Types of RFI and their sources

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered

Week 1	لايوجد
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	"Spacecraft Systems Engineering" by Peter Fortescue, John Stark, and Graham Swinerd	
Recommended Texts	"Communication Systems Engineering" by John G. Proakis and Masoud Salehi	
Websites	Institute of Electrical and Electronics Engineers (IEEE) Communications Society: https://www.comsoc.org/	

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.

Code	**Course/Module Title**	**ECTS**	**Semester**
Ssc6	Space science II	3	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0	48	27

Description

space science II is the study of communication systems, techniques, and technologies used in space missions. It involves the design, analysis, and optimization of communication systems that enable spacecraft to communicate with each other and with ground stations on Earth. The field of communication engineering in space science encompasses a wide range of topics, including antenna design, error control coding, , spacecraft communication subsystems, space-based internet and broadband communication, free-space optical communication, interference and spectrum management, spacecraft operations and ground segment, and emerging trends in space communication.

Effective communication is critical to the success of space missions. The communication systems used in space must be able to transmit and receive signals over long distances, in harsh environments, and under challenging conditions. Communication engineers must design systems that are reliable, efficient, and capable of handling large amounts of data. They must also consider factors such as power consumption, weight, and size, as well as the impact of radiation and other environmental factors on the performance of communication systems.

Communication engineering in space science is a multidisciplinary field that draws on knowledge from areas such as electrical engineering, computer science, physics, and mathematics. It is an important area of study for space agencies, aerospace companies, and research institutions that are involved in the development of space technology and exploration. The field of communication engineering in space science is constantly evolving, as new technologies and techniques are developed to meet the growing demands of space missions.

المرحلة: الرابعة

الفصل الدراسي: السابع

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Artificial Intelligence**			**Module Delivery**	
Module Type	**E**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210160**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Qutaiba Humadi Mohammed		**e-mail**	?@uoitc.edu.iq, Dr.Qutaiba.cse@gmail.com	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC200080 + ITC200050	**Semester**	3+2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• Understand the basics of artificial intelligence and its subfields. • Explore real-world applications of AI across different industries. • Gain insights into the ethical, social, and economic implications of AI. • Develop an appreciation for the potential of AI to drive innovation and transformation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Define and explain the fundamental concepts and subfields of AI. • Identify real-world applications of AI across various industries. • Analyze the ethical, social, and economic implications of AI. • Recognize the potential of AI to drive innovation and transformation in different domains.
Indicative Contents المحتويات الإرشادية	Human intelligence - "The mental quality that consists of the abilities to learn from experience, adapt to new situations, understand and handle abstract concepts, and use knowledge to manipulate one's environment." Artificial intelligence - "Intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals." Scientific method - "An empirical method for acquiring knowledge that has characterized the development of science

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Artificial Intelligence (AI) is an increasingly important topic to discuss in learning environments. The still emerging technology is likely to have transformative effects on higher education, students' future careers, and society as a whole. As educators, we have a responsibility to approach conversations about AI with care and intentionality. Many of us are still learning about AI and its implications for teaching and learning, and there has been much debate about its potential benefits and pitfalls. Some concerns raised by educators center around AI and academic integrity, but there are unknowns related to privacy, security, and copyright as well. Before we can have meaningful discussions about AI with students—and before we employ AI tools in our teaching—we should familiarize ourselves with these issues. This module description form will acquaint you with AI, address some of the concerns around its educational uses, and provide concrete suggestions for how to openly and effectively discuss AI with your students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Artificial Intelligence Definition: What is AI? Foundation of AI, History, Intelligent Agents, Agent architecture, AI Application (E Commerce & Medicine), AI Representation, Properties of internal representation, Future of AI, Production System, Issues in design of Search programs.
Week 2	Introduction to Artificial Intelligence Introduction, Logic, Logic Programming, Forward and Backward reasoning, Forward and Backward chaining rules.
Week 3	Heuristic Search Techniques

	Heuristic search, Hill Climbing, Best first search, mean and end analysis, constraint satisfaction, A* and AO* algorithm.
Week 4	Game Playing Minmax search procedure, Alpha-beta cutoffs, Waiting for quiescence, Secondary search
Week 5	Knowledge Representation Basic knowledge representation, knowledge representation paradigms, Propositional logic, Inference Rules in Propositional logic.
Week 6	Knowledge Representation (Using Predicate Logic) knowledge representation using Predicate logic: Predicate calculus, Predicate and arguments, ISA hierarchy, Frame notation, Resolution, Natural deduction
Week 7	Knowledge Representation (Non Montionic Logic) TMS (Truth Maintenance System), Statistical and probabilistic reasoning, Fuzzy Logic, Structure knowledge representation
Week 8	Mid Exam Knowledge Representation (Non Montionic Logic) Semantic-net, Frames, Conceptual dependency, Script
Week 9	Learning What is Learning? Types of Learning (Rote, Direct instruction analogy, Induction, Deduction)
Week 10	Planning Black world, Strips, Implementation using goal stack, Non linear planning with goal stacks, Hierarchical planning, least commitment strategy
Week 11	Natural Language Processing Introduction, Steps in NLP, Syntactic Processing, ATN, RTN, Semantic analysis, Discourse & Pragmatic processing
Week 12	Perception Perception, Action, Robot Architecture
Week 13	Neural Networks Introduction to neural networks and perception-qualitative analysis, Neural net architecture and applications
Week 14	Expert System Utilization and functionality, Architecture of expert system
Week 15	Expert System Knowledge representation
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• Introduction to Logic Programming by Prolog, applications of Prolog and writing a Prolog Program
Week 2	• Structure of a Prolog Program (Facts, Facts with Arguments, Rules, Queries and Variables)
Week 3	• Types (Simple Types, Type Predicates, Arithmetic Operators)
Week 4	• Types (Expressions, Boolean Predicates, Logical Operators)
Week 5	• Backtracking in Prolog (Backtracking in Rules)
Week 6	• Lists (Internal Representation, Cats and Negation)
Week 7	• Lists (Some Built-in Predicates for List Manipulation)
Week 8	• Mid Exam
Week 9	• TIC-TAC-TOE
Week 10	• A* Algorithm and Minmax algorithm
Week 11	• Minmax with Alpha Beta Cutoff
Week 12	• Unification algorithm
Week 13	• Expert System (Medical Diagnosis)
Week 14	• Expert System (Computer Maintenance)
Week 15	• Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Artificial Intelligence" by Neeta Deshpande, Year: 2010 (Second Revised Edition).	?
Recommended Texts		?

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

(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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer control**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☒ **Seminar**	
Module Code	**ITC210210**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	MTCE		**College**	Engineering	
Module Leader	Haider Mahdi		**e-mail**	E-mail	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC200062	**Semester**	4
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 and analysis closed loop physical systems and its behavior and stability to design a conventional controller (PI, PD, or PID) that contains computers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Understanding the concept of closed-loop physical systems and their behavior and stability. 2. Learning about different types of conventional controllers, such as PI, PD, and PID. 3. Gaining knowledge of computer-based control systems and their advantages over traditional control systems. 4. Developing skills in designing a conventional controller that contains computers. 5. Analyzing the performance of the designed controller through simulations and experiments. 6. Identifying the limitations of the designed controller and proposing possible improvements. 7. Applying the learned concepts and skills in real-world applications, such as industrial automation and robotics. 8. Enhancing critical thinking, problem-solving, and teamwork skills through group projects and assignments.
Indicative Contents المحتويات الإرشادية	- Open and Closed Loop System: Definition, Advantages and Disadvantages, Feedback Control System, Block Diagram Representation.(6) - Transfer Functions: Definition, Laplace Transform, Transfer Function of Electrical, Mechanical and Hydraulic Systems.(6) - Routh's Criterion: Introduction, Stability Analysis of Linear Systems using Routh's Criterion.(6) - Root Locus Method: Introduction, Construction of Root Locus, Rules for Sketching Root Locus, Root Locus Analysis of Control Systems.(6) - Nyquist Criterion: Introduction, Nyquist Plot, Stability Analysis of Control Systems using Nyquist Criterion.(6) - Mxn Criterion: Introduction, M- Circle and N-Circle, Stability Analysis of Control Systems using Mxn Criterion.(6) - Bode Diagram: Introduction, Frequency Response Analysis, Bode Plot, Stability Analysis of Control Systems using Bode Diagram.(6) - Compensation: Introduction, Types of Compensators, Design of Compensators using Root Locus and Bode Diagram.(6) - Nonlinear Systems: Definition, Nonlinearities in Control Systems, Analysis of Nonlinear Systems using Describing Function Method.(6) - Introduction to Discrete Control System: Sampling Theorem, Z-Transform, Transfer Function of Discrete Time Systems.(6)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	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 types of simple experiments involving some sampling activities that are interesting to the students.

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	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to control systems:**

Week 2	**Analytical background** - Deferential equations Laplace Transform
Week 3	**Methods of System Modeling Transfer Function** **Mathematical Model of Physical System (Electrical Systems)**
Week 4	**Signal Flow** **Block Diagram Reduction and MATLAB Applications** **Control system Response analysis: Introduction** **Transient Response**
Week 5	**Rouths Criterion I**
Week 6	**Rouths Criterion II**
Week 7	**Test**
Week 8	**Root Locus Method I**
Week 9	**Root Locus Method II**
Week 10	**Nyquist Criterion I**
Week 11	**Nyquist Criterion I**
Week 12	**Bode Diagram I**
Week 13	**Bode Diagram II**
Week 14	**Compensation I**
Week 15	**Compensation II**
Week 16	Midterm II

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Agilent VEE and PSPICE
Week 2	Lab 2: Thévenin's / Norton's Theorem and Kirchhoff's Laws
Week 3	Lab 3: First-Order Transient Responses
Week 4	Lab 4: Second-Order Transient Responses
Week 5	Lab 5: Frequency Response of RC Circuits
Week 6	Lab 6: Frequency Response of RLC Circuits
Week 7	Lab 7: Filters
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	Modern Control Engineering (by Katsuhiko Ogata)	
Recommended Texts	Automatic Control Systems (Benjamin C Kuo and Farid Golnaraghi) Digital Control System analysis and design (by Charles L Philips) Modern Control Systems (by Dorf and Bishop)	
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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language II**			**Module Delivery**	
Module Type	**Base**			☒ **Theory** ☐ **Lecture** ☐**Lab** ☐ **Tutorial** ☐ **Practical** ☐**Seminar**	
Module Code	**ITC000032**				
ECTS Credits	**2.0**				
SWL (hr/sem)0	**50**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	MCCE		**College**	COE	
Module Leader	Mustafa Khalid Saleh		**e-mail**	mksalrawi88@gmail.com	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Master of Arts	
Module Tutor	----------		**e-mail**	----------	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	16/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC000031	**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	1. To further develop students' listening, speaking, reading, and writing skills in English, focusing on more advanced language structures and vocabulary. 2. To enhance students' academic writing skills, including essay composition, research paper writing, critical analysis, and argumentation. 3. To strengthen students' ability to comprehend and analyze complex texts from a variety of disciplines. Improve critical thinking skills, inference, and evaluation of arguments. 4. To enhance students' oral communication skills in academic and professional settings. Develop skills in giving presentations, participating in debates, and engaging in discussions on complex topics. 5. To expand students' academic vocabulary to encompass specialized terminology from various disciplines. Develop strategies for acquiring and using domain-specific vocabulary. 6. To deepen students' understanding of advanced grammatical structures, syntax, and sentence complexity. Focus on accuracy and precision in language use. 7. To promote self-directed learning strategies, including self-assessment, goal setting, and reflection. Encourage students to take ownership of their language learning and pursue ongoing language development beyond the course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate advanced proficiency in the English language, including enhanced listening, speaking, reading, and writing skills. 2. Produce well-structured and coherent academic paragraphs, essays and reports. Apply appropriate academic writing conventions, including critical analysis, argumentation, and proper citation and referencing. 3. Comprehend and critically analyze complex academic texts from various disciplines. Identify main ideas, supporting evidence, and implicit arguments. Apply advanced reading strategies and engage in critical thinking. 4. Communicate effectively in academic and professional settings, such as presentations, debates, and discussions. Express ideas clearly, engage in nuanced conversations, and respond appropriately to audience needs. 5. Expand academic vocabulary to include discipline-specific terminology and advanced vocabulary relevant to various academic fields. Apply vocabulary effectively in speaking and writing tasks. 6. Demonstrate advanced understanding and application of grammar and syntax in complex sentence structures. Use grammatical structures accurately and effectively. 7. Engage in self-directed learning by reflecting on language learning progress, identifying areas for improvement, and implementing strategies for ongoing language development beyond the course.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Topic 1- Grammar and Syntax: Understanding complex grammar structures such as sentence patterns, verb tenses, conditionals, and reported speech is important. Using sentence structures effectively promotes sentence variety and coherence, conveying meaning clearly. Recognizing and correcting common grammar errors contributes to grammar accuracy. **(10 hrs.)** Topic 2- Academic Vocabulary Development: Expanding vocabulary with advanced academic terminology and discipline-specific words and phrases is crucial. Employing vocabulary acquisition strategies aids in acquiring and retaining new words effectively. **(6 hrs.)** Topic 3- Reading and Comprehension: Advanced reading comprehension involves understanding complex academic texts across various disciplines. Employing reading strategies like skimming, scanning, and critical reading techniques enhances comprehension. Analyzing and synthesizing information helps identify main ideas, supporting evidence, and implicit arguments within the text. Developing vocabulary in context through reading aids in understanding word usage in different contexts. **(6 hrs.)** Topic 4- Oral Communication and Presentation Skills: Academic presentations require effective planning, organization, and delivery. Improving pronunciation and intonation enhances spoken fluency, clarity, and natural expression. Developing listening and note-taking skills helps understand complex spoken discourse, summarize main ideas, and take effective notes. **(4 hrs.)** Topic 5- Independent Learning and Reflection: Developing self-directed learning strategies enables independent language learning, including goal setting and progress monitoring. Reflecting on language learning experiences helps identify strengths and areas for improvement, and implementing learning strategies for continuous growth. **(4 hrs.)**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Communicative Approach: Emphasize the use of English for real-life communication purposes. Encourage students to engage in meaningful interactions through pair work, group discussions, role-plays, and debates. • Task-Based Learning: Design learning activities that involve completing specific tasks or projects using English. This approach focuses on meaningful and authentic language use while addressing specific learning objectives. • Active Learning: Encourage active participation and engagement through hands-on activities, problem-solving tasks, and interactive exercises. This can include role-plays, and team work. • Technology Integration: Utilize technology tools and resources to enhance language learning. This can include multimedia presentations, online learning platforms, language learning apps, and virtual collaboration tools.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	#1, #2,#3, #5, #6
	Presentations	2	10% (10)	6 and 11	#3, #4, #5, #7
	Daily Activities	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	#2,#5, #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General Introduction
Week 2	Getting to know you, tenses, questions
Week 3	Whatever makes you happy, present tenses, simple and progressive
Week 4	What's in the news, past tenses, simple and progressive
Week 5	Eat, drink and be merry, quantity, much many, some any
Week 6	Looking forward, future forms, verb patterns
Week 7	The way I see it, What…like, comparative and superlative
Week 8	Living history, present perfect, unfinished past, definitive past
Week 9	Girls and boys, have to, should, must
Week 10	Time for a story, past perfect, narrative tenses
Week 11	Joining sentences, conjunctions
Week 12	Our interactive world, possessives
Week 13	Just wondering, first conditionals if, will
Week 14	Listening and speaking
Week 15	Reading Writing (focus on tenses)
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Liz and John Soars: New Headway, Pre-Intermediate 4th Edition. Oxford University Press	Yes
Recommended Texts	"English Grammar in Use" by Raymond Murphy: A comprehensive grammar reference and practice book "English Vocabulary in Use" by Michael McCarthy and Felicity O'Dell: A vocabulary book with exercises to expand your word knowledge.	Yes
Websites	• BBC Learning English (http://www.bbc.co.uk/learningenglish) - BBC Learning English provides a wide range of resources, including videos, audio programs, grammar explanations, vocabulary exercises, and quizzes. It covers different topics and skill levels, making it suitable for pre-intermediate learners.	

	• Cambridge English (https://www.cambridgeenglish.org/learning-english/) - Cambridge English offers a comprehensive range of learning materials, including videos, listening activities, vocabulary exercises, and grammar explanations. Their website also provides sample tests and exam preparation resources.

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mobile Applications Development**			**Module Delivery**	
Module Type	**E**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210200**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Mohammad M. Rasheed		**e-mail**	Mohammad.rasheed@uoitc.edu.iq	
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210040	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• Understand the fundamentals of mobile development and differentiate between native and cross-platform approaches. • Master Dart programming to write efficient and structured code. • Design and build interactive and visually appealing user interfaces using Flutter widgets. • Manage application state using advanced techniques like Provider and Riverpod. • Implement navigation between screens and integrate APIs for external data handling. • Optimize app performance and deploy applications to stores like Google Play and App Store. • Apply best practices in mobile development to ensure high-quality and efficient applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Develop cross-platform mobile apps using Flutter. • Design responsive and visually appealing user interfaces. • Manage application state using advanced techniques. • Integrate APIs and handle external data efficiently. • Work with local and cloud storage solutions. • Test, debug, and optimize app performance. • Deploy and publish apps to digital stores.
Indicative Contents المحتويات الإرشادية	The course begins with an introduction to mobile development, explaining the differences between native and cross-platform approaches, and highlighting the advantages of using Flutter for building apps. Students will then learn the basics of Dart programming, including syntax, variables, data types, control flow, functions, and object-oriented concepts. This foundation is essential for working with Flutter. Next, the course dives into Flutter's widget system, teaching students how to design user interfaces using stateless and stateful widgets. They will explore layout tools like Row, Column, Stack, and Container to create responsive and visually appealing UIs. The course also covers handling user input, including text fields, buttons, form validation, and gesture detection. State management is a key focus, starting with setState for simple apps and progressing to advanced solutions like Provider and Riverpod. Students will learn how to manage app state effectively to build dynamic and interactive applications. Navigation and routing are also covered, with a focus on moving between screens, passing data, and using named routes for better organization. The course then shifts to networking, teaching students how to make HTTP requests, fetch data from APIs, and work with JSON. Local storage solutions like SQLite, Hive, and SharedPreferences are introduced for saving data on the device. Firebase integration is also covered, including authentication and Firestore for real-time database functionality.

	Students will learn to add animations and custom UI elements to enhance user experience, as well as how to test and debug their apps using unit tests, widget tests, and debugging tools. Performance optimization techniques, such as reducing app size and improving rendering, are also explored. Finally, the course covers deploying and publishing apps to the Google Play Store and Apple App Store, including building APK/AAB files and following platform guidelines. The course concludes with a review of best practices and common mistakes to ensure students are well-prepared to build high-quality, scalable, and maintainable Flutter apps.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course will use a combination of interactive lectures, hands-on labs, and project-based learning to ensure students gain both theoretical knowledge and practical skills. Lectures will include live coding sessions and real-world examples to demonstrate key concepts like widget creation, state management, and API integration. Weekly lab sessions will provide students with guided exercises to practice building Flutter apps step-by-step, such as creating a to-do app, weather app, or e-commerce app. A final project will be assigned, where students build a complete Flutter app from scratch, incorporating all the concepts learned in the course. This project will encourage creativity and allow students to choose their app idea, such as a fitness tracker, expense manager, or social media app. Additionally, collaborative learning will be encouraged through group discussions, peer reviews, and team projects to foster problem-solving and teamwork skills. To support self-paced learning, students will have access to online resources, such as Flutter documentation, video tutorials, and coding challenges. Regular quizzes and assignments will be used to assess understanding and provide feedback. Finally, guest lectures from industry professionals and workshops on advanced topics like animations, performance optimization, and app publishing will be organized to give students exposure to real-world scenarios and best practices.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	5

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Mobile Development & Flutter Overview of mobile development, native vs. cross-platform, introduction to Flutter
Week 2	Basics of Dart Programming Dart syntax, variables, data types, functions, and control flow
Week 3	Introduction to Flutter Widgets Stateless vs. Stateful widgets, understanding the widget tree
Week 4	Layouts and UI Design in Flutter Flutter layout system, using Row, Column, Stack, and Container
Week 5	Handling User Input in Flutter Text fields, buttons, form validation
Week 6	State Management in Flutter Understanding setState, Provider, and Riverpod

Week 7	Navigation and Routing in Flutter Named routes, passing data between screens
Week 8	Networking and API Integration HTTP requests, working with JSON data
Week 9	Local Storage and Databases SQLite, Hive, SharedPreferences
Week 10	Firebase Integration in Flutter Firebase authentication, Firestore database basics
Week 11	Animations and Custom UI in Flutter Implicit vs. explicit animations, custom themes
Week 12	Testing and Debugging Flutter Apps Unit testing, widget testing, debugging tools
Week 13	Performance Optimization in Flutter Reducing app size, improving rendering performance
Week 14	Deploying and Publishing Flutter Apps Building APK/AAB, Play Store & App Store guidelines
Week 15	Final Review and Best Practices Reviewing key concepts, common mistakes to avoid
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• Setting Up Flutter Environment
Week 2	• Writing Basic Dart Programs
Week 3	• Building a Simple UI
Week 4	• Creating a Responsive UI
Week 5	• Creating and Validating Forms
Week 6	• Managing State in a Counter App
Week 7	• Implementing Multi-Screen Navigation
Week 8	• Fetching Data from an API
Week 9	• Storing and Retrieving Data Locally
Week 10	• User Authentication with Firebase
Week 11	• Adding Animations to UI
Week 12	• Writing and Running Tests
Week 13	• Optimizing a Flutter App

Week 14	• Generating an APK and Preparing for Publishing
Week 15	• Final Project Presentation

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Flutter for Beginners" by Alessandro Biessek, Year: 2021 (Second Edition).	Yes
Recommended Texts	"Flutter in Action" by Eric Windmill, Year: 2020 (First Edition).	yes

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mobile Broadcasting Systems**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210190**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Hind S. Ghazi		**e-mail**	hind.salim@uoitc.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210150	**Semester**	6
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. This course is designed to identify and analyze the broadcasting communications systems concepts, elements and applications . 2. It differentiates the different Radio broadcasting techniques such as AM, FM and TV . 3. To design AM, FM and TV broadcasting networks that include coverage mapping and interference . 4. The course contains guidelines on the end-to-end quality considerations at the radio and intermediate frequency level.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Understanding the principles of Radio broadcasting technologies such as AM, FM and TV . 2. Explaining Analog communications and the principles of channel model that are employed. 3. Explaining the fundamentals of digital radio technology in addition to Internet radio. 4. Demonstrating knowledge on the color Television (Analog and Digital color Television). 5. Demonstrating knowledge on wireless Cable Television. 6. Introducing Quality of service for broadcasting television. 7. Introducing the interactive Broadcasting.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Fundamentals</u> - Introduction to broadcasting, fundamentals of radio broadcasting technology and systems. [20 hrs]. - Television Principles – Explain briefly Television principles, television broadcasting as well as the fundamentals of Internet Protocol TV (IPTV) and Software-defined Radio (SDR). [20 hrs] <u>Part B – Television broadcasting</u> - Fundamentals of Television broadcasting, Wireless Cable Television, Quality of service for broadcasting television and Interactive Broadcasting. [24 hrs]. - Reviews and Summery. [20 hrs].

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to broadcasting.
Week 2	Fundamentals of Radio broadcasting.
Week 3	Radio Broadcasting Systems.
Week 4	Radio Broadcasting Systems.
Week 5	Television Principles.
Week 6	Television Principles.
Week 7	Mid-term Exam1
Week 8	Television Broadcasting.
Week 9	Television Broadcasting.
Week 10	Television Broadcasting.
Week 11	Wireless Cable Television.
Week 12	Quality of service for broadcasting television.
Week 13	Interactive Broadcasting.
Week 14	Reviews and Summery
Week 15	Mid-term Exam2.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: AM Radio.
Week 2	Lab 2: FM Radio.
Week 3	Lab 3: Channels Models
Week 4	Lab 4: Orthogonal Frequency Division Multiplexing (OFDM) transmission.
Week 5	Lab 5: GNU Radio
Week 6	Lab 6: GNU Radio
Week 7	Mid-term Exam1
Week 8	Lab 7: Generate a sine wave & some noise, add both, and plot the resulting signal in the frequency domain based on GNU Radio.
Week 9	Lab 8: Output a single tone from the computer's soundcard
Week 10	Lab 9: Receive a baseband signal using a USRP and listen to it using a narrow- or wide-band FM demodulator.

Week 11	Lab 10: Sample audio from your soundcard and transmit it from a USRP using a Narrow Band FM carrier.
Week 12	Lab 11: Send live Video Data by a TCP/IP tunnel based on GNU Radio and USRP.
Week 13	Lab 12: OFDM transmitter based on GNU Radio
Week 14	Reviews and Summery
Week 15	Mid-term Exam2

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Jerry C. Whitaker, 'Standard Handbook of Broadcast Engineering', McGraw Hill International, 4th Edition, 2005. 2. David Hemingway and Walid Sami, 'Handbook on Digital Terrestrial Television Broadcasting Networks and Systems Implementation', ITU, Geneva, October 2016.	Yes
Recommended Texts	1. TSOR for AM, FM and TV Broadcasting by KBP. 2. Tomasi, Wayne. *Electronic Communication Systems*. 5th Edition: Prentice Hall, 2004.	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Satellite Communications**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210180**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	MTCE		**College**	COE	
Module Leader	Adham R. Azeez		**e-mail**	adham.azeez@uoitc.edu.iq	
Module Leader's Acad. Title	Asst. Lect.		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	17/06/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210110	**Semester**	6
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Upon successful completion of this course, students should be able to: • To make the students understand the basic concept in the field of Satellite Communication and to know how to place a satellite in an orbit. • To calculate the link power budget. • To get a complete knowledge about the earth and space subsystems • To gain knowledge about the Satellite Access schemes • Study of satellite orbits and launching. • To gain knowledge about the Satellite system and mobile services provided
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After successful completion of the course, the students will be able to: **1.** Understand principle, working and operation of various sub systems of satellite as well as the earth station. **2.** Apply various communication techniques for satellite applications **3.** Analyze and design satellite communication link **4.** Learn advanced techniques and regulatory aspects of satellite communication **5.** Understand role of satellite in various applications
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction to Satellite Communication:** Historical background, Basic concepts of Satellite Communications, Communication Networks and Services, Comparison of Network Transmission technologies, Orbital and Spacecraft problems, Growth of Satellite communications [10hrs] **Orbits and Launching Methods:** Introduction, Kepler's First Law,Kepler's Second Law, Kepler's Third Law, Definitions of Terms for Earth-Orbiting Satellites, Orbital Elements, Apogee and Perigee Heights, Orbit Per turbations, Effects of a non-spherical earth, Atmospheric drag [10hrs] **Radio Wave Propagation:** Introduction, Atmospheric Losses, Ionospheric Effects, Rain Attenuation, Other Propagation Impairments [10hrs] **Polarization:** Introduction, Antenna Polarization, Polarization of Satellite Signals, Cross Polarization, Discrimination, Ionospheric Depolarizaon, Rain Depolarization, Ice Depolarization [10hrs] **The Space Segment :** Introduction, The Power Supply, Attitude Control, Spinning satellite stabilization, Momentum wheel stabilization, Station Keeping, Thermal Control, TT&C Subsystem, Transponders, The wideband receiver, The input demultiplexer, The power amplifier, The Antenna Subsystem [10hrs]

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
	The satellite Link design: Introduction, Equivalent Isotropic Radiated Power, Transmission Losses, Free-space transmission, Feeder losses, Antenna misalignment losses, Fixed atmospheric and ionospheric losses, The Link-Power Budget Equation, System Noise, Carrier-to-Noise Ratio, The Uplink, Saturation flux density, Input backoff, Downlink, Output back-off, Combined Uplink and Downlink C/N Ratio [10hrs] **Satellite Access:** Introduction, Single Access, Preassigned FDMA, Demand-Assigned FDMA, Spade System, TDMA, Preassigned TDMA, Demand-assigned TDMA, Satellite-Switched TDMA, Code-Division Multiple Access [15hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to 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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to satellite communication systems (1-week)
Week 2	EM-Wave and Frequency Bands for Satellite Communication (1-weeks)
Week 3	Satellite orbits and Launching Methods (2-weeks)
Week 4	=
Week 5	Radio Wave Propagation (2-weeks)
Week 6	=
Week 7	**Mid-1**
Week 8	Polarizations (1-week)
Week 9	Satellite construction and Space Segment (1-week)
Week 10	The satellite Link design (2-weeks)
Week 11	=
Week 12	Satellite Access (3-weeks)
Week 13	=
Week 14	=
Week 15	**Mid-2**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Understanding the basic concepts of satellite communication
Week 2	To setup a communication link between uplink transmitter and downlink receiver using Satellite.
Week 3	To setup an Active satellite communication link and demonstrate link fail operation
Week 4	To communicate voice & Video signal through satellite link
Week 5	Observe the effect of Different combinations of uplink and downlink frequencies on satellite link.
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	1. Dennis Roddy, 'Satellite Communication', McGraw Hill International, 4th Edition, 2006. 2. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, 'Satellite Communication Systems Engineering', Prentice Hall/Pearson, 2007.	-
Recommended Texts	Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, ArtechHouseBostan London, 1997.	-
Websites	https://en.wikipedia.org/wiki/Communications_satellite https://ocw.mit.edu/courses/16-851-satellite-engineering-fall-2003/pages/lecture-notes/	

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.

المرحلة: الرابعة

الفصل الدراسي: الثامن

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Internet of Things**			**Module Delivery**	
Module Type	**Elective**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210230**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	MTCE		**College**	COE	
Module Leader	Atheer Al-Chalabi		**e-mail**	atheeralchalabi@uoitc.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Msc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	18/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210170 + ITC210101	**Semester**	6+4
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. Understand the concept of Internet of Things (IoT) and its significance in modern technological advancements. 2. Explain how IoT works, including the communication protocols, data transmission, and device interconnectivity. 3. Identify and describe the characteristics and benefits of IoT in various domains, such as consumer applications and industrial settings. 4. Explore the different layers of IoT architecture and understand their roles in enabling efficient and secure data transfer. 5. Familiarize with IoT protocols for network communication, including WiFi, MQTT, and HTTP, and understand their suitability for different IoT applications. 6. Gain knowledge of IoT security principles and best practices to protect IoT devices, networks, and data from potential threats and vulnerabilities. 7. Learn about cloud computing and its role in IoT, including IoT Platform as a Service (IoT PaaS) for managing and analyzing IoT data. 8. Develop practical skills in programming and interfacing with IoT devices using Arduino UNO and NodeMCU ESP8266 platforms. 9. Design and implement IoT applications involving sensor integration, data acquisition, and device control. 10. Apply IoT concepts to real-world scenarios, such as building remote monitoring systems, home automation, or industrial process control, and understand the challenges and considerations involved in deploying IoT solutions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamentals of IoT, including its definition, working principles, and characteristics. 2. Explore the Internet of Everything (IoE) concept and its impact on various industries and domains. 3. Differentiate between Consumer IoT (CIoT) and Industrial IoT (IIoT) and identify their applications and challenges. 4. Gain knowledge of edge devices and their role in enabling local data processing and decision-making in IoT systems. 5. Learn about Machine-to-Machine (M2M) communication and its relevance in IoT deployments. 6. Analyze the layered structure of IoT systems and comprehend the significance of each layer. 7. Examine different IoT protocols for network communication, including WiFi, MQTT, and HTTP. 8. Understand IoT security considerations and implement measures to protect IoT systems.

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
	9. Explore cloud computing and IoT Platform as a Service (IoT PaaS) for scalable and efficient IoT solutions. 10. Develop programming skills for IoT devices using Arduino UNO and NodeMCU ESP8266 platforms. 11. Apply various WiFi modes of operation and understand common network topologies in IoT scenarios. 12. Implement an IoT system connection example using APIs and HTTP protocols. 13. Investigate alternative wireless communication modules like nRF24 and understand their features and specifications. 14. Utilize cloud-based platforms, such as Firebase, for data storage and analysis in IoT applications. 15. Create intuitive front-end interfaces for IoT systems using the MIT App Inventor platform.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part 1: <u>Fundamentals of IoT:</u> Definition and concept of IoT, How IoT works and its components, Characteristics and key principles of IoT, Benefits and challenges of implementing IoT solutions, Internet of Everything (IoE) and its impact. [10 hr] Part 2: <u>IoT Architecture and Protocols:</u> Understanding the layered structure of IoT systems, IoT structure layers: Perception layer, Network layer, and Application layer, IoT protocols for network communication: WiFi, MQTT, HTTP, Data protocols for IoT: JSON, XML, CoAP, Security protocols and considerations for IoT. [20 hr] Part 3: <u>IoT Devices and Communication:</u> Edge devices and their role in IoT deployments, Machine-to-Machine (M2M) communication and its importance in IoT, Networking modules for IoT devices: ESP8266, NodeMCU, Programming IoT devices using Arduino UNO and NodeMCU ESP8266, WiFi modes of operation and network topologies in IoT scenarios. [10 hr] Part 4: <u>IoT Applications and Integration:</u> Connecting IoT devices to the cloud and leveraging cloud computing, IoT Platform as a Service (IoT PaaS) for scalable and efficient solutions, Introduction to popular IoT platforms: Adafruit, Firebase, Integration of IoT devices with web servers and mobile applications, Real-world IoT applications: Remote control, monitoring, and data analytics. [20 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for teaching this unit is to encourage students to actively participate in exercises and develop their critical thinking skills. This will achieve through interactive classes, engaging tutorials, and hands-on experiments that involve exciting sampling activities. Furthermore, students will have the chance to visit private companies specializing in Internet of Things, gaining valuable real-world exposure and insights. By combining theoretical knowledge with practical experiences and industry visits, students will be well-prepared to excel in the field of IOT.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ **15** اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to IoT
Week 2	IoT Architectures and Communication Models
Week 3	IoT Structure and Protocols
Week 4	IoT Security and Privacy
Week 5	IoT Cloud Computing
Week 6	Networking Modules for IoT
Week 7	Midterm Exam + IoT System Connection and APIs
Week 8	IoT Web Server Development
Week 9	nRF24 Module Features and Specifications
Week 10	Non-HTTP Server-Based nRF24 System
Week 11	Cloud Computing for IoT
Week 12	MQTT Topics, Subscriptions, and QoS
Week 13	MQTT Broker Server and Arduino Client
Week 14	Remote Control and Monitoring via the Internet
Week 15	Mobile App Development for IoT
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Arduino and NodeMCU
Week 2	Arduino and NodeMCU GPIO Interfacing
Week 3	Sensor Interfacing and Data Acquisition
Week 4	Communication Protocols for IoT
Week 5	IoT Communication using WiFi
Week 6	Web Server Development
Week 7	Cloud Integration with Firebase
Week 8	IoT System Integration
Week 9	IoT Security and Authentication

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 10	IoT Data Visualization
Week 11	IoT Project Development (Part 1)
Week 12	IoT Project Development (Part 2)
Week 13	Wireless Communication with nRF24 Module
Week 14	IoT Project Enhancement
Week 15	IoT Project Presentation and Demonstration

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Kolban's Book on ESP8266 by Neil Kolban https://www.pcboard.ca/_documents/The-ESP8266-Book-September-2015.pdf	No
Recommended Texts	INTERNET OF THINGS & ITS APPLICATIONS https://mrcet.com/downloads/digital_notes/EEE/IoT%20&%20Applications%20Digital%20Notes.pdf	No
Websites	https://www.coursera.org/learn/iot?specialization=iot#syllabus	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Optical Fiber Communications			**Module Delivery**	
Module Type	C			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	ITC210220				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	4		**Semester of Delivery**	Eight	
Administering Department	MTCE		**College**	ENG	
Module Leader	Ali Najdi		**e-mail**	ali.najdi@uoitc.edu.iq	
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	TBC		**e-mail**	E-mail	
Scientific Committee Approval Date	xx/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210090	**Semester**	5
Co-requisites module	EMF3	**Semester**	3

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand fiber optic co ncept to information transmission. 2. Understand the functionality of each of the components that comprise a fiber-optic communication system: transmitter, fiber, amplifier, and receiver. 3. Understand the structure and properties of optical fiber that affect the performance of a communication link. 4. Analyze the role of various passive and active components that are used to manipulate optical signals in fiber-optic systems like optical amplifier. 5. Apply concepts listed above to the design of a fiber communication link.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic operating principles of single mode and multimode fibers. 2. Understand the basic operating principles of light sources, detectors and amplifiers. 3. Understand the basic operating principles of passive optical devices. 4. Have the ability to design a simple optical communication link. 5. Appreciate the principles of optical communication networks. 6. Present ideas and findings effectively. 7. Think critically. 8. Learn independently.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Optical Fiber [15 hrs]:</u> A.1 Principles of optical waveguiding, single mode and multimode fibers and their transmission characteristics. <u>Part B - Active and passive components [15 hrs]:</u> B.1 Light emitting diodes (LEDs) and semiconductor lasers: operating principles and characteristics. Semiconductor optical detectors: PINs and APDs. Optical amplifiers: Erbium doped fiber amplifiers (EDFAs). B.2 Coupler, isolator, circulator, wavelength division multiplexer and demultiplexer. <u>Part C - Optical communication systems [15 hrs]:</u> C.1 Transmission impairments: noise, dispersion, nonlinearity and crosstalk. Bit error rate (BER), Q factor and receiver sensitivity. C.2 Point to point link design: power budget and power penalty. C.3 Wavelength division multiplexing (WDM). Design of multi-span WDM links. <u>Part D - Optical communication networks [15 hrs]:</u> D.1 WDM add/drop multiplexer, WDM optical cross-connect, Basic architecture of a WDM optical network. Passive optical networks (PONs).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In this course, students will be studying individually and within a group of peers. As students work on the module objectives and outcomes, they are encouraged to share ideas with peers and instructor, work collaboratively on projects and team assignments, raise critical questions, and provide constructive feedback. It is instrumental to have hands on experience and on-site visits to the main vendors and operators of commercial optical networks.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #3, #6
	Assignments	2	10% (10)	2 and 12	LO #1-#5
	Projects	1	10% (10)	Continuous	All
	Lab Report	1	10% (10)	13	LO #1-#6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	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	Introduction to fiber optics and optical communication

Week 2	Types of optical fibers, structure, and cabling
Week 3	Properties of optical fibers: modes and configurations
Week 4	Light sources and optical transmitters I (LED)
Week 5	Light sources and optical transmitters II (Laser diode)
Week 6	Photodetectors and optical receivers I
Week 7	Photodetectors and optical receivers II
Week 8	Signal degradation in optical fibers: Attenuation, noise and bit-error-rate calculation
Week 9	Connectors, splices, and passive components
Week 10	Single-channel fiber optic communication link design: SNR and BER
Week 11	Repeaters and regenerators
Week 12	optical amplifiers and dispersion Compensation
Week 13	Optical networks (SONET)
Week 14	Wavelength-division multiplexing (WDM)
Week 15	Future Optical Networks: Fiber-to-the-home (FTTH) and radio over fibers
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: LAB preparations: setup of hardware or simulation software (MATLAB and Optiperformer)
Week 2	Lab 2: Introduction to fiber optics Measurements
Week 3	Lab 3: Fiber Numerical Aperture Measurements
Week 4	Lab 4: Fiber attenuation and dispersion measurement
Week 5	Lab 5: Single Mode Fiber Characteristic
Week 6	Lab 6: Connectors/Splices construction and loss measurements
Week 7	Lab 7: Construction of MUX and DEMUX for WDM systems
Week 8	Lab 8: Design of Fiber Optic WDM link

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	Keiser, G. (2011). Optical fiber communications. (4th ed.). Columbus, OH: McGraw-Hill.	Yes
Recommended Texts	Palais, J.C. (2004). Fiber optics communication. (5th ed.). Upper Saddle River, NJ: Prentice Hall.	Yes
Websites	https://www.edx.org/course/fiber-optic-communications	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Soft Computing**			**Module Delivery**	
Module Type	**Elective**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210130**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	MTCE		**College**	ENG	
Module Leader	Mohammad M. Rasheed		**e-mail**	mohammad.rasheed@uoitc.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210160	**Semester**	7
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• Understand the fundamental concepts and principles of soft computing. • Compare and contrast soft computing with conventional computing approaches. • Identify and explain the applications of soft computing in various domains. • Apply fuzzy logic techniques for solving real-world problems. • Design and implement fuzzy inference systems and control systems. • Implement neural networks for pattern recognition and prediction tasks. • Train neural networks using the backpropagation algorithm. • Utilize evolutionary computing techniques for optimization and problem-solving. • Apply swarm intelligence algorithms for optimization tasks. • Analyze real-world case studies to understand the practical applications of soft computing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge and Understanding: o Demonstrate a comprehensive understanding of soft computing techniques, including fuzzy logic, neural networks, evolutionary computing, and machine learning. o Explain the principles, algorithms, and architectures of different soft computing methodologies. o Understand the applications and potential benefits of soft computing in various domains. 2. Application and Analysis: o Apply fuzzy logic principles and techniques to solve real-world problems, including fuzzy inference systems, fuzzy control systems, and fuzzy decision-making. o Implement neural networks for pattern recognition, prediction, and other relevant tasks, using appropriate training algorithms. o Apply evolutionary computing techniques, such as genetic algorithms and particle swarm optimization, for optimization and problem-solving. o Integrate multiple soft computing techniques to develop hybrid systems for improved performance in complex applications. o Utilize support vector machines and machine learning algorithms for classification, regression, clustering, and data analysis tasks. o Apply deep learning architectures, such as artificial neural networks, convolutional neural networks, and recurrent neural networks, for advanced data processing and analysis. 3. Design and Development: o Design and implement soft computing models and algorithms to solve specific problems in various application domains. o Develop fuzzy systems, neural networks, and evolutionary algorithms tailored to specific problem requirements.

	- Design and optimize soft computing systems for image processing, data mining, natural language processing, control systems, and time series analysis. 4. Critical Thinking and Evaluation: - Evaluate and compare different soft computing techniques and methodologies for specific problem domains. - Analyze the strengths and limitations of soft computing approaches in relation to conventional computing methods. - Critically assess the performance and effectiveness of soft computing models and algorithms for given tasks. - Evaluate the ethical considerations and challenges associated with the use of soft computing techniques. 5. Communication and Presentation: - Clearly communicate and present soft computing concepts, theories, and methodologies. - Effectively communicate the results, findings, and conclusions of soft computing experiments and projects. - Present and discuss case studies and real-world applications of soft computing techniques. 6. Lifelong Learning and Adaptability: - Stay updated with emerging trends, advancements, and research in the field of soft computing. - Demonstrate the ability to learn and adapt to new soft computing techniques and technologies as they emerge. - Apply a problem-solving mindset and critical thinking skills to new and unfamiliar challenges in soft computing.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Course Duration: 15 weeks (2 hours per week) Week 1: Introduction to Soft Computing (2 hours) In the first week, students will be introduced to the fundamentals of Soft Computing. They will learn about the key concepts and principles that differentiate Soft Computing from conventional computing methods. The instructor will discuss various real-world applications of Soft Computing and its significance in solving complex problems. Week 2: Fuzzy Logic (2 hours) During the second week, students will delve into Fuzzy Logic. They will gain an understanding of fuzzy sets and fuzzy logic, and how they are used to handle uncertainty and vagueness in decision-making processes. The instructor will explain the principles of fuzzy inference systems and fuzzy control systems, emphasizing their applications in various domains. Week 3: Neural Networks (2 hours) In week 3, students will explore Neural Networks. They will learn about the fundamental concepts of neural networks and their architecture. The instructor will cover single-layer perceptrons and multi-layer perceptrons, along with the backpropagation algorithm for training neural networks. Practical examples and case studies will be discussed to illustrate the applications of neural networks.

	Week 4: Evolutionary Computing (2 hours) The fourth week of the course will focus on Evolutionary Computing. Students will be introduced to genetic algorithms, genetic programming, evolutionary strategies, and particle swarm optimization. The instructor will explain the underlying principles and mechanisms of these algorithms and demonstrate how they can be used for optimization and problem-solving. Week 5: Hybrid Soft Computing Techniques (2 hours) Hybrid Soft Computing Techniques will be the topic of discussion in week 5. Students will explore the integration of different soft computing methodologies, such as fuzzy logic, neural networks, and genetic algorithms. The instructor will highlight the advantages and applications of hybrid techniques, including fuzzy neural networks, neuro-fuzzy systems, and genetic neuro-fuzzy systems. Week 6: Support Vector Machines (2 hours) During week 6, students will dive into Support Vector Machines (SVMs). They will learn about the fundamentals of SVMs and their ability to handle both linear and nonlinear classification problems. The instructor will cover topics such as linear SVMs, nonlinear SVMs, and the use of kernel methods for SVMs. Week 7: Machine Learning Algorithms (2 hours) In week 7, students will explore various Machine Learning Algorithms. They will be introduced to supervised learning, unsupervised learning, and reinforcement learning algorithms. The instructor will discuss popular algorithms within each category and their applications in pattern recognition, data analysis, and decision-making. Week 8: Deep Learning (2 hours) The eighth week of the course will focus on Deep Learning. Students will gain an understanding of deep neural networks, including architectures such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs). The instructor will explain the training algorithms used in deep learning and showcase real-world applications of deep neural networks. Week 9: Swarm Intelligence (2 hours) Week 9 will cover Swarm Intelligence. Students will learn about swarm-based optimization algorithms, including ant colony optimization, particle swarm optimization, bee algorithms, and firefly algorithm. The instructor will discuss the principles of collective behavior and how it can be applied to solve complex optimization problems. Week 10: Soft Computing in Image Processing (2 hours) During this week, students will explore the applications of Soft Computing in Image Processing. They will learn how soft computing techniques can be used for image enhancement, segmentation, and object recognition. The instructor will discuss various algorithms and approaches, highlighting their effectiveness in solving image processing challenges. Week 11: Soft Computing in Data Mining (2 hours) In week 11, students will examine the role of Soft Computing in Data Mining. They will explore soft computing techniques for clustering, association rule mining, and classification. The instructor will demonstrate how soft computing methods can

	handle large and complex datasets, extract meaningful patterns, and make accurate predictions. Week 12: Natural Language Processing (2 hours) During this week, students will delve into Natural Language Processing (NLP) with Soft Computing. They will learn how soft computing techniques can be applied to tasks such as sentiment analysis, text classification, and language generation. The instructor will discuss the challenges and opportunities in NLP and showcase real-world applications. Week 13: Soft Computing in Control Systems (2 hours) In week 13, students will explore the use of Soft Computing in Control Systems. They will learn about fuzzy control systems, adaptive control techniques, and intelligent control systems that incorporate soft computing methodologies. The instructor will highlight the advantages of using soft computing in control systems and discuss relevant case studies. Week 14: Soft Computing in Time Series Analysis (2 hours) During this week, students will focus on Soft Computing in Time Series Analysis. They will learn how soft computing techniques can be used for time series forecasting, pattern recognition, and anomaly detection. The instructor will demonstrate the application of soft computing methods in analyzing and predicting time-dependent data. Week 15: Applications and Future Trends (2 hours) The final week of the course will be dedicated to exploring the applications and future trends of Soft Computing. Students will examine recent advancements and emerging areas where soft computing techniques are being utilized. The instructor will discuss ethical considerations related to the use of soft computing and provide insights into potential future developments.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategies for the Soft Computing course include interactive lectures, hands-on exercises, case studies, group discussions, demonstrations, guest lectures, research papers and readings, project work, online resources and tools, assessments, and continuous engagement. These strategies aim to facilitate understanding of theoretical concepts, practical application of soft computing techniques, analysis of real-world examples, collaboration among students, exploration of industry insights, independent study, project implementation, evaluation of progress, and active participation throughout the course.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Soft Computing
Week 2	Fuzzy Logic
Week 3	Neural Networks
Week 4	Evolutionary Computing
Week 5	Hybrid Soft Computing Techniques
Week 6	Support Vector Machines
Week 7	Machine Learning Algorithms
Week 8	Deep Learning
Week 9	Swarm Intelligence

Week 10	Soft Computing in Image Processing
Week 11	Soft Computing in Data Mining
Week 12	Natural Language Processing
Week 13	Soft Computing in Control Systems
Week 14	Soft Computing in Time Series Analysis
Week 15	Applications and Future Trends
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Fuzzy Logic in MATLAB
Week 2	Neural Networks in MATLAB
Week 3	Evolutionary Computing in MATLAB
Week 4	Support Vector Machines in MATLAB
Week 5	Machine Learning Algorithms in MATLAB
Week 6	Soft Computing in Image Processing using MATLAB
Week 7	Soft Computing in Data Mining using MATLAB
Week 8	Natural Language Processing using MATLAB
Week 9	Hybrid Soft Computing Techniques in MATLAB
Week 10	Soft Computing in Control Systems using MATLAB
Week 11	Time Series Analysis with Soft Computing in MATLAB
Week 12	Deep Learning in MATLAB
Week 13	Swarm Intelligence in MATLAB
Week 14	Soft Computing for Optimization in MATLAB
Week 15	Project Assessment in MATLAB

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fuzzy Logic with Engineering Applications (3rd Edn.), Timothy J. Ross, Willey, 2010. Soft Computing, D. K. Pratihar, Narosa, 2008. Practical Genetic Algorithms, Randy L. Haupt and sue Ellen Haupt, John Willey & Sons, 2002.	No
Recommended Texts	Neuro-Fuzzy and soft Computing, J.-S. R. Jang, C.-T. Sun, and E. Mizutani, PHI Learning, 2009. Neural Networks and Learning Machines, (3rd Edn.), Simon Haykin, PHI Learning, 2011.	No

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Studio Technology**			**Module Delivery**	
Module Type	**S**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ITC210250**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	MTCE		**College**	ENG	
Module Leader	Mohammed Hussain		**e-mail**	Mohammed.hussain@uoitc.edu.iq	
Module Leader's Acad. Title	Asst. Lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210120	**Semester**	5
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 provide students with an understanding of the technology used in recording studios for media and communication production 2. To introduce students to the various components of a recording studio and their functions 3. To develop students' practical skills in recording, mixing, and mastering audio for different media formats 4. To expose students to industry-standard software and practices in media and communication production 5. Develop expertise in audio production, including microphone types and placement, mixing consoles and signal flow, and recording and editing techniques. 6. Gain an understanding of live broadcasting, including live streaming technology and platforms, multi-camera setups and switching, and live audio mixing and effects. 7. Gain an understanding of virtual and augmented reality technology, including creating VR and AR content and applications of VR and AR in media and communication. 8.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students will be able to identify and describe the various components of a recording studio for media and communication production 2. Students will be able to operate microphones, mixers, and other recording equipment for different media formats 3. Students will be able to use digital audio workstations and software to record, mix, and master audio for different media formats 4. Students will be able to analyze and critique audio recordings based on technical and aesthetic criteria for different media formats 5. Students will be able to demonstrate a thorough understanding of studio technology and equipment, including audio and video production equipment, software, and techniques. 6. Students will be able to demonstrate an understanding of virtual and augmented reality technology, including creating VR and AR content and applications of VR and AR in media and communication. 7. Students will be able to develop expertise in interactive media design and development.
Indicative Contents المحتويات الإرشادية	**<u>Introduction to Studio Technology (8 hours)</u>** Overview of studio technology and equipment Basic principles of audio and video production Studio design and layout

	Microphones and Microphone Placement (6 hours) Types of microphones for different media formats Polar patterns and frequency response for different media formats **Mixers and Signal Flow (8 hours)** Analog and digital mixers for different media formats Signal routing and processing for different media formats **Digital Audio Workstations and Software (7 hours)** Overview of digital audio workstations (DAWs) for different media formats Recording and editing audio in a DAW for different media formats **Recording Techniques and Best Practices (7hours)** Recording dialogue, sound effects, and music for different media formats Monitoring and troubleshooting for different media formats **Mixing Techniques and Best Practices (6 hours)** EQ, compression, and other processing for different media formats Mixing in stereo and surround sound for different media formats **Live Broadcasting (6 hours)** Live streaming technology and platforms Multi-camera setups and switching and Live audio mixing and effects **Interactive Media (6 hours)** Interactive media design and development User experience and interface design **Virtual and Augmented Reality (6 hours)** Introduction to VR and AR technology Applications of VR and AR in media and communication

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: The instructor will deliver lectures on studio technology, equipment, and techniques. This will provide students with a solid foundation of knowledge that they can build upon throughout the course. 2. Demonstrations: The instructor will demonstrate the use of studio equipment and techniques, allowing students to see how they are used in practice. 3. Hands-on Practice: Students will have opportunities to use studio equipment and software to create their own content. This will give them the chance to apply what they have learned in a practical setting. 4. Group Projects: Students will work in teams to produce studio content, such as a news program or a talk show. This will give them experience working in a team and allow them to apply their knowledge and skills in a real-world setting. 5. Guest Speakers: The instructor will invite guest speakers who are experts in studio production to share their experiences and offer insights into the industry. 6. Readings and Assignments: Students will be assigned readings and assignments that will deepen their understanding of studio production and help them develop critical thinking skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2
	Assignments	2	10% (10)	2 and 12	LO #6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	LO #5, #4
Summative assessment	Midterm Exam	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of studio technology and equipment Basic principles of audio and video production Studio design and layout
Week 2	Analog and digital mixers for different media formats
Week 3	Signal routing and processing for different media formats
Week 4	Overview of digital audio workstations (DAWs) for different media formats
Week 5	Recording and editing audio in a DAW for different media formats
Week 6	Recording dialogue, sound effects, and music for different media formats
Week 7	Monitoring and troubleshooting for different media formats
Week 8	MIDTERM EXAM
Week 9	EQ, compression, and other processing for different media formats
Week 10	Mixing in stereo and surround sound for different media formats
Week 11	Live streaming technology and platforms
Week 12	Multi-camera setups and switching and Live audio mixing and effects
Week 13	Interactive media design and development
Week 14	User experience and interface design
Week 15	Introduction to VR and AR technology
Week 16	Applications of VR and AR in media and communication

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to studio equipment and software , Studio design principles and Safety considerations
Week 2	Set up studio equipment and practice basic camera and lighting techniques.
Week 3	Record and edit audio for a short podcast or music track.
Week 4	Record and edit a short video, incorporating different camera angles and lighting setups.
Week 5	Produce a live event, such as a talk show or music performance, using multiple cameras and live mixing.
Week 6	Edit and enhance a short film or music video, incorporating advanced post-production techniques.
Week 7	Work in teams to produce a studio production, such as a talk show or music performance, focusing on effective teamwork and communication.
Week 8	Using signal processing to shape the sound of individual tracks and the overall mix
Week 9	Introduction to MIDI and virtual instruments and Using virtual instruments to create realistic-sounding instrument tracks
Week 10	Techniques for syncing audio and video
Week 11	Techniques for creating and recording foley and sound effects
Week 12	Adding foley and sound effects to a video project
Week 13	Overview of live sound equipment and techniques
Week 14	Setting up and mixing a live sound event
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Modern Recording Techniques" by David Miles Huber and Robert E. Runstein	
Recommended Texts	"The Mixing Engineer's Handbook" by Bobby Owsinski	
Websites	https://www.soundonsound.com/	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Wireless and Mobile Communications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ITC210240**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	**8**	
Administering Department	MTCE		**College**	Engineering	
Module Leader	Mayahsa M. Aldhaief		**e-mail**	drmayali.uoitc@uoitc.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	17/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ITC210140 + ITC210150	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• Introducing the principles of wireless and mobile communication. • To understand the concepts of basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference. • To study the different generations of mobile networks, WAN and PAN • To understand the FDMA, TDMA, spread spectrum multiple access.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Describe the characteristics of modern wireless and cellular systems and networks. • Characterize and analyze the radio propagation mechanisms of mobile and wireless environments. • Analyze the efficient cellular communication systems by using the fundamental knowledge of cell design concept under the constraint of co-channel interferences. • Evaluate the different Types of Wireless Communication system. • Understand spread spectrum multiple access • Ability to differentiate between wireless and fixed telephone networks • Understand WiFi
Indicative Contents المحتويات الإرشادية	• Examples of wireless communication systems, paging systems, (6) • Cordless telephone systems, understand the second (6) • Generations of cellular networks(5) • Wireless in local loop(5) • Wireless local area networks, and personal area networks, also able to understand the concepts of spectrum allocation, (10) • Basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference, improving coverage and capacity, cell splitting. (6) • To understand various multiple accesses techniques: FDMA, TDMA, spread spectrum multiple access SDMA (10) • Understand the difference between wireless and fixed telephone networks. (6) • Wireless networks. (6)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to wireless communication systems** **Cellular Concept**
Week 2	**Cellular system design fundamentals**
Week 3	**Mobile radio propagation**
Week 4	**Medium Access Control**
Week 5	**GSM architecture/ GPRS and packet data network**

Week 6	**GSM Frequency Allocation**
Week 7	**Mid Term Exam1**
Week 8	**LTE , LTE-A & 5G**
Week 9	**OFDM & OFDMA Theory and Applications**
Week 10	**Introduction to Wireless Communication**
Week 11	**Wireless LAN**
Week 12	**Mobile Ad hoc Networks and Routing Protocols**
Week 13	**WiFi Version**
Week 14	**WiMAX**
Week 15	**Mid Term Exam2**
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to 4G LTE Smart Phone Techbook
Week 2	Lab 2: Study and Observe Transmitted/Received RF Signals
Week 3	Lab 3: Study and Observe the Oscillation of Transmitted/Received (I and Q) Signals
Week 4	Lab 4: Analyze the Partially on Mode while charging 4G LTE Smart Phone Techbook
Week 5	Lab 5: Study and Analyze the Power Management Unit 4G LTE Smart Phone Techbook
Week 6	Lab 6: Analyze that the mobile is Switched on at the Alarm set Time (Functions of RTC)
Week 7	Lab 7: Analyze the different Modes of a Mobile Phone
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	- Mobile Communication, Jochen Schiller , Second Edition, PEARSON Education,2003 - William Stallings, "Wireless Communications and Network", Pearson Education, 2002.	N/A
Recommended Texts	- Mobile Cullulare Communcations, S. Shankari, M. R. Ramesh, Pearson, Delhi, 2014 - Wireless Communications and Netwroking, W. Stalling, Pearson, 2005 - Wireless Information Networks, K. Pahlavan and A. Levesque, John Wiley and Sons, second edition, 2005.	N/A
Websites		

Grading Scheme
مخطط الدرجات

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