

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Evaluation Authority
Quality Assurance and Academic Accreditation Department
Accreditation Division**



Guide to Academic Program and Course Description

2026

Academic Program Description Template

University Name: Uruk University
College / Institute: College of Technical Engineering
Department: Communication Engineering Techniques
Academic or Professional Program Name: Bachelor's Degree
Final Degree Name: Bachelor's Degree in: Communication Engineering Techniques
Study System: Bologna
Date of Preparation of Description: 27-6-2025
Date of File Completion: 12-2-2026

Signature: 
Name of Department Head: Prof. Dr. Hussein K. Khafaji
Date: 27/6/2025

File Reviewed by
Quality Assurance and University Performance Department
Name of Director of Quality Assurance and University Performance Department: Ass. Prof. Dr. Majidat H. Majid
Date: 27/6/2026
Signature: 





Authentication of the Dean

Prof. Dr. Waleed A. Mahmoud AL-Jawher

1. **Program Vision**

The curriculum of the Department of Communication Engineering Technologies is designed to prepare distinguished engineering graduates who possess the knowledge and practical skills required to meet the demands of the telecommunications industry. The department also contributes to the development of the country's telecommunications infrastructure through cooperation with organizations operating in the communications sector. Furthermore, it promotes academic collaboration with other universities and specialized educational institutions to enhance research and knowledge exchange in this field.

Graduates of the department are qualified to work in government agencies and public institutions within their field of specialization, as well as in the private sector, including mobile telecommunications companies, Internet service providers (ISPs), and network engineering positions. They are also equipped to design, build, operate, and maintain communication networks and information centers across both public and private sector organizations.

2. **Program Mission**

The teaching staff in the Department of Communication Engineering Technologies / Technical Engineering College / University of Uruk strives to provide an integrated academic and technical education that equips students with a solid foundation in modern communication systems and technologies, while offering opportunities for specialization in areas such as communication networks, signal processing, and wired and wireless systems.

The academic curriculum and guidance are designed to prepare qualified graduates for their professional future, whether as competent engineers capable of designing, operating, maintaining, and managing communication networks and systems, or as candidates for postgraduate studies in Communication Engineering Technologies.

The program also aims to support research and innovation by providing students with the scientific and technical knowledge required to develop advanced communication solutions that meet the demands of the digital era and technological transformation. The department is committed to preparing distinguished graduates with strong scientific, technical, and professional skills, while keeping pace with global academic advancements and offering community services based on modern curricula, contributing to the development of an advanced academic environment.

3. Program Objectives

- 1.** Providing graduates with the scientific and practical skills required to diagnose faults in communication systems and networks efficiently and professionally.
- 2.** Preparing students to understand and effectively handle the components of various communication systems, while keeping pace with modern technological developments in this field.
- 3.** Equipping students with detailed knowledge of modern technologies used in Communication Engineering Technologies, including networks, wireless systems, and signal processing.
- 4.** Developing graduates' abilities to perform updates and improvements to communication systems in line with the needs of institutions and the labor market.
- 5.** Striving to achieve academic quality standards in education and research within the available resources and the requirements of technological advancement.
- 6.** The department strives to achieve academic quality standards in education and scientific research in accordance with the available resources and the requirements of technological advancement.
- 7.** Students should demonstrate an interest in engineering problems and the design of communication and computer systems, as well as the ability to develop effective engineering solutions.
- 8.** Students should develop critical thinking and discussion skills to enhance engineering designs and systems within their field of specialization.
- 9.** Form student teams to analyze and solve engineering problems within the field of specialization through collaborative teamwork.
- 10.** Employ brainstorming techniques to foster creativity and encourage gifted students to develop innovative ideas and engineering solutions.

4. Program Accreditation

5. Other External Influences

Ministry of Higher Education and Scientific Research, Iraq

6. Other External Influences

Ministry of Higher Education and Scientific Research, Iraq

7. Program Structure

Category	Number of Courses	Credit Units (ECTS)	Percentage	Notes
Basic Courses (Introductory / Scientific Basics)	14	66	27.5%	
Core Specialized Courses (Program Core)	26	146	60.8%	
Supporting / Related Courses	5	16	6.7%	
Elective Courses	3	12	5%	
Summer Training	2	No credit units	—	Training in 2nd and 3rd stages

8. Program Description

Semester 1 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATUU113	English 1	18	32	2	S	—
ATUU1111	Computer	48	27	3	B	—
ATU11103	Calculus 1	63	62	5	B	—
ATU11104	DC electrical circuits	93	82	7	C	—
ATU11105	Physics and Semiconductor	93	83	7	c	—
ATU11	Human Rights and Democracy	33	17	2	S	—
ATU11107	Engineering Drawing	63	37	4	B	—

Semester 2 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATUU112	Arabic language	18	32	2	S	—
ATU11208	Calculus 2	63	62	5	B	—
ATU11209	AC Electrical Circuits	78	72	6	C	—
ATU11210	Digital Logic	93	82	7	C	—
ATU11211	Electronic Circuits	93	82	7	C	—
ATU11212	Engineering Workshops	48	27	3	B	—

Semester 3 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU11301	Electronic Circuits Design	78	72	6.00	C	—
ATU11302	Signals and Systems	78	72	6.00	C	—
ATU11303	Electromagnetic static Fields	48	52	4.00	C	—
ATU11304	Mathematical Modeling System	63	62	5.00	B	—
ATU11305	Digital Circuits Design	78	72	6.00	C	—
ATU11306	Visaul Basic	48	27	3.00	B	—

Semester 4 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU222	computer2	48	27	3.00	B	—
ATU11408	Differential Equations	63	112	7.00	B	—
ATUU211	Baath Party crimes	18	32	2.00	S	—
ATU11410	Analog Communications	78	97	7.00	C	—
ATU11411	Integrated electronic circuits	78	97	7.00	C	—
ATU221	English 2	18	32	2.00	S	—
ATU220	Arabic language 2	18	32	2.00	S	—

Semester 5 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU11501	Engineering Analysis	63	62	5	B	—
ATU11502	Probability and Statistics	48	52	4	B	—
ATU11503	Antenna and Wave Propagation	78	72	6	C	—
ATU11504	Digital Communication	63	87	6	C	—

ATU11505	Microprocessor	93	57	6	C	
ATU11506	Matlab Programming	63	12	3	B	

Semester 6 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU11607	Numerical Analysis	48	52	4	B	
ATU11608	Information Theory	48	77	5	C	
ATU11609	Digital Signal Processing	48	102	6	C	
ATU11610	Optical Fiber	63	87	6	C	
ATU11611	Microcontroller	78	72	6	C	—
ATU11612	Python Language Programing	63	12	3	B	—

Semester 7 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU11701	Computer Networks	93	82	7	C	
ATU11702	Wireless Communications	48	52	4	C	
ATU11703	Optical Communication	63	87	6	C	
ATU11704	Control	93	82	7	B	
ATU11705	Projects Management	63	37	4	B	
ATU11706	Professional Ethics	33	17	2	S	

Semester 8 | 30 ECTS | 1 ECTS = 30 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU11807	Artificial Intelligence	63	87	6	C	
ATU11808	Satellite Communications	33	67	4	C	
ATU11809	Cyber Security	48	52	4	C	
ATU11810	Mobile Communications	63	87	6	C	
ATU11811	Communication Devices Maintenance	93	57	6	C	
ATU11812	Final Project	63	37	4	C	

9. Expected Learning Outcomes of the Program

Students who complete the MIET program will have a strong foundation in communication engineering, with various employment options and occupations in mind. Graduates are knowledgeable and skilled in creating, designing, testing, and maintaining communication devices and equipment. Additionally, they can pinpoint the crucial role of the communication technology developments have played in communication system. They can use information, the internet, and communication technologies to gather accurate and pertinent information for reports, presentations, etc., that satisfy academic criteria. They possess the ability to interact in a second language. Additionally, they possess the capacity to communicate both verbally and in writing with various audiences. Moreover, the capacity for open-minded, interactive communication with non-experts.

Outcome 1 – Understanding of allied knowledge

Graduates will be able to show a thorough understanding of the market's requirements for knowledge, skills, and expertise. They are also aware of how the market and technological advancement are moving.

Outcome 2 – Oral and Written Communication

Graduates will be able to formally communicate the instruments of communication systems troubleshooting results using oral and written communication skills.

Outcome 3 – Technical and cognitive skills

Graduates can design circuits for communication equipments based on specific criteria and develop applications to view or control the outcomes.

Outcome 4 – Critical thinking and analytical skills

Graduates will be able to identify emerging problems and try to solve them with approaches based on logical and critical thinking using modeling, designing, and forecasting.

Outcome 5 – Appropriate research tools and techniques

Graduates will be capable of carrying out various scientific applications using fundamental research procedures. The graduate can adapt and acquire new skills to produce the desired results.

Outcome 6 – Communications and IT skills

Graduates can share information with the technical team to find the optimal solution. Additionally, they can use the internet, communication, and information technologies. Graduates can read and comprehend user manuals and directions for various communication equipment. They communicate with non-experts showing awareness of diverse informational levels and different perspectives with various engineering terms in English.

Outcome 7 – Group/team leadership

Graduates will be self-motivated, cooperate effectively with other professionals in different disciplines, backgrounds, and interests to solve problems, work lucidly in confusing situations under pressure, and demonstrate knowledge of and commitment to following safety procedures for themselves and others.

Outcome 8 – Own professional development

Graduates can make decisions, plan, problem-solving, and stay updated professionally.

9. Teaching and Learning Strategies

- 1. Interactive Lectures:**
Used to present fundamental and applied concepts, and to explain theoretical aspects using digital presentation tools and real-world examples.
- 2. Laboratory and Practical Work:**
Involves applying technical skills using real communication devices and equipment, which enhances hands-on experience and develops practical and technical competencies.
- 3. Project-Based Learning:**
Students are assigned individual or group projects to solve real-world engineering problems, fostering critical thinking, innovation, and teamwork.
- 4. Class Discussions and Workshops:**
Used to develop communication and analytical skills, and to facilitate the exchange of ideas and perspectives between students and instructors.
- 5. Self-Directed Learning:**
Students are encouraged to explore and investigate by reviewing scientific sources, articles, and journals, and by utilizing digital learning tools.
- 6. Presentations and Technical Reports:**
Enhance students' written and oral communication skills in English and prepare them to engage effectively with technical and clinical teams.
- 7. Site Visits and Summer Training:**
Provide students with exposure to real working environments in companies and engineering centers, reinforcing the link between academic learning and practical application.

10. Evaluation Methods

The assessment methods employed in the communication Engineering Techniques program are designed to measure the extent to which students have achieved the intended learning outcomes at both the course and program levels. A variety of assessment tools are used to evaluate students' cognitive, practical, analytical, and communication skills. These include:

- Written examinations to assess theoretical understanding.
- Laboratory assessments to evaluate practical skills and technical proficiency.
- Project-based evaluations to measure critical thinking, innovation, and problem-solving abilities.
- Oral presentations and technical reports to assess communication skills in both individual and group contexts.
- Assignments and homework tasks to promote self-learning and consistent academic engagement.
- Participation and performance in workshops, discussions, and seminars.

These methods ensure that students are continuously monitored and guided toward achieving both academic and professional excellence.

11. Faculty

Full Name	Academic Title	Specialization		Requirements/ Specific Skills (if any)	Faculty Preparation	
		General	Specialized		Staff	Lecturer
Hussein Keitan Mancy	Professor. Lecturer Dr	Computer Science	Artificial Intelligence and specified data		Staff	
Ali Husain Ahmad Al Hadidi	Assistant Professor Lecturer Dr	Electrical Engineering	Control & Electronics Power		Staff	
Alaa Hameed Alwan Alabdullah	Assistant Professor Lecturer Dr	Mathematics	Functional approximation theory		Staff	
Majidah Hameed Majeed	Assistant Professor Lecturer Dr	Electrical Engineering	Electronics & Communication Engineering		Staff	
Fahad Mohammed Abduhussein Al-Zubaidi	Lecturer Dr.				Staff	

Elhaj Elamin Babekir Gafar	Lecturer. Dr	Computer Scieince	Big data cyber security		Staff	
Nibras Jabbar Mohammad	Assistant Lecturer	Electrical Engineering	Electrical Power Engineering		Staff	
Amir Abdullah Abbas	Assistant Lecturer	Electrical Engineering	Electronic Engineering		Staff	
Reham Esmaal Ibrahim	Assistant Lecturer	Control systems Engineering	Computer Engineering		Staff	

12. Professional Development

Orientation for New Faculty Members

The college adopts a comprehensive approach for orienting new faculty members. A thorough orientation program is provided to facilitate their integration into the academic and administrative environment. This program includes focused introductory sessions that familiarize new members with the organizational structure, teaching and learning strategies employed by the college, academic and administrative systems, as well as campus services. Academic mentors are assigned to guide new faculty members individually, focusing on continuous support and answering their inquiries to ensure their swift adaptation to the academic work environment. For visiting and full-time faculty members, detailed information is provided about their expected academic tasks and available resources to ensure the highest levels of success and effectiveness in performing their duties.

Professional Development for Faculty Members

The college aims to enhance the continuous professional growth of faculty members through a comprehensive plan focused on developing teaching strategies, innovating teaching and learning methods, and evaluating learning outcomes in line with the latest global academic trends. The plan includes organizing regular workshops and training courses covering various topics such as improving teaching efficiency, utilizing modern technologies in education, innovative assessment methods, and developing research skills. The college also encourages participation in local and international academic conferences and seminars to promote the exchange of experiences and specialized knowledge. In addition, a comprehensive evaluation mechanism is implemented to assess the performance of faculty members, including feedback from students and colleagues, which contributes to offering tailored training opportunities based on individual needs. In this context, the college ensures to provide a learning environment that supports continuous professional development and contributes to improving academic performance quality.

13. Admission Criteria

The student is accepted into the college through the central admission process of the Ministry of Higher Education and Scientific Research.

14. Main Sources of Information about the Program

1. Faculty staff in the college.
2. Lectures by faculty members.
3. College library.
4. Electronic library.
5. Textbooks.
6. Supplementary books.
7. Websites and the internet.

15. Program Development Plan

1. Presence of E-Learning
2. Training in communication engineering Companies
3. Academic Training in companies.
4. Preparation of Graduation Projects, Following Up, and Discussing them in a Manner that Simulates University Theses and Dissertations to Strengthen the Research Skill Aspect of the Student

	ATU11704	Control	Basic learning activities	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11705	Projects Management	Basic learning activities		✓						
	ATU11706	Professional Ethics	Support learning activity	✓			✓				
Semester 8	ATU11807	Artificial Intelligence	Core learning activities	✓	✓	✓	✓	✓	✓	✓	
	ATU11808	Satellite Communications	Core learning activities	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11809	Cyber Security	Core learning activities	✓	✓				✓	✓	✓
	ATU11810	Mobile Communications	Core learning activities	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11811	Communication Devices Maintenance	Core learning activities	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11812	Final Project	Core learning activities	✓	✓	✓	✓	✓	✓	✓	✓

Description of the courses.

وصف المقررات الدراسية

نموذج وصف المادة الدراسية

اللغة الانكليزية

Module Information			
معلومات المادة الدراسية			
Module Title	English1		Module Delivery
Module Type	S		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture
Module Code	ATU12		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGI	Semester of Delivery	
Administering Department		College	NETC
Module Leader	Mohammed Salim	e-mail	E-mail
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives أهداف المادة الدراسية</p>	<p>1-The aim of this course is to provide English learners with integrated language skills such as reading, listening and writing resulting in a level of basic language knowledge.</p> <p>2-This course will focus on grammar rules, basic word knowledge and usage, reading comprehension, reading out of the lesson, and Paragraph writing.</p> <p>3- A student may be able to listen to native speakers and speak English Language.</p> <p>4- A student may be able to write and have creativity in his writing.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>1- Uses expressions of Quantity in elementary level of English.</p> <p>2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task.</p> <p>3- Defines basic Modals and employ them in elementary level of communication and writing skills.</p> <p>4- Translates sentences in elementary level from English to another language.</p> <p>5- Interprets the texts written in elementary level of English.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Language is a rule-governed behavior. It is defined as the comprehension and/or use of a spoken (i.e., listening and speaking), written (i.e., reading and writing), and/or other communication symbol system (e.g., American Sign Language).</p> <p>Spoken and written language are composed of receptive (i.e., listening and reading) and expressive (i.e., speaking and writing) components.</p> <p>Spoken language, written language, and their associated components (i.e., receptive and expressive) are each a synergistic system comprised of individual language domains (i.e., phonology, morphology, syntax, semantics, pragmatics) that form a dynamic integrative whole</p> <p>Phonology study of the speech sound (i.e., phoneme) system of a language, including the rules for combining and using phonemes.</p> <p>Morphology study of the rules that govern how morphemes, the minimal meaningful units of language, are used in a language.</p>

Syntax the rules that pertain to the ways in which words can be combined to form sentences in a language.

Semantics the meaning of words and combinations of words in a language.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

- 1- Uses the available material to increase his efficiency.
- 2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task.
- 3- Defines basic Modals and employ them in elementary level of communication and writing skills.
- 4- Develop and enhance students' language skills to communicate in English properly.
- 5- Interprets the texts written in elementary level of English.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	18	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	1.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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 /Siminar	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	Able to identify linking Ideas: Present and Past Irregular Plurals, Consonants, There was/were
Week 2	Identify countable and Uncountable Nouns, Imperatives Healthy Living and
Week 3	Able to identify can for ability Could and Couldn't Skills at work
Week 4	Able to identify can for requests Adjectives and Adverbs
Week 5	Able to identify describing People, Present Continuous and Adjectives

Week 6	Demonstrates knowledge about question for, 'information, prepositions: (at, in, on, to)
Week 7	Mid-term Exam
Week 8	Able to identify (Have to don't have to Housework, home, school & work obligations)
Week 9	Mid-term Exam
Week 10	Demonstrates knowledge about Offering and Inviting Why..? Would you like to...? Let's...? Free time activities
Week 11	Able to identify (Be going to + infinitive for plans)
Week 12	Able to identify (Be going to weak forms: Maybe/perhaps)
Week 13	Able to identify {Past Simple have to)
Week 14	Demonstrates knowledge about Transport, Prepositions of movement Address
Week 15	Demonstrates knowledge about (Writing Activities)
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Headway book for learning English	Yes
Recommended Texts	Skills in writing and Learning English	No
Websites	https://www.bbc.co.uk/learningenglish/	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
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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.

نموذج وصف المادة الدراسية

حاسوب

Module Information معلومات المادة الدراسية			
Module Title	Computer		Module Delivery
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATUU1111		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGI	Semester of Delivery	
Administering Department		College	NETC

Module Leader	Salim Mohsen Wadi	e-mail	coj.sal@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. Utilize the computer for fundamental tasks. 2. Identify and discuss the hardware components of the computer system. 3. Creating documents using word processor and creating presentations 4. Conducting research on the internet
Module Learning Outcomes	<ol style="list-style-type: none"> 1. Enable to describe the computer components. 2. Enable to Install the software program of a computer. 3. Connect to the internet and share resources in a networked environment. 4. Enable to work on Microsoft Office.

مخرجات التعلم للمادة الدراسية	5. Troubleshoot using system tools and diagnostic software.
Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none"> - Introduction to computer - Computer componenets - Operting system and graphical user interface GUI - Word Processing - Spread sheet - Presentation Software - Introduction to Internet and Web browsers - Communication and Emails - Computer troubleshooting

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	48	Structured SWL (h/w)	3.2
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	27	Unstructured SWL (h/w)	1.8

الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا			
Total SWL (h/sem)		75			
الحمل الدراسي الكلي للطلاب خلال الفصل					
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

(المفردات تم تعميمها حسب كتاب الوزارة ذي العدد ت م 3 / 11009 بتاريخ 9 / 10 / 2024)

	Material Covered
Week 1	introduction to Computer: Concepts of Hardware and Software with their components; Concept of Computing, Data and Information; Applications of Information Electronics and Communication Technology (IECT); Connecting input/output devices, and peripherals to CPU.

Week 2&3	Computer Components: Computer Portions, Hardware Parts, I/O Units, Memory Types, Basic CPU Components, Computer Ports, Personal Computer, Personal Computer (Features and Types).
Week 4&5	Operating System and Graphical User Interface GUI: Operating System; Basics of Common Operating Systems; The User Interface, Using Mouse Techniques; Use of Common Icons, Status Bar, Using Menu and Menu-selection, Concept of Folders and Directories, Opening and closing of different Windows: Creating Short cuts.
Week 6&7	Word Processing: Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.
Week 8&9	Spread Sheet: Basics of Spreadsheet; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet
Week 10&11	Presentation Software: Basics of presentation software; Creating Presentation; Preparation and Presentation of Slides: Slide Show; Taking printouts of presentation.
Week 12	Mid term exam
Week 13	Introduction to Internet and Web Browsers: Computer networks Basic; LAN, WAN; Concept of Internet and its Applications; connecting to internet; World Wide Web; Web Browsing software's, Search Engines; Understanding URL: Domain name; IP Address.
Week 14	Communications and Emails: Basics or electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration.
Week 5	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	get started with use of computer
Week 2	Basic use of Windows operating system
Week 3	General view of Microsoft Office tools
Week 4	Getting Started with Microsoft Office Word
Week 5	Microsoft Office Word: Editing a Document and Formatting Text and Paragraphs
Week 6	Microsoft Office Word: Adding Tables and Inserting Graphic Objects
Week 7	Microsoft Office Word: Controlling Page Appearance and Proofing a Document
Week 8	Microsoft Office Excel: Getting Started with Microsoft Office Excel
Week 9	Microsoft Office Excel: Sorting, Selecting and Subtotaling data
Week 10	Microsoft Office Excel: Formulas and Functions
Week 11	Microsoft Office Excel: Worksheet Formatting and Presentation
Week 12	Microsoft Office PowerPoint: Getting Started with Microsoft Office PowerPoint
Week 13	Microsoft Office PowerPoint: Developing a PowerPoint Presentation, Adding Graphical
Week 14	Elements to Your Presentation and Modifying Objects in Your Presentation
Week 15	Microsoft Office PowerPoint: Adding Graphical Elements, tables and charts to Your

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020) 2- Microsoft Office 2019 Step by Step. By Joan Lambert, Curtis Frye Part of the Step by Step series.	no
Recommended Texts	1- Absolute Beginner's Guide to Computer Basics Part of: Absolute Beginner's Guide (34 books) by Michael Miller Jan 1, 2009 2- Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology In Action Complete", 16th Edition (2020).	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.

نموذج وصف المادة الدراسية

رياضيات 1

Module Information				
معلومات المادة الدراسية				
Module Title	Calculus I		Module Delivery	
Module Type	basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11103			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGI	Semester of Delivery		1
Administering Department		College	NETC	
Module Leader	Ahmed Mohammed Zeki		e-mail	Ahmed.alhilli@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq

Scientific Committee Approval Date	01/10/2024	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. To develop problem solving skills and understanding of functions and their differentiation. 2. To understand differentiation and its geometric meaning. 3. To understand differentiation applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Understand the meaning of functions and their properties 2. Combining functions. 3. Understanding shifting and scaling of functions. 4. Definition of Trigonometric and exponent functions. 5. Basic understanding of rates of changes and tangent of curves. 6. Limit of functions and limits laws. 7. Continuity of functions. 8. Tangent and derivative of a point. 9. The derivative as a function. 10. Differentiation rules. 11. The chain rule.

	<p>12. Implicit differentiation, the inverse function and logarithms</p> <p>13. Inverse trigonometric functions</p> <p>14. Application of derivatives</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Functions, types of functions, graph of the functions, domain and range of function</p> <p>Trigonometric function: graph of trigonometric function, range and domain of trigonometric functions, identities.</p> <p>Limits and Continuity: Properties, limits involving infinity, continuity.</p> <p>Transcendental functions: Inverse function, graph of inverse function,</p> <p>Logarithmic and exponential functions, inverse trigonometric functions, hyperbolic functions, inverse hyperbolic functions.</p> <p>Derivatives: Definition, rules of derivative, Implicit differentiation,</p> <p>Applications of derivatives: rate of change problems, derivative, Linearization, Mean value theorem, Initial value problem.</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>The main strategies that will be adopted in delivering this module is to encourage students to engage in exercises, while at the same time honing and expanding their critical thinking skills. Teaching methods include interactive lectures, where basic mathematical principles are explained in detail. Regular formative assessments will be conducted to monitor students' understanding of the material, and immediate feedback will be provided to guide their learning process. Emphasis will be placed on linking mathematical concepts to real-world engineering applications to make the learning experience more relevant and engaging.</p>
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	63	Structured SWL (h/w)	4.2
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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	4.1
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
	Home Work	2	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
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Week 1	Understand the meaning of functions and their properties
Week 2	Combining functions.
Week 3	Understanding shifting and scaling of functions.
Week 4	Definition of Trigonometric and exponent functions.
Week 5	Basic understanding of rates of changes and tangent of curves.
Week 6	Limit of functions and limits laws.
Week 7	Continuity of functions.
Week 8	Tangent and derivative of a point.
Week 9	The derivative as a function.
Week 10	Differentiation rules.
Week 11	The chain rule.
Week 12	Implicit differentiation, the inverse function and logarithms
Week 13	Inverse trigonometric functions
Week 14	Application of derivatives
Week 15	Application of derivatives
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus 14 th edition	Yes
Recommended Texts	Calculus 10 th edition by Anton, Bivens, and Davis	Yes

Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/
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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.

نموذج وصف المادة الدراسية

دوائر التيار الكهربائي المستمر

Module Information		
معلومات المادة الدراسية		
Module Title	DC Electrical Circuits	Module Delivery
Module Type	Core	<input checked="" type="checkbox"/> Theory

Module Code	ATU11104	<input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	UGI	Semester of Delivery	1
Administering Department		College	NETC
Module Leader	Serab Jwyed Musa	e-mail	inj.srb@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>4. To develop problem solving skills and understanding of circuit theory and circuit analysis through the application of techniques.</p> <p>5. To understand voltage, current and power from a given circuit.</p> <p>6. This course deals with the basic concept of electrical circuits.</p> <p>7. This is the basic subject for all electrical and electronic circuits.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>15. Recognize how electricity works in electrical circuits.</p> <p>16. Learn the various terms associated with electrical circuits.</p> <p>17. Describe electrical power, charge, and current.</p> <p>18. Define Ohm's law.</p> <p>19. Learn the basics of circuits connections (series, parallel, and Y-Δ connections).</p> <p>20. Identify the basic circuit elements and their applications.</p> <p>21. Explain the basic rules of electric circuits analysis, such as Ohm's law, voltage and current division rules, and Kirchhoff's laws.</p> <p>22. Explain circuits analysis methods, such as nodal and mesh analysis.</p> <p>23. Explain circuits analysis theorems, such as Thevenin's and Norton's theorems, in addition to superposition principle.</p> <p>24. Explain the principles of maximum power transfer and its relationship to circuits analysis theorems.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p><u>Basic Concepts</u></p> <p>Current and voltage definitions, passive sign convention and circuit elements, combining resistive elements in series and parallel</p> <p><u>Basic Laws</u></p> <p>Series and parallel connections, Ohm's law, Kirchhoff's laws, Voltage and current division rules.</p> <p><u>Series and parallel circuit</u></p> <p><u>Circuit Analysis Methods</u></p> <p>Nodal analysis and Mesh analysis.</p> <p><u>Circuit Theorems</u></p> <p>Thevenin's and Norton's theorems, in addition to superposition principle.</p> <p><u>Three phase circuit</u></p>

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.5
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
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

Summative assessment	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Charge, current, voltage, resistance and conductance
Week 2	power and energy. Power sign convention.
Week 3	Basics of Network Elements, Definition of Nodes, Branches, and Loops, type of sources.
Week 4	Series and parallel circuits: series circuits, voltage divider rule, current divider rule.
Week 5	Star-delta transformations.
Week 6	Kirchhoff's Laws.
Week 7	Mid-term Exam.
Week 8	Circuit Analysis - Nodal method.
Week 9	Circuit Analysis – Mesh method.
Week 10	Linearity and Superposition.
Week 11	Source Transformations.
Week 12	Thevenin's Theorem.
Week 13	Norton's Theorem.
Week 14	Maximum power transfer theorem.
Week 15	Preparatory week before the final Exam.

Week 16	Final Exam.
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Laboratory Equipment Training.
Week 2	Lab 2: Measuring voltage, current and resistance.
Week 3	Lab 3: Ohm's law.
Week 4	Lab 4: Series connections.
Week 5	Lab 5: parallel connections.
Week 6	Lab 6: Voltage divider rule.
Week 7	Lab 7: Voltage divider rule.
Week 8	Lab 8: Star-Delta Transformations
Week 9	Lab 9: Kirchhoff's laws.
Week 10	Midterm exam
Week 11	Lab 10: Thevenin's theorem.
Week 12	Lab 11: Norton's theorem.
Week 13	Lab 12: Superposition principle.
Week 14	Lab 13: Maximum power transfer.
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	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.

نموذج وصف المادة الدراسية

فيزياء واشباه الموصلات

Module Information

معلومات المادة الدراسية

Module Title	Physics and Semiconductor		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11105			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGI	Semester of Delivery		
Administering Department		College	NETC	
Module Leader	Thenaa Hassan Yousaf		e-mail	thanaa.yousif.chm@atu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer		Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims</p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. To understand atom models. 2. To Know the Semiconductor materials and their types. 3. To Know the P-N junction and biasing 4. To understand the V/I Characteristics of the diode. 5. To study the Equivalent circuit of the diode and analysis its circuit. 6. To study the diode types and their applications.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Learn about the structure of the atom. 2. Discuss the energy bands in an atom. 3. Discuss the types of semiconductor materials and how to manufacture them. 4. study generation and recombination of the carrier. 5. How to form the depletion layer. 6. Recognize the forward and reverse biased of the P-N junction. 7. Learn about Diode Equation. 8. Discussion of the Equivalent circuit of the diode. 9. Discuss the series and parallel diode configuration. 10. Study rectifier circuits, clipper and clamper circuits, and voltage doublers. 11. Study zener diode and application,
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<ul style="list-style-type: none"> - Model of the atom., Bohr's model, atom energy levels, Collisions of Electrons with Atoms, The Photon Nature of Light, energy bands, valance and conduction bands, Insulators, Semiconductors and Metals. [8 hrs] - Semiconductor types: Intrinsic and Extrinsic Semiconductors, n-type and P-type, majority and minority carriers. Drift and diffusion currents, electron-hole pair, carrier and life time, generation and recombination of carrier. [12 hrs] - P-N junction, forward and reverses biased P-N junction, Diode Equation, Forward and reverse V/I Characteristics of diode, diode resistance. [11 hrs] - Equivalent circuit of diode: Piecewise Equivalent Circuit, Simplified Equivalent Circuit, Ideal Equivalent Circuit, Load line analysis, Examples. Series and parallel diode

	configuration examples. Half wave rectifier, full wave rectifier, clipper and clamper circuits, voltage doublers. [18 hrs] - Types of diodes, zener diode, light emitting diode, [11 hrs]
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 showing the students how the construction members exposed to external loads. This can be done by films or videos or by the ready structural software.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	93/15 = 6.2
Unstructured SWL (hr/sem) (USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	82/15 = 5.5
Total SWL (hr/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, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week	Syllabus
Week 1&2	Atoms, electrons and shells, energy levels, valance electron, Ionization, Molecules and Solids - Combination of atoms - Bonding force in solids, material classifications (conductors, insulators, and semiconductors).
Week 3&4	Semiconductor materials: Ge, Si, and GaAs, Covalent bonding, electron and hole current, intrinsic and extrinsic semiconductors. p-type and n-type materials.
Week 5&6	PN-junction and barrier potential. semiconductor diode, characteristics of diode, Silicon diode versus germanium diode, ideal diode versus practical, current-voltage relationship, temperature effect.
Week 7-9	Diode resistance level, Diode equivalent circuits, Diode in DC circuits series and parallel diode configurations, load line analysis, transition and diffusion capacitance, reverse recovery time, diode switching circuit; OR and AND gates.
Week 10-12	Diode in AC circuits; diode rectifiers circuit; Half wave rectifier operation, transformer coupler, full wave rectifiers operation; Bridge and center-tap full wave, capacitor filter.
Week 13&14	Diode clipping circuit, diode clamping circuits. other types of diodes; light emitting diode and Zener diode.
Week 15	Zener diode operation and its applications
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to Lab instruments
Week 2	Lab 2: Forward and reverse V/I Characteristics of diode.
Week 3	Lab 3: half wave rectifier.
Week 4	Lab 4: Full wave rectifier with center tap transformer.
Week 5	Lab 5: Full wave (bridge) rectifier.
Week 6	Lab 6: clipper and clamper circuits
Week 7	Lab 7: voltage doubler and voltage triple
Week 8	Lab 8: Zener diode characteristics in forward biasing and reverse biasing.
Week 9	Lab 9: Using a zener diode to stabilize the voltage with a constant and variable resistive load.
Week 10	Lab 10: light emitting diode.
Week 11	Lab 11: characteristics of photo diode.
Week 12	Lab 12: characteristics of varactor diode.
Week 13	Lab 13: characteristics of Schottky diode.
Week 14	Lab 14: characteristics of Lazer diode.
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Electronic Devices And Circuit Theory by R. Boylestad.	Yes
Recommended Texts	1. Electronic devices electronic flow version by Thomas L. Floyd	Yes
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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.

نموذج وصف المادة الدراسية

حقوق انسان وديمقراطية

Module Information			
معلومات المادة الدراسية			
Module Title	Human Right and Democracy		Module Delivery
Module Type	S		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGI	Semester of Delivery	
Administering Department		College	NETC
Module Leader	Hiader abd Al-Jaleel		e-mail
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>1 يتعلم الطالب اساسيات حقوق لانسان والديمقراطية ، و كيف يدافع عنها بالطرق القانونية وماهي ضماناتها 1 الداخلية والدولية</p> <p>استحصال المعرفة في مجال الديمقراطية وأنواع أنظمتها واثرها على حقوق الانسان-2 .</p> <p>تنمية شخصية الطالب وتعزيز وعيهم في الأنظمة السياسية الديمقراطية وتفصيلها وكيفية تطبيقها على 3 .</p> <p>ارض الواقع واهمية ان يكون فعال في المجتمع من خلال احترامه لحقوق الاخرين ومعرفة ان الحقوق والحريات تنتهي عند بداية حقوقهم وحرياتهم ويؤدي واجباته بدال من اكتساب الحقوق فقط .</p> <p>تعزيز ثقافة السالم القائمة على العدل والمساواة 4 .</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>1 تمكين الطالب من معرفة اساسيات الدفاع عن حقوقه وحقوق الاخرين بعد معرفتها ومعرفة أهميتها له - 1 . وللمجتمع بصورة عامة وأيضا معرفه كل شخص حدود حقوقه وحريته .</p> <p>تمكين الطالب في المشاركة السياسية وذلك من خلال معرفته بأهمية مشاركته في الانتخابات وتأثير هذه 2 - . المشاركة على سير الانتخابات وتشكيل السلطة فيما بعد</p> <p>معرفة الطالب ضمانات حقوقه وحرياته وماهي مصادرها 3</p> <p>معرفة الفرق بين الحقوق والحريات - 4</p> <p>فهم الطالب للقانون الدولي لحقوق الانسان وايضا الدولية والية عملها 5-</p>
Indicative Contents المحتويات الإرشادية	<p>الجزء الاول -تعريف حقوق الانسان</p> <p>الجزء الثاني معرف حقوق الانسان في الأديان السماوية</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>-زيادة وعي الطالب بأهمية معرفه حقوقه وواجباته اتجاه المجتمع وعالقة حقوق الانسان بالنظام الديمقراطي 1</p> <p>ثقافة عامة في مجموعة من المجالات ومنها المجال القانوني و السياسي والاجتماعي 2</p>
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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	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (15)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	15% (15)	2 and 12	LO #3, #4 and #6, #7
	Projects	----	--	--	--
	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	<p>Freedom & Democracy</p> <ul style="list-style-type: none"> - An introduction to freedom and democracy in multiple societies and on different ages, its types and how changes in regime occurred <p>Relativity in freedom</p> <ul style="list-style-type: none"> - Freedom is not an absolute idea but it is variable with respect to time, place regime...etc.
Week 2	<p>General Freedom guaranties</p> <ul style="list-style-type: none"> - Freedom has political and legal guaranties. <p>General freedom divisions</p> <ul style="list-style-type: none"> - Natural freedoms, private freedoms, intellectual freedoms, collective freedoms and political freedoms
Week 3	<p>Individual Freedoms</p> <ul style="list-style-type: none"> - Opinion freedom, expression freedom, press freedom...etc. <p>Democracy & political systems</p> <ul style="list-style-type: none"> - Overview about democracy and its history
Week 4	<p>Democracy types</p> <ul style="list-style-type: none"> - Direct and indirect <p>Dictatorship and its specification - Overview and specification</p>
Week 5	<p>Concepts about democracy</p> <ul style="list-style-type: none"> - Traditional meaning and modern meaning. <p>Democracy in Greek Civilization VS.</p>

	Current democracy
Week 6	Current crisis of democracy - Economical, social, cultural and political difficulties Civil & political rights - Which includes life right, personal freedom, possessing, contracting family...etc.
Week 7	Individual importance and its relation with nation and regime Importance and specifications of sovereignty
Week 8	Main portions of a country - People, land, government and sovereignty Human rights in human history - Human rights in ancient ages like Mesopotamian, Greek, and Roman civilizations
Week 9	Human rights in divine religions - In Christian and Islamic - Overview, properties and types
Week 10	International confession of human rights Territorial confession of human rights - international and legal resources from international agreements
Week 11	NGO and its role in the protection of human rights Women rights - In Islamic time
Week 12	Children Rights - In old civilizations - In divine religions In international agreement on 1989
Week 13	Elections and human rights

	- Human rights is a concept of free elections
Week 14	<p>Human rights resources in Iraq</p> <p>- Basics of human rights in Iraq from the Iraqi constitution, year 2005</p> <p>Civil Rights</p> <p>- Equality, life freedom rights and house and personal privacy</p>
Week 15	<p>Political & economical rights</p> <p>- Election rights government critique</p> <p>Social & cultural rights</p> <p>- This includes the right of family creation, social and health care, and the right of clean environment</p>
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	حقوق الانسان والطفل والديمقراطية / تأليف ماهر صالح علاوي ورياض عزيز هادي وعلي عبد الرزاق محمد واخرون	No
Recommended Texts	عباس الدليمي / حقوق الانسان الفكر والممارسة	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

الرسم الهندسي

Module Information

معلومات المادة الدراسية

Module Title	Engineering Drawing	Module Delivery
Module Type	Basic B	<input type="checkbox"/> Theory

Module Code	ATU11107		<input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGI	Semester of Delivery	1	
Administering Department		College	NETC	
Module Leader	Noor Fadil		e-mail	noor.habib@atu.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	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. To present a brief vision of Computer-Aided Design (auto CAD) and the tools of this term. 2. Highlighting the mathematical modeling principles of line, arc, spline, and other segments. Fundamental of electricity element : resistance, inductance, ... ,etc. 3. Covering the significant programs utilized in the modeling and comparing these programs. 4. Defining the AutoCAD and workbench program's tools and modeling outcomes. 5. Explaining global and local coordinate systems in modeling.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Control of AutoCAD principles as background programming of each segment, such as line or arc. 2. Controlling the main and sub-tools of the AutoCAD program as a professional designer. 3. Contributing to knowing the methodology of drawing accuracy and technology terms.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Part A Introduction to modeling system in AutoCAD:</p> <p>Drawing planes, Preparing sheet drawings, Line commands, circle commands, Arc commands, Rectangle commands, straight slot commands, Ellipse commands, Spline commands, and 3D sketch planes.</p> <p>Part (B) Fit conceptual:</p> <p>Transition, Clearance, and Interference.</p> <p>Part (C) Bearing, Cams, Gears, and Belts, bolts, Welding conceptual.</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>The strategy of this subject is to study the principles of computer-aided design (auto CAD) by employing one of the popular programs. The tools of autocad program contribute to developing the users' skills in 2D and 3D drawing. Besides, this program utilizes the assembly and sheet representation for sketched parts with annotation technologies. Furthermore, this program boosts the modeling of belts, coupling, gears, and cams. Consequently, prepare the students to design advance modeling of electrical and electronic circuits.</p>
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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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
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)	4 and 12	
	Assignments	2	10% (10)	3 to 12	
	Projects / Homework	5	10% (10)	6 and 11	
	Report	1	10% (10)	0	
Summative assessment	Midterm Exam	2hr	10% (10)	7	
	Final Exam	3hr	25% (25)	15	

Total assessment	100% (100 Marks)		
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	DDA AND ELECTRICITY Algorithm for line, Bresenham Algorithm for arc, HC-Spline.
Week 2	Bezier spline, Preparing sheet and plane for drawing by SOLIDWORK program.
Week 3	2D and electricity drawing tools.
Week 4	2D and electricity drawing tools, 2D modify tools.
Week 5	3D and electricity drawing tools.
Week 6	3D and electricity drawing tools.
Week 7	3D drawing tools, Mid-Test.
Week 8	3D Modify-Features tools.
Week 9	Surfaces tools.
Week 10	Surfaces tools, Modify-Surfaces tools.
Week 11	Modify-Surfaces tools, Assembly tools.
Week 12	Assembly tools, Drawing Sheet tools.
Week 13	Feet and clearance tools.
Week 14	Bearing, Cams, and Gears tools
Week 15	Belts, Bolts, and Welding tools
Week 16	Final Exam.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Radhakrishnan, P., Subramanyan, S. and Raju, V., 2008. CAD/CAM/CIM. New Age International. Bethune, James D. Engineering Design and Graphics with SolidWorks 2016. United States: Pearson, 2016.	no
Recommended Texts	.	
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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MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

اللغة العربية

Module Information			
معلومات المادة الدراسية			
Module Title	Arabic language		Module Delivery
Module Type	Suplement		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATUU112		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	JGI	Semester of Delivery	
Administering Department		College	NETC
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	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1- تعريف الطلبة اهم المفاتيح الاساس في التعامل بلغة عربية فصحة خالية من اي الأخطاء. 2- رفع القدرات التعبيرية للطلاب، ومساعدتهم على استخدام العبارة المناسبة بشكل صحيح وواضح. 3- تدريب الطلبة على التنظيم المنطقي للأفكار باللغة العربية الفصحى. 4- جعل الطلبة قادرين على اكتساب خزين لغوي من الكلمات والتعابير الفصيحة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- تعلم اساليب اللغة العربية . 2- استخدام علامات الترتيم أثناء الكتابة. 3- تعلم كيفية تحليل النصوص الأدبية. 4- التدريب على القراءة الواضحة والالقاء.
Indicative Contents المحتويات الإرشادية	1- توضيح أهمية اللغة العربية وفوائدها للطلبة من غير اختصاص اللغة العربية. 2- تفسير بعض الايات القرنية 3- تحليل بعض القصائد العربية. 4- قواعد اللغة العربية وأهميتها. 5- الأسماء، أنواعها، الضمانر 6- النكرة والمعرفة. 7- اعراب بعض الايات القرنية، الايات الشعرية. 8- علامات الترتيم واهميتها في اللغة العربية. 9- شرح موضوع العدد ، وماهي اقسامه.
Strategies	- المحاضرة والمشاركة - - المناقشة والحوار - - العصف الذهني - - كتابة التقارير عن الموضوع - - السؤال والجواب

Student Workload (SWL)

الحمل الدراسي للطلاب

Structured SWL (hr/sem) (SSWL)	18	Structured SWL (h/w)	18/15 =1.2
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الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (hr/sem)(USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	32/15=2.1
Total SWL (hr/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
1	اللغة: توضيح أهمية اللغة العربية وفوائدها بالنسبة للطلاب الجامعي من غير تخصص اللغة العربية.
2	اللغة: تفسير وتحليل عدد من آيات القرآن الكريم، وبيان اهم الأوجه والبلاغية والنحوية.
3	اللغة: تفسير وتحليل عدد من آيات القرآن الكريم، وبيان اهم الأوجه والبلاغية والنحوية.
4	اللغة: تفسير وتحليل عدد من آيات القرآن الكريم، وبيان اهم الأوجه والبلاغية والنحوية.
5	الأدب: تحليل عدد من ابیات الشاعر ابي الطيب المتنبي ، وبيان اهم الأوجه والبلاغية والنحوية في القصيدة
6	الأدب: تحليل أحد قصائد الشعر الحر للشاعر العراقي بدر شاكر السياب.
7	الأدب: تحليل أحد قصائد الشاعر إيليا أبو ماضي، وبيان اهم الأوجه والبلاغية والنحوية في القصيدة
8	معرفة اقسام الكلام، الاسم والفعل والحرف. القواعد:
9	القواعد: النكرة والمعرفة
10	القواعد: الضمائر
11	القواعد: أسماء الإشارة
12	الاملاء: علامات الترقيم واهميتها في اللغة العربية.
13	الاملاء: شرح موضوع العدد، ومعرفة تميز العدد وماهي اقسام العدد مع الأمثلة وحالات الاعراب
14	الاملاء: احكام كتابة التاء المربوطة والمفتوحة والالف الممدودة والمقصورة
15	الاملاء: أحكام كتابة الضاد والطاء

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	-1	
Recommended Texts	-1	
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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.

5MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

الرياضيات 2

Module Information				
معلومات المادة الدراسية				
Module Title	Calculus 2		Module Delivery	
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11209			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGI	Semester of Delivery		2
Administering Department		College	NETC	
Module Leader	Ahmed Mohammed Zeki		e-mail	Ahmed.alhilli@atu.edu.iq
Module Leader's Acad. Title	Assist. Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq	

Scientific Committee Approval Date	01/10/2024	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 8. To develop problem solving skills and understanding of functions and their integration. 9. To understand integrations and antiderivatives. 10. This course deals with the basic concept of calculus. 11. To understand integral applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. The Definite Integral, the Fundamental Theorem of Calculus 2. Indefinite Integrals and the Substitution Method 3. Definite Integral Substitutions and the Area Between Curves 4. Volumes Using Cross-Sections, Volumes Using Cylindrical Shells 5. Arc Length and Areas of Surfaces of Revolution 6. The Logarithm Defined as an Integral 7. Using Basic Integration Formulas 8. Integration by Parts 9. Trigonometric Integrals

	10. Trigonometric Substitutions 11. Integration of Rational Functions by Partial Fractions
Indicative Contents المحتويات الإرشادية	- Integration - Method of integration - Application of definite integrals - Hyperbolic Functions

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.
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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	4.2
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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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
	Homework	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
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Week 1	Indefinite Integrals and the Substitution Method, Integration of Trigonometric and Hyperbolic functions
Week 2	Integration methods, 1) Integration by parts
Week 3	Trigonometric Integrals, Integrating powers of Trigonometric functions
Week 4	Integration by Trigonometric substitutions
Week 5	Integration by partial fraction
Week 6	Integration of rational function of $\sin x$ and $\cos x$
Week 7	Integration of rational functions contains $\sqrt[n]{x}$
Week 8	Definite Integral, the Fundamental Theorem of Calculus
Week 9	Applications of definite Integral: a) The area under the curve, b) Area between two curves
Week 10	Volumes; Volumes Using Cross-Sections, Volumes Using Cylindrical Shells
Week 11	Complex Numbers, Complex Arithmetic; Argand Diagrams and the Polar Form
Week 12	The Exponential Form of a Complex Number; De Moivre's Theorem
Week 13	Matrices; Introduction to Matrices; Matrix Multiplication
Week 14	Determinants; The Inverse of a Matrix
Week 15	Matrix solution of equations; Solution by Cramer's Rule; Solution by Inverse Matrix Method
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus 14 th edition	Yes

Recommended Texts	Calculus 10 th edition by Anton, Bivens, and Davis	Yes
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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

دوائر التيار الكهربائي المتناوب

Module Information

معلومات المادة الدراسية

Module Title	AC Electrical Circuits		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11210			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGI	Semester of Delivery		
Administering Department		College	NETC	
Module Leader	Serab Jwyed Musa		e-mail	inj.srb@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>12. To develop problem solving skills and understanding of AC circuits theory and AC circuits analysis through the application of techniques.</p> <p>13. To understand voltage, current and power from a given AC circuit.</p> <p>14. This course deals with the basic concept of AC electrical circuits.</p> <p>15. To understand Poly Phase Circuits.</p> <p>16. To understand Resonance circuits.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>25. Describe the principles of sinusoidal signals and phasors.</p> <p>26. Explain how sinusoidal signals behave when interact with AC circuits elements.</p> <p>27. Learn the various terms associated with AC electrical circuits.</p> <p>28. Learn the behavior of capacitors and inductors when connected to AC sources.</p> <p>29. Learn the basics of circuits connections (series, parallel, and Y-Δ connections).</p> <p>30. Describe the operation of RC, RL, and RLC circuits.</p> <p>31. Explain the basic rules of AC electric circuits analysis, such as Ohm's law, voltage and current division rules, and Kirchhoff's laws.</p> <p>32. Explain circuits analysis methods, such as nodal and mesh analysis methods.</p> <p>33. Explain circuits analysis theorems, such as Thevenin's and Norton's theorems, in addition to superposition principle and maximum average power transfer.</p> <p>34. Explain Poly Phase Circuits.</p> <p>35. Explain Resonance circuits.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p><u>Basic Concepts</u></p> <p>Sinusoidal signals and their properties, Phasors, phasor representations, and time domain signals vs phasor domain signals.</p> <p><u>AC Circuits Elements</u></p> <p>Resistors, capacitors, and inductors: voltage-current relationship, impedance and admittance, equivalent circuits of capacitors and inductors as a function of signal frequency.</p> <p><u>Basic Laws, Analysis Methods, and Theorems in AC</u></p> <p>Series and parallel connections, Ohm's law, Kirchhoff's laws, Voltage and current division rules. Nodal analysis and Mesh analysis. Thevenin's and Norton's theorems, in addition to superposition principle.</p> <p><u>AC power Analysis</u></p>

	<p>Active power, reactive power, apparent power, power triangle, power factor correction. instantaneous and average power, maximum average power transfer.</p> <p><u>Resonance:</u></p> <p>Series resonance, quality factor, selectivity, bandwidth, parallel resonance.</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>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.</p>
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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	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
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	Sinusoidal signals and their properties.
Week 2	Phasors: phasor representation, derivatives and integrals of sinusoids in phasor domain,

Week 3	AC Circuits Elements: V-I relationship of resistors, capacitors, and inductors.
Week 4	Series and parallel circuits: series circuits, voltage divider rule, current divider rule.
Week 5	Kirchhoff's Laws.
Week 6	Circuit Analysis – Nodal and mesh methods.
Week 7	Mid-term Exam.
Week 8	Superposition principle, and source transformation.
Week 9	Thevenin's and Norton's Theorems.
Week 10	AC Power Analysis: Instantaneous and average power, maximum average transferred power,
Week 11	AC Power Analysis: Active power, reactive power, apparent power, power factor.
Week 12-13	Resonance: Series resonance, quality factor, selectivity, bandwidth, parallel resonance, derive resonance frequency for many circuits
Week 14-15	Basic intro to three phase systems, balance load, unbalance load, power in three phase circuits.
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Series RL circuits.
Week 2	Lab 2: Series RC circuits.
Week 3	Lab 3: Parallel RL circuits.
Week 4	Lab 4: Parallel RC circuits.

Week 5	Lab 5: Series RLC circuits.
Week 6	Lab 6: Parallel RLC circuits.
Week 7	Lab 7: Superposition theorem
Week 8	Lab 8: Maximum average AC power transfer.
Week 9	Mid-term exam
Week 10	Measure AC Power
Week 11	Lab 11: Maximum average AC power transfer.
Week 12	Series Resonance
Week 13	Parallel Resonance
Week 14	Measure power in three phase circuits
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Introductory to circuit analysis by Boylestad.	Yes
Recommended Texts	Fundamentals of Electric Circuits by C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education Electric circuits, Pearson Education by Nilsson, James William	No

	Textbook of Electrical Technology-Volume I (Basic Electrical Engineering), by Theraja, B. L. A.	
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

الرقمية

Module Information

معلومات المادة الدراسية

Module Title	Digital Logic		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11211			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGI	Semester of Delivery		
Administering Department		College	NETC	
Module Leader	Huda Hussien Abed		e-mail	eng.huda2020@atu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.	
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>This course aims to enable the student to:</p> <ol style="list-style-type: none"> 17. Explain the number systems. 18. Perform arithmetic operations on binary number systems. 19. Define the logic gates. 20. Write the logic expression of the logic circuits. 21. Produce the truth table for the logic expressions. 22. Simplify the Boolean expressions. 23. Understand the functions of combinational logic circuits. 24. Analyze and design various combinational logic circuits.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 36. Represent any given number in different bases (such as bases 2, 8, and 16). 37. Implement the arithmetic operations on binary numbers. 38. Obtain the 1's complement and 2's complement of binary numbers. 39. Identify the logic gates by their logic symbol, write the logic expression, and produce the truth table for the logic gates. 40. Analyze a logic circuit to determine its logic expression and truth table. 41. Employ theorems of Boolean algebra to simplify logic expressions. 42. Determine the standard SOP expression and standard POS expression from the truth table. 43. Use a Karnaugh map to minimize POS & SOP expressions. 44. Convert nonstandard logic expressions to standard logic expressions. 45. Implement the logic functions using only NAND gates or only NOR gates. 46. Design of various combinational logic circuits such as adders, subtractors, comparators, and code converters.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p><u>Part A - Number Systems</u></p> <p>Define number systems, convert a decimal number to any radix number, convert a binary number to an octal or hexadecimal number and vice versa, and convert an octal number to a hexadecimal number and vice versa. [1-3 weeks]</p> <p><u>Part B - Arithmetic operations & logic gates</u></p> <p>Perform arithmetic operations on binary numbers, convert a binary number to its 1's complement, and 2's complement, Identify the logic gates, write the logic expression, and produce the truth table. [1-2 weeks]</p> <p><u>Part C - Combinational logic circuit</u></p>

Analyze a combinational logic circuit, draw a logic diagram, theorems of Boolean algebra, DE Morgan's theorem, standard SOP & POS expressions, use a Karnaugh map to minimize POS & SOP expressions, convert nonstandard expressions to standard expressions, implement the logic expressions using only NAND gates or only NOR gates. [1-5 weeks]

Part D - Design combinational logic circuits

- Arithmetic logic circuits: half-adder and full-adder logic circuits, half-subtractor and full-subtractor logic circuits. [1-2 weeks]
- Code converters logic circuits: binary to gray code converter circuit and vice versa, Binary-to-BCD Code circuit, BCD to Excess-3 code converter circuit and vice versa. [1-2 weeks]
- Comparators logic circuits: 1-bit & 2-bit comparators logic circuits. [1 week]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

- Interactive lecturing style, with opportunities for questions.
- Encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.
- Interactive simulation for the logic circuits.
- Make tutorial questions for formative feedback.
- Assessments related to students' answers are delivered with scientific comments.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.5
Total SWL (h/sem)	175		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4 and 10	L #2, #3 and #9, #8
	Assignments	2	10% (10)	7 and 15	L #6, #7 and #13, #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	12	LO #5, #10 and #12
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 - Number Systems: binary, decimal, octal, and hexadecimal numbers.
Week 2	Convert a decimal number to any radix number.
Week 3	Convert a binary number to an octal or hexadecimal number and vice versa, and convert an octal number to a hexadecimal number and vice versa.
Week 4	Perform arithmetic operations on binary numbers, and convert a binary number to its 1's complement, and 2's complement.
Week 5	Identify the logic gates, write the logic expression, and produce the truth table.

Week 6	Analyze a combinational logic circuit, draw a logic diagram, and theorems of Boolean algebra.
Week 7	DE Morgan's theorem, standard SOP expression, and standard POS expression.
Week 8	Mid-term Exam + Construct a Karnaugh map for two, three, and four variables, use a Karnaugh map to minimize POS & SOP expressions.
Week 9	Convert nonstandard expressions to standard expressions, and Use the Karnaugh map to convert between POS and SOP.
Week 10	Use NAND gates to create other logic gates, Use NOR gates to create other logic gates, and implement the logic functions using only NAND gates or only NOR gates.
Week 11	Design half-adder & full-adder logic circuits, and use full-adders to implement a parallel binary adder.
Week 12	Design the half- subtractor & full-subtractor logic circuits, and use full-subtractors to implement a parallel binary subtractor.
Week 13	Explain the concept of code converters, and describe gray code, BCD, and excess-3 code.
Week 14	Design combinational logic circuits that convert from one coding method to another.
Week 15	Design 1-bit, and 2-bit comparators using logic gates, and use the 74HC85 comparator to compare the magnitudes of two 4-bit numbers.
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Explain the function of a logic gates (AND, OR, NOT, AND, NOR, XOR , and XNOR) using the logical board.
Week 2	Lab 2: Implement the logic gates (AND, OR, & NOT) using diodes, transistors, and resistors.

Week 3	Lab 3: Verify the truth table of logic gates (AND, OR, NOT, NAND, NOR, XOR, &XNOR) by using integrated circuits IC (7408, 7432, 7404, 7400, 7402, & 7486).
Week 4	Lab 4: Boolean's algebraic
Week 5	Lab 5: DE Morgan's theorem.
Week 6	Lab 6: Implement logic gates (AND, OR, NOT, NAND, NOR, XOR & XNOR) using NAND gates only.
Week 7	Lab 7: Implement logic gates (AND, OR, NOT, NAND, NOR, XOR & XNOR) using NOR gates only.
Week 8	Lab 8: Design the half-adder circuit using logic gates.
Week 9	Lab 9: Design the full-adder circuit using logic gates.
Week 10	Lab 10: Design the half-subtractor circuit using logic gates.
Week 11	Lab 11: Design the full-subtractor circuit using logic gates.
Week 12	Lab 12: Design the full subtractor circuit using logic gates.
Week 13	Lab 13: Implement a binary to gray code converter circuit using logic gates.
Week 14	Lab 14: Implement the BCD to Excess-3 code converter circuit using logic gates.
Week 15	Lab 15: Design (1-bit) comparator circuit using logic gates.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. G. K. Kharate, "Digital Electronics" Oxford university press, 7th edition, ISBN 13: 978-0-19-806183-0, 2013.	NO
	2. Thomas L. Floyd, "Digital Fundamentals" Pearson Education, 11 th edition, ISBN 10: 1-292-07598-8, 2015.	Yes
	3. T. Ndjountche "Digital Electronics 1", John Wiley & Sons, 1 st edition, ISBN 978-1-84821-984-7, 2016.	Yes

	4. N. S. Widmer, G. L. Moss, R. J. Tocci, "Digital Systems", Pearson Education Limited e, 12th edition, ISBN 978-0-134-22013-0, 2017.	Yes
	5. Shuqin Lou, Chunling Yang, "Digital Electronic Circuits" Science Press, 4th edition, ISBN 978-3-11-061466-4, 2019.	NO
Recommended Texts	1. A.P. Godse and D.A. Godse, "Digital Logic Circuits" Technical Publications Pune, 4th edition, ISBN: 9788184316506, 2009.	NO
	2. R. S. Sedha, "A TEXTBOOK OF DIGITAL ELECTRONICS" S. Chand & Company ltd, ISBN: 81-219-2378-6, 2010.	Yes
	3. D. P. leach and a. p. malvino, "digital principles and applications", tata mcgraw hill education, 7th edition, ISBN: 978-0-07-014170-4, 2011.	Yes
	4. D. P. Kothari, and J. S. Dhillon "digital circuits and design" Pearson education, ISBN 978-93-325-4353-9, 2015.	No
	5. S. Salivahanan and S. Arivazhagan, "DIGITAL CIRCUITS AND DESIGN" Oxford university press, 5th edition, ISBN-13 : 978-0199488681, 2018.	NO
Websites	https://www.allaboutcircuits.com/textbook/digital/	

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 DESCRIPTOR FORM

نموذج وصف المادة الدراسية

الدوائر الالكترونية

Module Information			
معلومات المادة الدراسية			
Module Title	Electronic Circuits		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11212		
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	UGI	Semester of Delivery	
Administering Department		College	NETC
Module Leader	Thenaa Hassan Yousaf	e-mail	thanaa.yousif.chm@atu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims</p> <p>أهداف المادة الدراسية</p>	<p>The student learns about the basic construction and operation of a bipolar transistor. And be able to apply appropriate biasing to secure operation in the active area.</p> <ol style="list-style-type: none"> 1. Identify the characteristics of a BJT (NPN or PNP) and their response. 2. Student will be able to determine DC and AC load line. <p>of important BJT configurations.</p> <ol style="list-style-type: none"> 3. Understand the BJT transistor configuration. 4. The student will also be familiar with the saturation and cut-off conditions of the BJT. 5. Define the application of BJT transistor. 6. Identify FET, JFETs and MOSFET transistors, construction and characteristics 7. Learns about the basic construction and operation of a multistage amplifiers.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Enable to know the concepts of BJT and FET transistors, know about the BJT and FET transistors configurations. 2. Enabling student to design of BJT circuits. 3. Understand the basic operation of transistor and applications 4. Enabling student to test the transistor 5. Enabling student to know the Design of multistage amplifiers.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <p>Introduction to aviation electronics and its role in aircraft systems.</p> <ol style="list-style-type: none"> 1. Basic BJT principles, operation and configurations.

	<ol style="list-style-type: none"> 2. Basic FET principles, operation and configurations. 3. Basic MOSFET principles, operation and configurations. 4. Multistage amplifiers
Strategies	<p>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 showing the students how the construction members exposed to external loads .This can be done by films or videos or by the ready structural software.</p>

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	93/15 = 6.2
Unstructured SWL (hr/sem) (USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	82/15 = 5.5
Total SWL (hr/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, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Material Covered	
Week	Syllabus
Week 1&2	Bipolar junction transistor, BJT operation, transistor configurations; common base configuration common emitter configuration, and common collector configuration, DC load line, Limits of operation.
Week 3	Analysis of Fixed bias configuration, voltage divider bias configuration.
Week 4	Collector feedback configuration; saturation level and load line analysis, emitter follower configuration, Design operation.
Week 5	Transistor switching networks, Multiple BJT networks, bias stabilization.
Week 6&7	BJT AC analysis, amplification in AC domain, BJT modeling, the "r _e " transistor model, determine the current and voltage gain, two-port system approach, The Hybrid Equivalent Model, cascade system, frequency response of BJT amplifiers.
Week	Field effect transistors, FET types, FET fixed bias configuration, self-bias configuration, voltage divider configuration, common-gate configuration. FET amplifiers.

8-10	junction FETs, construction and characteristics of JFETs, transfer characteristics, specification sheets (JFETs).
Week 11&12	MOSFETs, depletion type MOSFET, enhancement type MOSFET, MOSFET Handling. E-MOSFET drain feedback configuration, E-MOSFET voltage divider configuration, Designing FET amplifier networks
Week 13-15	BJT and JFET frequency response, Logarithms, decibel, general frequency consideration, normalization process, low frequency analysis, low frequency response-BJT amplifier with RL, impact Rs on the BJT low frequency response, low-frequency response FET amplifier, Miller effect capacitance, high-frequency response -BJT amplifier, high frequency response- FET amplifier, multistage frequency effect.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to the lab tools which uses in the experiments
Week 2	Lab 2: BJT Transistor Characteristics.
Week 3	Lab 3: Transistor CE Characteristics.
Week 4	Lab 4: Transistor CB Characteristics.
Week 5	Lab 5: Transistor CC Characteristics.
Week 6	Lab 6: Transistor as switch
Week 7	Lab 7: Frequency response of common emitter amplifier.
Week 8	Lab 8: Frequency response of common base amplifier.
Week 9	Mid Term exam.
Week 10	Lab 10: FET Transistor Characteristics.

Week 11	Lab 11: FET common Source Characteristics.
Week 12	Lab 12: FET common drain Characteristics.
Week 13	Lab 13: MOSFET Transistor Characteristics.
Week 14	Lab 14: Multistage amplifiers.
Week 15	Lab 15: Multistage amplifiers.
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electronic devices electronic flow version by Thomas L. Floyd	yes
Recommended Texts	Electronic Devices And Circuit Theory by R. Boylston.	yes
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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 DESCRIPTOR FORM

نموذج وصف المادة الدراسية

الورش الهندسية

Module Information

معلومات المادة الدراسية

Module Title	Engineering Workshops		Module Delivery	
Module Type	Basic		<input type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11213			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	UGI	Semester of Delivery		
Administering Department		College	NETC	
Module Leader	Liath Wajeh		e-mail	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. Develop practical skills in electronics workshop operations, focusing on safety measures and proficiency in using measuring devices and tools. 2. Acquire knowledge and techniques related to welding, soldering, and handling electronic components on printed boards. 3. Gain familiarity with various electronic components, circuits, and their behaviors through hands-on manufacturing and experimentation. 4. Understand the principles of parallel and series circuits involving resistors and capacitors, and apply them in practical scenarios. 5. Enhance the ability to read and interpret electronic boards, and design
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	and assemble electronic circuits on printed boards.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Demonstrate a thorough understanding of the fundamental concepts and principles of electronics, including measuring devices, soldering techniques, and electronic components. 2. Apply knowledge and skills in conducting welding and soldering operations with precision and adherence to safety guidelines in an electronics workshop. 3. Construct and analyze various electronic circuits, including resistive, capacitive, and semiconductor circuits, using appropriate tools and materials. 4. Evaluate and troubleshoot electronic circuits, identify faults, and apply effective problem-solving techniques to rectify issues. 5. Develop proficiency in reading and interpreting electronic boards, designing and assembling circuits, and effectively communicating ideas and findings related to electronics.
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none"> 1. Electronic Workshop: Acquire practical skills in electronics, including the use of measuring devices, soldering techniques, and working with electronic components. 2. Mechanical Workshop: Develop hands-on knowledge and skills in mechanical engineering, including working with different tools, understanding mechanical systems, and performing various mechanical operations.
Strategies	<p>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 showing the students how the construction members exposed to external loads. This can be done by films or videos or by the ready structural software.</p>

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	48/15 = 3.2
Unstructured SWL (hr/sem)(USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	27/15 = 1.8
Total SWL (hr/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, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي المختبري

	Material Covered
Week	Syllabus
1-7	<ul style="list-style-type: none"> Occupational Safety, Foundry Workshop, Files type Workshop, Carpentry Workshop, Turnery workshop, Welding types Workshop
8	<ul style="list-style-type: none"> Learn how to use different measuring devices in the workshop, Learn how to use caustic, types of caustic, welding by using caustic
9	<ul style="list-style-type: none"> Types of welding, Auxiliary materials for welding, wires welding between them and with other components. Sucker solder and Solder removal, Training to remove some of the electronic components of the printed board
10	<ul style="list-style-type: none"> Learn different types of printing board through printing method, drilling operation, Install the various components.
11	<ul style="list-style-type: none"> Different types of electronics components through manufacturing for example the resistance and its power, measure the value of resistance in different methods, rheostat, Parallel resistance circuit - series resistance circuit - parallel and series resistance circuits - and check it.
12-13	<ul style="list-style-type: none"> Types of capacitance 14-15 Parallel capacitance circuit - series capacitance circuit - parallel and series capacitance, circuit - check it on the board, Switch types, Fuses types, Inductor types, Transformer types
14-15	<ul style="list-style-type: none"> Learn how to read electronic board, Students learn to design electronic board on the printed board, install the component on the board, and welding the components on the board.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electronics Workshop Companion by Stan Gibilisco	no
Recommended Texts	Electronic Principles Eighth Edition by Albert Malvino David Bates. Make: Electronics Second Edition by Charles Platt.	
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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

تصميم دوائر الالكترونية

Module Information		
معلومات المادة الدراسية		
Module Title	Electronic Circuits Design	Module Delivery

Module Type	C	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11301		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGII	Semester of Delivery	1
Administering Department		College	NETC
Module Leader	Ahmed Adnan Wahhab	e-mail	ahmedadnan@atu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	none	Semester	
Co-requisites module	none	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	25. The student learns about the basic construction and operation of a power electronic. 26. Identify and be able to explain the characteristics all types of rectifier circuits. 27. Being able to identify Chopper circuits. 28. Able to design inverter circuits 29. Able to design Voltage controller
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowing the concepts of power electronic. 2. Knowing about the Thyristor principle and application 3. Enabling to design inverter and chopper circuits
Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none"> - Power electronics - Thyristor principle and application - Controlled rectifier - Inverter - Choppers

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	78	Structured SWL (h/w)	7
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الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	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	Power electronics systems: Power semiconductor diode : basic structure of power diode, I-V characteristics of power diode.

Week 2	power diode types (general purpose, fast switching and schottky diodes), effect of forward and reverse recovery time of diode, diodes and rectifier circuit (half wave and full wave).
Week 3	Power transistor: bipolar junction transistor
Week 4-5	Power MOSFET, insulated Gate BJT, IGBT structure
Week 6	Thyristor principle and application: basic structure of thyristor, I-V characteristics, two transistor model of thyristor
Week 7	turn-ON and turn-OFF characteristics, thyristor gate characteristics
Week 8	thyristor protection circuit, di/dt protection circuit, dv/dt protection circuit
Week 9	thyristor commutation circuit, series and parallel connection of thyristor, thyristor types
Week 10	controlled rectifier: single phase half wave rectifier (R, RL) load, freewheeling diode single phase full wave rectifier (RL)
Week 11&12	inverter : classification of inverter , single phase half wave inverter, single phase full bridge wave inverter
Week 13	Voltage controller: introduction to voltage controller, principle of ON-OFF control
Week 14&15	Choppers: introduction to chopper, basic classification of chopper, basic operation.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to the lab tools which uses in the experiments.
Week 2 -3	Thyristor operation, Thyristor protection
Week 4&6	Thyristor applications

Week 7	Midterm exam
Week 8-9	controlled rectifier
Week 10 -12	Single phase inverter
Week 13 & 14	Chopper
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Power electronics devices, circuits, and applications by Muhammad H. Rashid	No
Recommended Texts	electronic-devices-9th-edition-by-floyd	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	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

إشارات وانظمة

Module Information				
معلومات المادة الدراسية				
Module Title	Signal and System		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11302			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGII	Semester of Delivery		1
Administering Department		College	NETC	
Module Leader	Ahmad H. Hadi		e-mail	Coj.Ahmadhadi@atu.edu.iq
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq

Scientific Committee Approval Date	1/10/2024	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. Define the basics of signals in real-life. 2. Determine the circuit response to a periodic signal using the Fourier Series. Model linear time-invariant systems using convolution. 3. Describe how composite signals are used to determine the response of linear systems) 4. To understand the power and energy of signals. 5. Demonstrate what happens in the frequency domain when a continuous signal is sampled. 6. Design an anti-alias filter for a sampled data system. 7. Utilize the z-Transform to describe a discrete-time signal. 8. Understanding the representation signals using (Time/Frequency) domains
Module Learning Outcomes	<ol style="list-style-type: none"> 47. Understand the main signal and recognize different types of signals and systems. 48. Have the ability to Understand Signals operations.

مخرجات التعلم للمادة الدراسية	<p>49. Understanding the convolution and correlation operations.</p> <p>50. Have the ability to design Filters.</p> <p>51. Have the ability to representation of the signals in time/frequency- domains.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>1. Signals and Systems. (6 hrs).</p> <p>2. Fourier Series and Fourier Transform (6 hrs).</p> <p>2. Filters (3 hrs).</p> <p>3. Convolution and Correlation (6 hrs).</p> <p>4. Noise (9 hrs).</p> <p>6. Sampling (9 hrs).</p> <p>7. Transmission lines (6 hrs).</p>

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.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	78	Structured SWL (h/w)	78/15=
الحمل الدراسي المنتظم للطلاب خلال الفصل		الحمل الدراسي المنتظم للطلاب أسبوعيا	5.2
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	72/15=

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem)	150		
الحمل الدراسي الكلي للطالب خلال الفصل			

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 1-5	Signals and Systems, spectrum, and filters; Singularity functions; periodic signals and Fourier series; nonperiodic signals and Fourier transform. convolution and impulses system response and filters; correlation and spectral density; Parseval's theorem for energy signals

Week 6-8	Noise: Band-limited white noise; thermal noise; noise figure.
Week 9	Mid-term Exam
Week 10-12	Sampling: sampling theory and practice, aliasing.
Week 13-15	Transmission lines: characteristic impedance, reflection coefficient and standing waves
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introducing laboratory equipment and their operation.
Week 2-3	Low pass filter and high pass filter (passive)
Week 4&5	Signals operations using RLC circuits and responses
Week 6&7	band pass filter and band reject filter
Week 8-9	Filter design: First order and second order filter design
Week 10	Midterm exam
Week 11-12	Oscillator's operation, Hartley oscillator, voltage control oscillator
Week 13	Signal analysis using oscilloscope
Week 14	sampling of signals circuits
Week 15	Aliasing proofing

Week 16	Final exam
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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	"Introduction to Communication Systems" By F. G. Strelmer	No
Recommended Texts	Sanjay Sharma: "Communication Systems (Analog and Digital) T. R. Ganesh Babu, and G. Srinivasan: " Communication Theory and systems", 2006	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

مجالات كهرومغناطيسية ثابتة

Module Information				
معلومات المادة الدراسية				
Module Title	Electromagnetic Static Fields		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11303			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGII	Semester of Delivery		1
Administering Department		College	NETC	
Module Leader	Ghufran Mahdi Hatem		e-mail	Coj.ghf@atu.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	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	none	Semester	
Co-requisites module	none	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>30. To provide a comprehensive understanding of the fundamental concepts and principles of electromagnetic fields.</p> <p>31. To develop the ability to analyze and solve problems related to electromagnetic fields.</p> <p>32. To enhance critical thinking skills in applying electromagnetic field theory to practical engineering applications.</p> <p>33. To foster an appreciation for the importance of electromagnetic fields in various disciplines of engineering and science.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>1. Explain the basic concepts and principles of electromagnetic fields.</p> <p>2. Analyze and solve problems related to static and dynamic electric and magnetic fields.</p> <p>3. Apply electromagnetic field theory to practical engineering applications.</p> <p>4. Demonstrate an understanding of the interactions between electric and magnetic fields.</p> <p>5. Evaluate and analyze electromagnetic wave propagation and transmission.</p>

	6. Apply mathematical techniques, including vector calculus, in the analysis of electromagnetic fields.
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following.</p> <ol style="list-style-type: none"> 1. Introduction to Electromagnetic Fields <ol style="list-style-type: none"> a. Review of vector calculus and coordinate systems and transformation Between Coordinates and Dell operator b. Electric charge and Coulomb's law c. Electric field intensity and electric flux d. Gauss's law and its applications 2. Electric Fields in Materials <ol style="list-style-type: none"> a. Electric potential and voltage b. Conductors, insulators, and dielectrics c. Capacitance and capacitance calculations d. Poisson's and Laplace's equations

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem)	52	Unstructured SWL (h/w)	3.5

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	100		
الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (15)	5 and 10	LO #1.....#16
	Assignments	2	15% (15)	2 and 12	LO #3, #4 and #6, #7
	Homework	0	0%	-----	-----
	Report	2	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 Electromagnetic Fields

Week 2	Vector definition- Scalars And Vectors and Vector Algebra
Week 3	The Cartesian Coordinate System - Vector Component And Unit Vectors - The Vector Field - Dot Product - Cross Product
Week 4	Cylindrical Coordinate - Spherical Coordinate
Week 5	Transformation Between Coordinates
Week 6	Del Operator - Laplacian Operator - Gradient - Divergence and Curl
Week 7	Coulomb law -Electric force
Week 8	Coulomb law - Electric field intensity - Field due to continuous volume charge - Field of line charge - Field of sheet charge
Week 9	Mid-term Exam
Week 10	Electric Flux Density
Week 11	Gauss Law - Application of Gauss Law - Maxwell First Equation.
Week 12	Energy and Potentials in A Moving Point Charge in An Electric Field
Week 13	Dielectric and Capacitance - Current and Current Density - Continuity of Current - Metallic Conductor
Week 14	Boundary Conditions - Image Theory -Semiconductor - Dielectric Materials – Capacitance
Week 15	Poisson's and Laplace's equations
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	W.H. Hayt, and J.A. Buck, "Engineering Electromagnetics", McGraw-Hill, 2007.	Yes

Recommended Texts	1) David K. Cheng, "Fundamentals of Engineering Electromagnetics", Prentice Hall, 1993. 2) Matthew N.O. Sadiku, "Elements of Electromagnetics", 4th ed. Oxford, 2006.	Yes
Websites	https://empossible.net/academics/emp3302/	

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

نمذجة الأنظمة رياضيا

Module Information

معلومات المادة الدراسية

Module Title	Mathematical Modeling Systems		Module Delivery	
Module Type	Basic		<input checked="" type="checkbox"/> Theory	
Module Code	ATU11304		<input type="checkbox"/> Lecture	
ECTS Credits	5		<input type="checkbox"/> Lab	
SWL (hr/sem)	125		<input checked="" type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGII	Semester of Delivery	1	
Administering Department		College	NETC	
Module Leader	Asaad. S. Daghah		e-mail	ad466kent@atu.edu.iq
Module Leader's Acad. Title	Assist. Prof.		Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1- To understand functions of multiple variables, limits, continuity, and partial derivatives. 2- To apply the chain rule, directional derivatives, and gradients. 3- To determine tangent planes, normal vectors, and extrema of functions in two variables. 4- To work with polar, cylindrical, and spherical coordinates. 5- To understand vectors in 3D space, including dot and cross products. 6- To evaluate double and triple integrals over various regions. 7- To apply convergence tests to infinite series. 8- To approximate functions with Maclaurin and Taylor polynomials. 9- To explore power series and their applications.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1- Understanding functions of multiple variables 2- Computing partial derivatives 3- Applying the chain rule in multivariable calculus 4- Calculating directional derivatives and gradients of functions 5- Determining tangent planes and normal vectors to surfaces 6- Finding maxima and minima of functions of two variables 7- Working with polar coordinates and graphing polar equations 8- Calculating areas and lengths in polar coordinates 9- Understanding conic sections and their representation in polar coordinates 10- Working in three-dimensional space 11- Understanding vectors, dot product, cross product, and their applications 12- Describing lines and planes using parametric equations 13- Understanding quadric surfaces and working with cylindrical and spherical coordinates 14- Evaluating double integrals over various regions 15- Calculating surface area and working with parametric surfaces 16- Computing triple integrals in different coordinate systems 17- Applying change of variables and understanding Jacobians in multiple integrals 18- Understanding sequences and series 19- Applying convergence tests and analyzing convergence properties 20- Approximating functions using Maclaurin and Taylor polynomials 21- Understanding power series and their convergence properties 22- Modeling with the Taylor series for various applications
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <ol style="list-style-type: none"> 1- Multivariable Calculus: (25 h) <ul style="list-style-type: none"> • Functions of Two or More Variables • Limits and Continuity • Partial Derivatives • Directional Derivatives and Gradients • Tangent Planes and Normal Vectors 2- Optimization and Extrema: (9 h) <ul style="list-style-type: none"> • Maxima and Minima of Functions of Two Variables • Lagrange Multipliers 3- Coordinate Systems and Vectors: (25 h) <ul style="list-style-type: none"> • Polar Coordinates • Cylindrical and Spherical Coordinates • Matrices and Determinants

	<ul style="list-style-type: none"> • Vectors in Three-Dimensional Space • Dot Product and Cross Product <p>4- Multiple Integrals: (25 h)</p> <ul style="list-style-type: none"> • Double Integrals • Triple Integrals • Change of Variables in Multiple Integrals • Surface Area and Volume Calculations <p>5- Infinite Series and Sequences: (25 h)</p> <ul style="list-style-type: none"> • Convergence and Divergence • Taylor and Maclaurin Series • Power Series • Applications of Taylor Series
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Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	<p>Use the following Learning, Teaching, and Assessment strategies</p> <p>Learning Strategies:</p> <ul style="list-style-type: none"> • Encourage students to actively engage with the material through problem-solving, discussions, and group activities. • Use visual aids like graphs, diagrams, and interactive simulations to help students grasp complex concepts in multivariable calculus and vector calculus. • Connect calculus concepts to real-world scenarios to demonstrate their practical relevance and enhance understanding. • Conduct engaging lectures that involve student participation, discussions, and demonstrations to keep students actively involved. • Incorporate hands-on activities, such as working with software tools for graphing or numerical calculations, to reinforce learning. • Assign challenging problems that require critical thinking and problem-solving skills, promoting a deeper understanding of the material. • Use formative assessments like quizzes, homework assignments, and in-class exercises to provide feedback and monitor student progress. • Present case studies or application problems that require students to apply calculus concepts to analyze and solve real-world problems. • Incorporate peer evaluation in group activities or projects to promote collaboration and peer learning. <p>By incorporating these strategies into the learning and teaching process, students can develop a solid understanding of advanced calculus topics and enhance their problem-solving skills in multivariable calculus, vector calculus, and series expansions.</p>
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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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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
	Homework	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	Functions of Two or More Variables, Limits and Continuity, Partial Derivatives
Week 2	The Chain Rule, Directional Derivatives and Gradients.
Week 3	Tangent Planes and Normal Vectors, Maxima and Minima of Functions of Two Variables, Lagrange Multipliers.
Week 4	Polar Coordinates, Graphing Polar Coordinate Equations, Areas and Lengths in Polar Coordinates
Week 5	Conic Sections, Conics in Polar Coordinates
Week 6	THREE-DIMENSIONAL SPACE; VECTORS: Rectangular Coordinates in 3-Space
Week 7	Spheres; Cylindrical Surfaces, Vectors, The Dot Product, The Cross Product
Week 8	Parametric Equations of Lines, Planes in 3-Space, Quadric Surfaces, Cylindrical and Spherical Coordinates
Week 9	MULTIPLE INTEGRALS: Double Integrals, Double Integrals over Nonrectangular Regions,
Week 10	Double Integrals in Polar Coordinates, Surface Area; Parametric Surfaces
Week 11	Triple Integrals, Triple Integrals in Cylindrical and Spherical Coordinates, Change of Variables in Multiple Integrals; Jacobians
Week 12	INFINITE SERIES: Sequences, Monotone Sequences, Infinite Series, Convergence Tests
Week 13	The Comparison, Ratio, and Root Tests, Alternating Series; Absolute and Conditional Convergence
Week 14	Maclaurin and Taylor Polynomials, Maclaurin and Taylor Series; Power Series
Week 15	Convergence of Taylor Series, Differentiating and Integrating Power Series; Modeling with Taylor Series
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus 14 th edition	Yes
Recommended Texts	Calculus 10 th edition by Anton , Bivens , and Davis	Yes
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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.

نموذج وصف المادة الدراسية

تصميم دوائر رقمية

Module Information				
معلومات المادة الدراسية				
Module Title	Digital Circuits Design		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11305			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGII	Semester of Delivery		1
Administering Department		College	NETC	
Module Leader	Huda Hussein Abed		e-mail	eng.huda2020@atu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer		Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024		Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>34. Explain the concepts of sequential logic circuits.</p> <p>35. Describe the difference between NAND and NOR latch.</p> <p>36. Explain the operation of S-R, D, J-K, and T flip-flops.</p> <p>37. Create the excitation table and characteristic equation for the flip-flops.</p> <p>38. Design asynchronous counters and draw the timing diagram for them.</p> <p>39. Define the modulus number for the counter.</p> <p>40. Design synchronous counters and draw the timing diagram for them.</p> <p>41. Explain the concepts of the shift register.</p> <p>42. Implement the logic circuits of the multiplexer, demultiplexer, encoder, and decoder using logic gates.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>52. Describe the difference between combinational logic circuits and sequential logic circuits.</p> <p>53. Explain the operation of the S-R latch.</p> <p>54. Identify the difference between a positive and a negative edge-triggered flip-flop.</p> <p>55. Describe the outputs of a given flip-flop.</p> <p>56. Explain the difference between asynchronous and synchronous counters.</p> <p>57. Draw the timing diagram for the counters.</p> <p>58. Design various types of counters according to the given requirement.</p> <p>59. Write the modulus of the given counter and the entire count sequence.</p> <p>60. Define the concept for cascading counters.</p> <p>61. Explain the operation of a multiplexer and a demultiplexer.</p>

	62. Explain the operation of an encoder and a decoder.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A – Concept of sequential logic circuits and flip-flops</u></p> <p>Define the sequential logic circuits, explain the operation of the S-R latch, determine the Q waveform for the NOR and NAND latch, define the flip-flop, explain the S-R, D, J-K, and T flip-flops, determine the Q output waveforms of the S-R, D, J-K, and T flip-flops, create the excitation table and characteristic equation for the flip-flops. [1-4 w]</p> <p><u>Part B – Counters</u></p> <p>Explain the operation of an asynchronous counter, design an asynchronous counter using J-K, D, and T flip-flops, draw the timing diagram for an asynchronous counter., define the modulus number for the counter, explain propagation delays in ripple counters, find the count sequence for the asynchronous counter with a truncated sequence, design of synchronous counters using J-K, T, and D flip-flops, analysis of synchronous counter to find the complete count sequence, create the timing diagram for the synchronous counter, describe the concept of cascading the counters, and explain the operation of a Johnson and Ring counters. [1-7 weeks]</p> <p><u>Part C – Shift Registers</u></p> <p>Describe the operation of four types of shift registers (SISO, SIPO, PISO, and PIPO), explain how data bits are entered into a shift register, and explain how data bits are taken out of a shift register. [1 week]</p> <p><u>Part D – Analysis and Design combinational logic circuits</u></p> <p>Implement 2:1, 4:1, and 8:1 multiplexers using logic gates, design higher order multiplexers using lower order multiplexers, implement logic functions using multiplexers, implement 1:2, 1:4, and 1:8 demultiplexers using logic gates, design higher order demultiplexers using lower order demultiplexers, describe the decimal-to-BCD encoder and the octal-to-binary encoder, explain the purpose of the priority feature in the binary encoders, describe the BCD-to-decimal decoder and the binary-to-octal decoder, and implement 2-to-4-line decoder with active low enable input using logic gates. [1-3 weeks]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ul style="list-style-type: none"> • Interactive lecturing style, with opportunities for questions. • Encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. • Interactive simulation for the logic circuits. • Make tutorial questions for formative feedback. • Assessments related to students' answers are delivered with scientific comments.
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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	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
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 11	L #2, #3 and #8, #9
	Assignments	2	10% (10)	7 and 14	L #6, #7 and #13, #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #10 and #12
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 - Define the sequential logic circuits, and explain the operation of the S-R latch.
Week 2	Define the flip-flop, explain the operation of the S-R & D flip-flops, and determine the Q output waveforms of the S-R & D flip-flops.
Week 3	Explain the operation of J-K & T flip-flops, determine the Q output waveforms of the J-K & T flip-flops, and distinguish between synchronous and asynchronous inputs of the flip-flop.
Week 4	Create the excitation table of flip-flops, and derive the characteristic equation of the flip-flops.
Week 5	Design an asynchronous up binary counter using J-K flip-flops, design an asynchronous down binary counter using J-K flip-flops, and draw the timing diagram for an asynchronous counter.
Week 6	Describe the operation of an asynchronous up/down counter, define the modulus number for the counter, design a mod-10 asynchronous counter, and explain propagation delays in ripple counters.
Week 7	Design an asynchronous counter using D & T flip-flops, find the count sequence for the asynchronous counter with a truncated sequence, and explain the concept of frequency division.
Week 8	Mid-term Exam + Design of synchronous counters using J-K, T, and D flip-flops.

Week 9	Analysis of the synchronous counter to find the complete count sequence, create the timing diagram for the synchronous counter, and design a synchronous Up/Down counter.
Week 10	Design a synchronous decade counter, design a synchronous counter with the irregular count sequences, and describe the concept of cascading the counters.
Week 11	Explain the operation of a Johnson counter, draw the timing diagram for a Johnson counter, explain the operation of a ring counter, and draw the timing diagram for a Ring counter.
Week 12	Describe the operation of four types of shift registers (SISO, SIPO, PISO, and PIPO), explain how data bits are entered into a shift register, and explain how data bits are taken out of a shift register.
Week 13	Explain the basic operation of a multiplexer, implement 2:1, 4:1, and 8:1 multiplexers using logic gates, and design higher order multiplexers using lower order multiplexers.
Week 14	Implement logic functions using multiplexers, explain the basic operation of a demultiplexer, implement 1:2, 1:4, and 1:8 demultiplexers using logic gates, and design higher order demultiplexers using lower order demultiplexers.
Week 15	Describe the decimal-to-BCD encoder and the octal-to-binary encoder, explain the purpose of the priority feature in the binary encoders, describe the BCD-to-decimal decoder and the binary-to-octal decoder, and implement a 2-to-4-line decoder with active low enable input using logic gates.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Implement the S-R latch using NOR gates & NAND gates.
Week 2	Lab 2: Construct S-R, and D flip-flops using logic gates.
Week 3	Lab 3: Construct J-K, and T flip-flops using logic gates.
Week 4	Lab 4: illustrate the effect of asynchronous inputs on the output of the J-K & D flip-flops

Week 5	Lab 5: Design an asynchronous up binary counter using J-K flip-flops.
Week 6	Lab 6: Design an asynchronous down binary counter using J-K flip-flops.
Week 7	Lab 7: Design a 4-bit synchronous counter using J-K flip-flops.
Week 8	Lab 8: Design a synchronous decade counter using J-K flip-flops.
Week 9	Lab 9: Design a Mod-8 Johnson counter using J-K flip-flops.
Week 10	Lab 10: Design a Mod-4 Ring counter using J-K flip-flops.
Week 11	Lab 11: Implement SISO shift register using J-K flip-flops.
Week 12	Lab 12: Implement a 4:1 multiplexer using logic gates.
Week 13	Lab 13: Implement a 1:4 demultiplexer using logic gates.
Week 14	Lab 14: Design a 4 to 2 encoder using logic gates.
Week 15	Lab 15: Design a 2-to-4-line decoder using logic gates.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. G. K. Kharate, "Digital Electronics" Oxford university press, 7th edition, ISBN 13: 978-0-19-806183-0, 2013.	NO
	2. Thomas L. Floyd, "Digital Fundamentals" Pearson Education, 11 th edition, ISBN 10: 1-292-07598-8, 2015.	Yes
	3. T. Ndjountche "Digital Electronics 1", John Wiley & Sons, 1 st edition, ISBN 978-1-84821-984-7, 2016.	Yes

	4. N. S. Widmer, G. L. Moss, R. J. Tocci, "Digital Systems Principles and Applications", Pearson Education Limited e, 12th edition, ISBN 978-0-134-22013-0, 2017.	Yes
	5. Shuqin Lou, Chunling Yang, "Digital Electronic Circuits" Science Press, 4th edition, ISBN 978-3-11-061466-4, 2019.	NO
Recommended Texts	1. A. SAHA, and N. MANNA, "Digital Principles and Logic Design" Infinity science press LLC, ISBN: 978-1-934015-03-2, 2007.	Yes
	2. M. M. Mano, and M. D. Ciletti "Digital Design" Pearson Education , 5th edition , ISBN-13: 978-0-13-277420-8, 2013..	Yes
	3. M. Rafiquzzaman, "Fundamentals of Digital Logic and Microcontrollers" John Wiley & Sons, Inc., 6th edition, ISBN 978-1-118-85579-9, 2014.	Yes
	4. D. P. Kothari, and J. S. Dhillon "digital circuits and design" Pearson education, ISBN 978-93-325-4353-9, 2015.	No
	5. Ata Elahi, "Computer Systems", Springer, ISBN 978-3-319-66774-4, 2018.	NO
Websites	https://www.allaboutcircuits.com/textbook/digital/	
	https://www.circuit-diagram.org/editor/	
	https://circuitverse.org/simulator	

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

لغة البرمجة فجووال بيسك

Module Information			
معلومات المادة الدراسية			
Module Title	Visual basics		Module Delivery
Module Type	basic		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11306		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGII	Semester of Delivery	
Administering Department		College	NETC
Module Leader	Alia abduhussien Lafta	e-mail	Coj.alia@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	43. Explain the concepts of visual basic . 44. Describe the difference between loop and jumping instruction. 45. Explain the operation of all loop instruction.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	63. Have will be able to be completed a basic computer literacy course (e.g., CIS100, BIT1150, INFS1010) or receive permission of instructor 64. Be self-motivated 65. Be computer savvy and feel VERY comfortable getting around on the computer 66. Have the ability to troubleshoot their own computer problems 67. Any computer programming experience is helpful but not necessary.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Concept of visual basics</u> Course Introduction • The Visual Basic Interface

	<ul style="list-style-type: none"> • Variables, Constants and Calculations • Decision Making • The IDE Debugger <p><u>Part B – visual basics programming</u></p> <p>_Menus, Subprocedures and Functions</p> <ul style="list-style-type: none"> • Creating Object-Oriented Programs • Lists, Looping and Printing • Arrays and Structures <p>-</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ul style="list-style-type: none"> • Interactive lecturing style, with opportunities for questions. • Encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. • Interactive simulation for the logic circuits. • Make tutorial questions for formative feedback. • Assessments related to students' answers are delivered with scientific comments.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	48	Structured SWL (h/w)	3.2
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	27	Unstructured SWL (h/w)	1.8

الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem)	75		
الحمل الدراسي الكلي للطلاب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 11	L #2, #3 and #8, #9
	Assignments	2	10% (10)	7 and 14	L #6, #7 and #13, #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #10 and #12
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	Identify Visual Basic components
Week 2	Identify Visual Basic instructions

Week 3	Understand Object-Oriented Programming
Week 4	Organize application development
Week 5	Design and create forms
Week 6	Build Menus
Week 7	Program using decision statements and loops
Week 8	Mid-term Exam
Week 9	Follow Visual Basic application development steps
Week 10	Code Global, Module, and Form level events, procedures, variables, and constants
Week 11	Identify Visual Basic data handling
Week 12	Use the Debug Tool
Week 13	Develop menu item, Help button, and context sensitive Help
Week 14	Preparing for final exam global review process
Week 15	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	i)Study of VB environment with following details: Textbox, Label, Combo, List
Week 2	i)Study of VB environment with following details: Check box and Option Buttons Form and their Types
Week 3	Design of Forms to perform mathematical operations: Addition,
Week 4	Subtraction,

Week 5	Multiplication
Week 6	Divisions using Text box, Labels, Command buttons
Week 7	Lab 7: exam
Week 8	Design of Forms to perform following operations: Use of Date, Time and Mathematical functions using Text box,
Week 9	Labels, Combo box, Command buttons
Week 10	To find the simple interest
Week 11	To find the greatest numbers among three numbers
Week 12	To find the greatest and smallest among a list of numbers
Week 13	To calculate the sum of N numbers
Week 14	To check whether a given number is even or odd
Week 15	Lab 15: Design a 2-to-4-line decoder using logic gates.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	. Columbia Guide to Online Style by Janice R. Walker and Todd Taylor	yes

Recommended Texts	Columbia Guide to Online Style by Janice R. Walker and Todd Taylor	yes
Websites	https://www.macmillanlearning.com/college/us/online/cite6.html	

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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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

معادلات تفاضلية

Module Information

معلومات المادة الدراسية

Module Title	Differential Equations		Module Delivery	
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11407			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGII	Semester of Delivery		
Administering Department		College	NETC	
Module Leader	Asaad. S. Daghah		e-mail	ad466kent@atu.edu.iq
Module Leader's Acad. Title	Assist. Prof.		Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman		e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. Understanding Transform Theory: <ul style="list-style-type: none"> ○ To provide students with a comprehensive understanding of Fourier series and Fourier transforms, enabling them to analyze and represent both periodic and aperiodic functions in the frequency domain. 2. Application of Fourier Analysis: <ul style="list-style-type: none"> ○ To equip students with the skills to apply Fourier analysis to solve practical problems in signal processing, communications, and other related fields, including the use of convolution in system analysis. 3. Differential Equations Fundamentals: <ul style="list-style-type: none"> ○ To introduce students to the fundamental concepts of ordinary differential equations (ODEs), including first-order and second-order equations, and to develop their ability to classify and solve these equations using appropriate techniques. 4. Analytical Techniques for ODEs: <ul style="list-style-type: none"> ○ To teach students various analytical methods for solving first-order and second-order ordinary differential equations, including separation of variables, integrating factors, and the method of undetermined coefficients. 5. Complex Problem Solving: <ul style="list-style-type: none"> ○ To enhance students' problem-solving abilities by applying complex methods, such as variation of parameters, to find particular solutions of non-homogeneous differential equations. 6. Real-World Applications: <ul style="list-style-type: none"> ○ To emphasize the importance of differential equations in engineering and applied sciences by exploring their applications in modeling real-world phenomena, such as mechanical vibrations and electrical circuits.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>1: Fourier Series</p> <p>Learning Outcome: Students will be able to represent periodic functions using Fourier series and calculate the Fourier coefficients for given functions, identifying even and odd properties.</p> <p>2: Fourier Transform</p>

	<p>Learning Outcome: Students will understand the concept of the Fourier transform and its application to aperiodic functions, including the ability to compute the Fourier transform and its inverse for various functions.</p> <p>3: Properties of Fourier Transforms</p> <p>Learning Outcome: Students will demonstrate knowledge of the key properties of Fourier transforms, including linearity, time and frequency shifting, and the convolution theorem.</p> <p>4: Convolution Theorem and Fourier Integral</p> <p>Learning Outcome: Students will be able to apply the convolution theorem in signal processing and compute Fourier integrals for non-periodic functions, linking them to their Fourier transforms.</p> <p>5: First Order Ordinary Differential Equations</p> <p>Learning Outcome: Students will solve first-order ordinary differential equations using various methods such as separation of variables, exact equations, and integrating factors, differentiating between homogeneous and non-homogeneous cases.</p> <p>6: Second Order Ordinary Differential Equations</p> <p>Learning Outcome: Students will analyze and solve second-order ordinary differential equations, including homogeneous equations with constant coefficients, using methods such as characteristic equations, undetermined coefficients, and variation of parameters. These outcomes provide a structured approach to learning, allowing students to build on their knowledge each week.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<ul style="list-style-type: none"> - Fourier transform - Ordinary differential equation - Bernoulli equation - High order differential equations

<p>Learning and Teaching Strategies</p> <p>استراتيجيات التعلم والتعليم</p>	
Strategies	Use the following Learning, Teaching, and Assessment strategies

Learning Strategies:

1. **Interactive Lectures:**

- Use multimedia presentations and real-world examples to introduce key concepts of Fourier series, Fourier transforms, and differential equations.
- Encourage student participation through questions and discussions to reinforce understanding.

2. **Problem-Based Learning:**

- Assign practical problems that require the application of Fourier analysis and differential equation techniques.
- Facilitate group work where students collaborate to solve complex problems, fostering teamwork and critical thinking.

3. **Hands-On Workshops:**

- Organize workshops where students can use software tools (e.g., MATLAB, Python) to visualize Fourier transforms and solve differential equations.
- Provide guided practice sessions to help students build confidence in applying mathematical methods.

4. **Flipped Classroom:**

- Encourage students to review lecture materials and video tutorials at home, allowing class time to be dedicated to problem-solving and collaborative discussions.
- Provide online resources and forums for students to ask questions and engage with peers outside of class.

5. **Case Studies and Applications:**

- Present case studies that demonstrate the real-world applications of Fourier analysis and differential equations in engineering and science.
- Invite guest speakers from industry to share their experiences and the relevance of these concepts in practical scenarios.

6. **Regular Assessments and Feedback:**

- Implement formative assessments (quizzes, homework) to gauge student understanding and provide timely feedback.
- Use peer review and self-assessment strategies to encourage reflection on learning progress and areas for improvement.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	63	Structured SWL (h/w)	4.2
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	112	Unstructured SWL (h/w)	7.5

الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem)	175		
الحمل الدراسي الكلي للطلاب خلال الفصل			

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
	Homework	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	Transform Theory; Fourier series; periodic function; even and odd functions
Week 2	Fourier transform; aperiodic functions; properties.

Week 3	Convolution theorem; Fourier Integral.
Week 4	Ordinary differential equation of first order: - basic concepts in differential equations; variable separable
Week 5	Equation's reducible to separable form
Week 6	Homogenous equations and non-homogenous equations
Week 7	Exact differential equations;
Week 8	Non exact differential equations; integrating factor
Week 9	linear first order differential equations
Week 10	Bernoulli equation
Week 11	Ordinary differential equations of second order: - homogenous linear second order; homogeneous with constant coefficients; roots of characteristics equations,'initial condition and boundary condition
Week 12	Non homogeneous second order differential equations; complex methods for obtaining particular solutions (undetermined coefficients);
Week 13	Variation of parameters method;
Week 14	High order differential equations: - basic concepts; solution of high order characteristics equation.
Week 15	Applications of Differential Equations
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus 14 th edition	Yes
Recommended Texts	Calculus 10 th edition by Anton , Bivens , and Davis	Yes
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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 DESCRIPTOR FORM

نموذج وصف المادة الدراسية

جرائم حزب البعث

Module Information

معلومات المادة الدراسية

Module Title	Baath Party crimes		Module Delivery	
Module Type	Suplement		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATUU211			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	JGII	Semester of Delivery	2	
Administering Department		College	NETC	
Module Leader	Hiader Abd Al-Jaleel		e-mail	
Module Leader's Acad. Title	Assistant professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024	Version Number	1.0	

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. التعرف على ماهية الجريمة لغة واصطلاحاً وماهية أقسام الجرائم. 2. التعرف على جرائم نظام البعث. 3. تنمية وعي الطلبة بجرائم نظام البعث. 4. دراسة الجرائم التي ارتكبتها نظام البعث على مدى سنوات طويلة واثارها النفسية والاجتماعية . 5. التعرف على صور انتهاكات حقوق النسان وجرائم السلطة والتعرف على الجرائم البيئية لنظام البعث في لعراق. 6. تعزيز الوعي بحقيقة ما جرى من مآسي المقابر الجماعية المرتكبة من النظام البعثي في العراق
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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. تمكين الطالب من معرفة المفاهيم النظرية للجرائم وأركان الجرم . 2. تمكين الطالب من معرفة أقسام الجرائم . 3. تمكين الطالب من معرفة قانون المحكمة الجنائية العراقية العليا لسنة 2005. 4. يتعلم الطالب أنواع الجرائم الدولية على وفق النظام الساسي للمحكمة الجنائية الدولية. 5. يتمكن الطالب من فهم موقف النظام البعثي من الدين من خلال فهم عقيدة النظام السياسي 6. يتمكن الطالب من التعرف على صور أنتهاكات القوانين العراقية وأنتهاكات حقوق النسان وجرائم السلطة. 7. يتعرف الطالب على أماكن السجون لنظام البعث. 8. معرفة الطالب بالجرائم البيئية وأثار الجرائم البيئية لنظام البعث ويتعرف على جرائم المقابر الجماعية.
Indicative Contents المحتويات الإرشادية	1- جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا لعام 2005م، 2- الجرائم النفسية والاجتماعية وأثارها وابرز انتهاكات النظام البعثي في العرا 3- الجرائم البيئية لنظام البعث في العراق، جرائم المقابر الجماعية
Strategies	زيادة وعي الطالب بالجرائم التي ارتكبها نظام البعث في العراق وحقيقة ما جرى من مآسي وويلات بحق 1 الشعب العراقي. اكتساب الطالب ثقافة عامة بماهية الجرائم واركانها واقسامها وموقف المشرع العراقي منها. 2- 3- زيادة وعي الطالب بموقف القانون الدولي والمحاکم الجنائية الدولية من الجرائم والانتهاكات التي ترتكبها الانظمة السلطوية.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	18	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	18/15 = 1.2
Unstructured SWL (hr/sem) (USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	32/15 = 2.1
Total SWL (hr/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week	Syllabus
1	محاضرة تعريفية عن المادة واهميتها.
2	التعريف بالجريمة لغة واصطلاحاً، أقسام الجريمة، جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا عام 2005 م ، أنواع الجرائم الدولية
3	القرارات الصادرة من المحكمة الجنائية العليا، وأبرز القضايا التي نظرت فيها المحكمة.
4	الجرائم النفسية، اليات الجرائم النفسية.
5	اثر الجرائم النفسية، الجرائم الاجتماعية
6	عسكرة المجتمع، موقف النظام البعثي من الدين.
7	انتهاكات القوانين العراقية، صور انتهاكات حقوق النسان، جرائم السلطة.
8	بعض قرارات الانتهاكات السياسية والعسكرية لنظام البعث، السجون لنظام البعث
9	. استعمال الاسلحة المحرمة دولياً ومخاطر الالغام- التلوث الحربي الاشعاعي :الجرائم البيئية لنظام البعث في العراق

10	التلوث بالمواد المشعة، أثار استخدام الاسلحة المحرمة دولياً
11	تدمير المدن والقرى(سياسة الرض المحروقة)
12	تجفيف الاهوار أثارها البيئية والاجتماعية والاقتصادية
13	تجريف بساتين النخيل والاشجار والمزروعات
14	جرائم المقابر الجماعية، أحداث المقابر الجماعية المرتكبة من النظام البعثي في العراق
15	التصنيف الزمني لمقابر الابادة الجماعية في العراق
16	الامتحان النهائي

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	المنهج المقر الدراسي للجامعات من قبل الوزارة	
Recommended Texts		
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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

اتصالات تناظرية

Module Information

معلومات المادة الدراسية

Module Title	Analog communication	Module Delivery
Module Type	Core	<input checked="" type="checkbox"/> Theory

Module Code	ATU11408		<input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGII	Semester of Delivery	2	
Administering Department		College	NETC	
Module Leader	Ahmad H. Hadi		e-mail	Coj.Ahmadhadi@atu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	1/10/2024	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives	1. To define the main terms of the analog communication systems.
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أهداف المادة الدراسية	<ol style="list-style-type: none"> To introduce the concept of modulation. To learn the types of modulation techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> Understanding the parameters of the analog communication system. Recognizing the differences between modulation types. Define the interaction between message signal and carrier signal. Define the theory behind the generation of each modulation type. Understanding the reaction between signals and noise.
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none"> Modulation. Amplitude modulation Frequency modulation Analog pulse modulation

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.
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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	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
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 1-2	Modulation: Linear modulation, double-sideband modulation AM and DSB modulators and transmitters; SSB and VSB; frequency conversion; detection and receivers; frequency division multiplexing.

Week 3-6	Amplitude modulation: the AM transmission: the AM spectrum; power considerations; phasor representation; AM modulators; another AM transmitter, Application of AM Systems.
Week 7-10	Frequency modulation: fundamental concepts; Frequency modulation: the FM spectrum; phasor representation; narrowband FM; broadband FM; FM generation; FM transmitter; interference and noise; the PM spectrum PM/FM transmitter.
Week 11	Mid – Term Exam.
Week 12-13	Noise in CW modulation: system models and parameters; interference noise in linear modulation; noise in exponential modulation; comparison of CW modulation system
Week 14-15	Pulse modulation: Analog pulse modulation; PAM, PDM and PPM, pulse-code modulation PCM, DM, and DPCM; time-division multiplexing
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-2	Am modulation
Week 3	Design Amplitude modulation circuit by Student.
Week 4	Am demodulation
Week 5	Design Amplitude demodulation circuit by Student.
Week 6	Phase Locked Loop (PLL)
Week 7-9	FM modulation using different circuits (CD4046, 555 timer, 565 ...etc)
Week 10	FM demodulation

Week 11	Midterm exam
Week 12-15	PM modulation (PAM, PDM and PPM)
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Introduction to Communication Systems By F. G. Strelmer	yes
Recommended Texts	1- Analog communication textbook by sanjay sharma. 2-Modern digital and analog communication systems by B. P. Lathi & Zhi Ding	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

دوائر الكترونية متكاملة

Module Information			
معلومات المادة الدراسية			
Module Title	Integrated electronic circuits		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11409		
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	UGII	Semester of Delivery	
Administering Department		College	NETC
Module Leader	Nasir Hussein Selman	e-mail	Coj.nas@atu.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	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	none	Semester	
Co-requisites module	none	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	46. Understanding of Integrated Circuits. 47. To Define types of Integrated Circuits. 48. To Know the application on integrated Circuits. 49. To understand the design of integrated Circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enabling student to know the concepts of IC 2. learning the type of IC. 3. Enabling student to know about the Construction of IC. 4. Enabling student to design Many application of IC. 5. Understand the basic operation of some types of IC 6. Enabling student to Select the suitable IC for the applications
Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none">• introduction to IC• Working with Power point• Theoretical lectures• Lab.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	different examples.
	Using different styles of discussion that aim to connect the theoretical and practical sides.
	Asking questions and giving exercises that require analysis and conclusions related to lectures.
	Encourage students to participate in discussions and do the practical work.
	Encourage students to work in groups..

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 1-2	Introduction to Integrated Circuits, Types of integrated circuits, Analog Integrated Circuits, digital integrated circuits, Programmable Integrated Circuits, Integrated Circuit Applications, Advantages of integrated circuits, Future trends in integrated circuit technology
Week 3-10	operational amplifier, applications (linear and non-linear applications): inverting, noninverting, voltage follower, adder, subtractor, integrator and differential, comparator, zero crossing detector, voltage bounding, log and antilog, Analog to Digital Converters, Digital to Analog Converters, active filters design (Butterworth filter).
Week 11-12	Feedback Amplifier, Oscillators: Positive feedback and oscillation, Stability of Oscillation, Oscillators using OP-AMP: Phase-shift Oscillator, Wien Bridge Oscillator, Hartley Oscillator, Crystal Oscillator.

Week 13-15	Timing circuits 555 timer applications, 555 timer as a mono stable multivibrator and a bistable multivibrator
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1 &2	Op-Amp Voltage Followers and Noninverting Amplifiers, Inverting Amplifiers
Week 3 &4	Summing and Difference Amplifiers
Week 5	Differentiator and integrator
Week 6 &7	Lowpass, Bandpass and High pass active Filters
Week 8	Midterm exam
Week 9 &10	Analog to Digital Converters, Digital to Analog converters
Week 11 & 12	Different Oscillators
Week 13 & 14	555 IC Operating as Astable Multivibrator, 555 IC Operating as Bistable Multivibrator, 555 IC Operating as Monostable Multivibrator
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	"Electronic Devices and Circuit Theory", Robert Boylestad, Louis Nashelsky, 10th Edition , 2009.	Yes
Recommended Texts	electronic-devices-9th-edition-by-floyd	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

اللغة الإنكليزية 2

Module Information

معلومات المادة الدراسية

Module Title	English2	Module Delivery	
Module Type	S	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU221		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGII		
Administering Department		College	NETC
Module Leader	Mohammed Salim	e-mail	E-mail
Module Leader's Acad. Title	Asst. Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives أهداف المادة الدراسية</p>	<p>1-The aim of this course is to provide English learners with integrated language skills such as reading, listening and writing resulting in a level of basic language knowledge.</p> <p>2-This course will focus on grammar rules, basic word knowledge and usage, reading comprehension, reading out of the lesson, and Paragraph writing.</p> <p>3- A student may be able to listen to native speakers and speak English Language.</p> <p>4- A student may be able to write and have creativity in his writing.</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>1- Uses expressions of Quantity in elementary level of English.</p> <p>2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task.</p> <p>3- Defines basic Modals and employ them in elementary level of communication and writing skills.</p> <p>4- Translates sentences in elementary level from English to another language.</p> <p>5- Interprets the texts written in elementary level of English.</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Language is a rule-governed behavior. It is defined as the comprehension and/or use of a spoken (i.e., listening and speaking), written (i.e., reading and writing), and/or other communication symbol system (e.g., American Sign Language).</p> <p>Spoken and written language are composed of receptive (i.e., listening and reading) and expressive (i.e., speaking and writing) components.</p> <p>Spoken language, written language, and their associated components (i.e., receptive and expressive) are each a synergistic system comprised of individual language domains (i.e., phonology, morphology, syntax, semantics, pragmatics) that form a dynamic integrative whole</p>

	<p>Phonology study of the speech sound (i.e., phoneme) system of a language, including the rules for combining and using phonemes.</p> <p>Morphology study of the rules that govern how morphemes, the minimal meaningful units of language, are used in a language.</p> <p>Syntax the rules that pertain to the ways in which words can be combined to form sentences in a language.</p> <p>Semantics the meaning of words and combinations of words in a language.</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>1- Uses the available material to increase his efficiency.</p> <p>2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task.</p> <p>3- Defines basic Modals and employ them in elementary level of communication and writing skills.</p> <p>4- Develop and enhance students' language skills to communicate in English properly.</p> <p>5- Interprets the texts written in elementary level of English.</p>
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	18	Structured SWL (h/w)	1.2
الحمل الدراسي المنتظم للطلاب خلال الفصل		الحمل الدراسي المنتظم للطلاب أسبوعيا	
Unstructured SWL (h/sem)	32	Unstructured SWL (h/w)	2.1
الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem)	50		

الحمل الدراسي الكلي للطالب خلال الفصل

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
	Siminar	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	
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	
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Headway book for learning English	Yes
Recommended Texts	Skills in writing and Learning English	No
Websites	https://www.bbc.co.uk/learningenglish/	

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 DESCRIPTOR FORM

نموذج وصف المادة الدراسية

لغة عربية 2

Module Information			
معلومات المادة الدراسية			
Module Title	Arabic language		Module Delivery
Module Type	Supplement		Theory
Module Code	ATU220		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	JGII	Semester of Delivery	
Administering Department		College	NETC

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	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<p>5- تعريف الطلبة اهم المفاتيح الاساس في التعامل بلغة عربية فصيحة خالية من اي الأخطاء.</p> <p>6- رفع القدرات التعبيرية للطلاب، ومساعدتهم على استخدام العبارة المناسبة بشكل صحيح وواضح.</p> <p>7- تدريب الطلبة على التنظيم المنطقي للأفكار باللغة العربية الفصحى.</p> <p>8- جعل الطلبة قادرين على اكتساب خزين لغوي من الكلمات والتعابير الفصيحة.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>5- تعلم اساليب اللغة العربية .</p> <p>6- استخدام علامات الترقيم أثناء الكتابة.</p> <p>7- تعلم كيفية تحليل النصوص الأدبية.</p> <p>8- التدريب على القراءة الواضحة والالقاء.</p>
Indicative Contents المحتويات الإرشادية	<p>10- توضيح أهمية اللغة العربية وفوائدها للطلبة من غير اختصاص اللغة العربية.</p> <p>11- تفسير بعض الايات القرنية</p> <p>12- تحليل بعض القصائد العربية.</p> <p>13- قواعد اللغة العربية وأهميتها.</p> <p>14- الأسماء، أنواعها، الضمائر</p> <p>15- النكرة والمعرفة.</p> <p>16- اعراب بعض الايات القرنية، الايات الشعرية.</p> <p>17- علامات الترقيم واهميتها في اللغة العربية.</p> <p>18- شرح موضوع العدد ، وماهي اقسامه.</p>
Strategies	<p>المحاضرة والمشاركة -</p> <p>المناقشة والحوار -</p>

.العصف الذهني -
 .كتابة التقارير عن الموضوع -
 - السؤال والجواب

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	18	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	18/15 =1.2
Unstructured SWL (hr/sem)(USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	32/15=2.1
Total SWL (hr/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week	Syllabus
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	-2	
Recommended Texts	-2	
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
(0 – 49)	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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

تحليلات هندسية

Module Information معلومات المادة الدراسية			
Module Title	Engineering Analysis		Module Delivery
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11501		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGIII	Semester of Delivery	
Administering Department		College	NETC

Module Leader	Asaad. S. Daghah	e-mail	ad466kent@atu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> Comprehensive Understanding: Develop a holistic understanding of complex analysis, Laplace transforms, and partial differential equations. Problem-Solving Skills: Enhance analytical and problem-solving skills through the application of theoretical concepts to practical scenarios. Interdisciplinary Connections: Foster the ability to connect mathematical theories to applications in science, engineering, and technology.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> Z-Transform Understanding and Application, Properties and Pairs, Inverse Z-Transform, Discrete-Time System Analysis. Laplace Transform Definition and Basic Functions, Inverse Transform, Differential Equations, Transform Properties: Partial Differential Equations Fundamental Concepts, Separation of Variables, D'Alembert's Solution Complex Analytic Functions Complex Functions and Properties, Analyticity and Cauchy-Riemann Equations, Laplace's Equation and Rational Functions. Complex Integrals Line Integrals in the Complex Plane, Properties of Complex Line Integrals, Cauchy's Integral Formula. Special Functions Gamma and Beta Functions, Applications of Special Functions.
Indicative Contents	<ol style="list-style-type: none"> Z-Transform Laplace Transform

المحتويات الإرشادية	3. Partial Differential Equations 4. Complex Analytic Functions 5. Complex Integrals 6. Special Functions
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استراتيجيات التعلم والتعليم Learning and Teaching Strategies

Strategies	<ol style="list-style-type: none"> Lectures: Introduce key concepts using structured presentations and visual aids. Interactive Tutorials: Conduct problem-solving sessions and encourage peer collaboration. Hands-On Exercises: Utilize mathematical software for computational tasks. Case Studies: Discuss real-world applications and invite industry speakers. Assignments and Projects: Assign individual problems and facilitate group projects. Discussion Forums: Use online platforms for peer interaction and guide discussions. Assessment Methods: Implement formative quizzes and summative exams. Self-Directed Learning: Provide recommended readings and encourage study groups. Feedback Mechanisms: Offer regular feedback on assignments and encourage reflective practices for improvement.
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الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا Student Workload (SWL)

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) 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	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

تقييم المادة الدراسية Module Evaluation

	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 /Siminar	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 Z-Transform: Basics of Z-Transform; Definition and significance of the Z-transform; Overview of discrete-time signals and systems; Properties: linearity, time shifting, and region of convergence (ROC)
Week 2	Key Techniques and Applications: Z-Transform Pairs and Inversion; Common Z-transform pairs; Techniques for finding the inverse Z-transform (power series and partial fractions); Z-transform of common signals (step, impulse, exponential)
Week 3	System Analysis and Applications: Analysis of discrete-time systems using Z-transform; Frequency response and stability analysis
Week 4	Laplace transformation: - definition of Laplace transform; Laplace transform of some elementary function
Week 5	Linearity, time shifting, and initial/final value theorems
Week 6	unit step function; ramp function; impulse function.
Week 7	Inverse of Laplace transforms; Laplace transform of derivative and transformation of ordinary differential equations
Week 8	partial fractions: solution of differential equation by using Laplace transform
Week 9	Partial differential equations: - basic concepts; separation of variables; D'Alembert's solution of wave equation.
Week 10	Mid -Term Exam
Week 11	Complex analytic functions: - complex function; limit; derivative;
Week 12	Analytic function; Cauchy-Rieman equations;
Week 13	Laplace's equation; rational function; root.

Week 14	Complex Integrals: - Line integral in the complex plane; basic properties of the complex line integral; Cauchy's integral formula; the derivatives of an analytic function
Week 15	Special functions: - Gamma function; Beta function
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics" by Erwin Kreyszig	Yes
Recommended Texts	Engineering Mathematics" by K.A. Stroud and Dexter J. Booth	No
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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

احتمالية واحصاء

Module Information معلومات المادة الدراسية			
Module Title	Probability and Statistics		Module Delivery
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11502		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGIII	Semester of Delivery	
Administering Department		College	NETC
Module Leader	Asaad. S. Daghah	e-mail	ad466kent@atu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	4. Understand Basic Probability: Learn the foundational concepts of probability, including sample spaces, events, and probability axioms. 5. Apply Probability Distributions: Use common distributions (e.g., binomial, normal) and key theorems like Bayes' and the central limit theorem. 6. Analyze Random Variables: Calculate expected values, variances, and apply these concepts to model stochastic processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Basic Probability Concepts: Students will be able to define and calculate probabilities for simple and compound events, applying the axioms of probability. 2. Probability Distributions and Theorems: Students will be able to apply probability distributions and key theorems to solve problems and make predictions. 3. Random Variables and Expectation: Students will be able to analyze random variables, calculate expected values and variances, and model real-world stochastic processes.
Indicative Contents المحتويات الإرشادية	1. Overview of set theory. 2. Random variables and probability density functions. 3. Joint, Marginal and conditional distributions. 4. Characteristic functions.

استراتيجيات التعلم والتعليم Learning and Teaching Strategies

Strategies	1. State the need for Mathematics with Engineering Studies and Provide real-life examples. 2. Support and guide the students for self-study. 3. Assigning homework, grading assignments, quizzes, and documenting students' progress. 4. Encourage the students to group learning to improve their creative and analytical skills. 5. Show short related video lectures.
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الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا (SWL) Student Workload

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 /Siminar	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	Overview of set theory and essential mathematical concepts; Random experiments and probability axioms;
Week 2	Conditional probability and Bayes' rule;
Week 3	Counting methods
Week 4	Discrete random variables and probability mass functions;
Week 5	functions of Discrete random variables
Week 6	Continuous random variables and probability density functions;
Week 7	Functions of Continuous random variables
Week 8	Cumulative distribution functions; Expectation, variance, and higher-order moments
Week 9	Joint distributions of discrete and continuous variables; Marginal and conditional distributions;
Week 10	Mid -Term Exam
Week 11	Covariance and correlation; Functions of multiple random variables
Week 12	Definition and properties of moment-generating functions;
Week 13	Characteristic functions and their applications;

Week 14	Inequalities in probability (e.g., Markov's and Chebyshev's inequalities)
Week 15	Revision of whole materials
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>A First Course in Probability</i> by Sheldon Ross	Yes
Recommended Texts	<i>Probability and Statistics for Engineering and the Sciences</i> by Jay L. Devore	No
Websites	Khan Academy - Probability and Statistics	

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

هوائيات وانتشار موجات

Module Information معلومات المادة الدراسية			
Module Title	Antenna and Wave propagation		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11503		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None		Semester	

Co-requisites module	None	Semester	
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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	7. To provide an introduction to the fundamentals of electromagnetic wave propagation in both guided structures and open media 8. Introduce essentially a review of basic electromagnetic theory. 9. Introduce the fundamental principles of antenna theory and apply them to the analysis, design, and measurements of antennas. 10. It is devoted to the study of antenna arrays. 11. introduce the student to a technology that will advance antenna theory and design, and revolutionize wireless communications 12. deals with the issues related to the propagation of radio waves
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. Understanding the relative between Maxwell's equation and antenna system. 7. Recognize the radiation mechanism. 8. Basic understanding of the Properties of Antenna. 9. Comprehend the antenna parameters. 10. Categorise and analysis most types of linear antenna. 11. Basic knowledge about antenna array & the wave propagation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Theoretical content</u> 1- Review of basic electromagnetic theory. 2- The field computation to antennas. 3- Study of antenna arrays & Propagation of radio waves. <u>Part B – LAB-</u> 1- Design, analysis, and visualization of antenna elements and arrays. 2- Compute impedance, current distribution, radiation patterns. 3- Antenna coordinate systems & RF propagation models.

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.
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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)	10	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 equations -Antenna Definition - Properties of Antenna - Types of Antennas - Block Diagram of Communication Systems - The Isotropic - Radiation Mechanism.
Week 2	Antenna Parameters - Radiation Pattern - Field Regions - Radian and Steradian - Radiation Intensity
Week 3	Pattern beamwidth- Directivity - Power Gain
Week 4	Input Impedance of Antenna
Week 5	Antenna Polarization- Polarization Mismatch
Week 6	Radiation Efficiency - Effective Length - Effective Area - Antenna Bandwidth

Week 7	Antennas In Communication (Friis Formula) - Antennas in Radar System
Week 8	Thin Linear Antenna –Short Dipole
Week 9	Monopole - Dipole Antenna - Loop antenna-small loop
Week 10	Mid-Term Exam
Week 11	Aperture Antenna - Folded Dipole Antenna - Yagi-Uda Antenna
Week 12	Helical antenna -Spiral antenna - Microstrip patch antenna
Week 13	Antenna Arrays - Linear Array - Pattern Multiplication - Two Element, Uniform Array - End Fire Array - Broad Side Array
Week 14	Radio Wave Propagation - Ground Wave - Free Space Propagation - Ground Reflection - Surface Waves - Diffraction -
Week 15	Wave Propagation in Complex Environment - Troposphere Propagation - Troposphere Scatter - Ionosphere Propagation
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Antenna Library- Structure of Antenna- Properties of Antenna- Plot Radiation Pattern of Antenna- Plot Azimuth and Elevation Pattern of Antenna
Week 2	Directivity of Antenna- E-fields of Antenna- Polarizations and Axial Ratio of Antenna
Week 3	Return Loss and Voltage Standing Wave Ratio (VSWR) of Antenna
Week 4	Current and Charge Distribution of Antenna- Mesh of Antenna
Week 5	Rectangular Coordinate System- Spherical Coordinate System- Polar Plot
Week 6	Design and Analysis Using Antenna Designer
Week 7	Array Modeling and Analysis
Week 8	RF Propagation and Visualization
Week 9	Introduction to Computer Software Technology (CST)
Week 10	Mid-Term Exam
Week 11	Analysis of Monopole and dipole Antenna parameters using CST
Week 12	Analysis of Yagi-Uda Antenna parameters using CST

Week 13	Analysis of Spiral antenna parameters using CST
Week 14	Analysis of Microstrip patch antenna parameters using CST
Week 15	Analysis of Array Antenna parameters using CST
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Antenna Theory Analysis and Design by C.A> Balanis, John Wille Sons	Yes
Recommended Texts	Elements of Electromagnetics by Matthew N. O. Sadiku (2 nd Edition)	No
Websites	https://www.antenna-theory.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

الاتصالات الرقمية

Module Information معلومات المادة الدراسية			
Module Title	Digital Communications		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11504		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	
Administering Department	Communications Techniques Department	College	Technical College of Najaf
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq

Scientific Committee Approval Date	01/05/2025	Version Number	1.0
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Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives <small>أهداف المادة الدراسية</small>	<ol style="list-style-type: none"> 1- To provide students with a foundational understanding of digital communication systems. 2- To introduce the principles of signal representation, sampling, quantization, and modulation. 3- To develop students' ability to analyze and compare various digital modulation techniques. 4- To expose students to practical applications of digital communication, such as OFDM and spread spectrum.
Module Learning Outcomes <small>مخرجات التعلم للمادة الدراسية</small>	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the differences between analog and digital communication. 2. Apply the sampling theorem and understand the phenomenon of aliasing. 3. Describe & analysis the process of Pulse Code Modulation (PCM) and its variations. 4. Understand and mitigate the effects of inter-symbol interference (ISI). 5. Describe and compare various digital modulation tech. (ASK, FSK, PSK, QAM, etc.). 6. Analyze the error performance of binary and multilevel modulation systems. 7. Explain the principles of OFDM and spread spectrum techniques.
Indicative Contents <small>المحتويات الإرشادية</small>	<ol style="list-style-type: none"> 1. Introduction to digital communication systems and its elements. 2. (PCM), variations (delta modulation, DPCM), ISI, equalization, matched filter. 3. Binary digital modulation, coherent and non-coherent detection, error performance. 4. Multilevel modulation (QAM, QPSK, OQPSK, MSK, MFSK, M-ary PSK/QAM),

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.
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 Digital Communications: Overview, Analog vs. digital communications, and Elements of a digital communication system.
Week 2	Signal Representation & Sampling: Baseband signal representation, Sampling theorem, and, Aliasing, and practical sampling considerations.
Week 3	Quantization & Pulse Code Modulation (PCM): Pulse Code Modulation (PCM) and Quantization process.

Week 4	PCM System Analysis: Representation of binary data, Noise consideration in PCM system, and SNR performance of PCM.
Week 5	Modifications of PCM: Limitations and modifications of PCM, Delta modulation, Delta-Sigma modulation, Adaptive delta modulation, and Differential PCM (DPCM).
Week 6	Inter-Symbol Interference (ISI) and Equalization: ISI, Pulse shaping, Equalization techniques, and adaptive equalization.
Week 7	Matched Filter and Optimal Reception: The matched filter receiver and optimal receiver design.
Week 8	Digital Modulation: Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), and Phase Shift Keying (PSK).
Week 9	Digital Modulation: Differential PSK (DPSK), Coherent and non-coherent detection, and Error performance analysis of binary systems.
Week 10	Mid-Term Exam
Week 11	Digital Modulation: Quadrate Amplitude Modulation (QAM), Quadrate Phase Shift Keying (QPSK), Offset-QPSK (OQPSK), Minimum Shift Keying (MSK).
Week 12	Digital Modulation: Multilevel modulation techniques (MFSK, M-ray PSK & M-ray QAM), Error performance of M-ray systems.
Week 13	Digital Modulation: Comparison between performance of digital modulation types, and Modulation trade-offs (Bandwidth, Power, Complexity)
Week 14	Applications I: Orthogonal Frequency Division Multiplexing (OFDM)
Week 15	Applications II: Spread spectrum (Direct sequence and Frequency hopping spread spectrum), and Multiple access (CDMA, TDMA, FDMA).
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Pulse generation circuit
Week 2	Sampling Theorem
Week 3	Quantization: Sample and hold circuit
Week 4	PAM modulation and demodulation

Week 5	PPM modulation and demodulation
Week 6	PCM modulation
Week 7	PCM demodulation
Week 8	ASK modulation and demodulation
Week 9	FSK modulation and demodulation
Week 10	Mid-Term Exam
Week 11	PSK modulation and demodulation
Week 12	PFM modulation and demodulation
Week 13	PWM modulation and demodulation
Week 14	DPCM modulator
Week 15	DOCM demodulator
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Digital Communications, by John G. Proakis and Masoud Salehi.	No
Recommended Texts	2- Analog communication textbook by sanjay sharma. 3- Modern digital and analog communication systems by B. P. Lathi & Zhi Ding	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

معالج دقيق

Module Information

معلومات المادة الدراسية

Module Title	Microprocessor		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11505			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGIII	Semester of Delivery	1	
Administering Department		College	NETC	
Module Leader		e-mail		
Module Leader's Acad. Title		Module Leader's Qualification		
Module Tutor	Name (if available)	e-mail		
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives	13. To view the development of microprocessor.
	14. To study the hardware of 8085 microprocessor.
	15. To learn programing the 8085 microprocessor.

أهداف المادة الدراسية	16. To introduce some applications of 8085 microprocessor.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	12. Understanding hardware of 8085 microprocessor. 13. Programming 8085 microprocessor. 14. Understanding machine language. 15. Understanding the buses types in microprocessor. 16. Studying the interfacing between microprocessors and memories blocks
Indicative Contents المحتويات الإرشادية	5. 8085 microprocessor hardware. 6. 8085 microprocessor Programming. 7. Addressing modes. 8. Counter design using 8085 microprocessor.

استراتيجيات التعلم والتعليم Learning and Teaching Strategies

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 9	LO #1, #2, and #4, #5
	Assignments	2	10% (10)	2 and 12	LO #3 and #5
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2 and #3
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Architecture of 8085 microprocessor: development of microprocessors; block diagram; registers; ALU; control unit.
Weeks 2 & 3	Pin out of 8085 microprocessor: Buses system; Control signals; some of digital circuits connected with 8085 microprocessor.
Weeks 4 & 5	Timing Diagram: clock signals; 8085 microprocessor machine cycles; instruction fetch and execute cycle
Weeks 6 & 7	Interrupts: definition of interrupts; interrupts types; overall structure of interrupts; operation of interrupts instructions.
Week 8	Stack and subroutine: definition of stack memory; PUSH & POP instructions; subroutine concepts and instructions; subroutines writing.
Week 9	Time delay and counters: time delay types; counter design using programming.
Week 10	Mid-Term Exam
Week 11	Addressing Modes: definitions of addressing modes; 8085 mic. addressing modes.

Weeks 12-13	Memories: types of memory; storage element; memory addressing; multi chips memory; interfacing between 8085 mic. and memory chips.
Week 14	I/O device interfacing: I/O ports; IN & OUT instructions; connections between 8085 mic. and I/O ports
Week 15	8086 microprocessor: block diagram; architecture; pin out; Introduction to programming.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Understanding the kit program
Week 2	Data transfer operations
Week 3	Arithmetic operation (8-bit summation & subtraction)
Week 4	Arithmetic operation (16-bit summation & subtraction)
Week 5	logic operation (AND, OR & EX-OR operations)
Week 6	Clear of set memory locations
Week 7	Summation of set memory locations contents
Week 8	Counting even numbers
Week 9	Summation of odd order numbers
Week 10	Mid-Term Exam
Week 11	Finding largest number
Week 12	BCD to binary & binary to BCD conversion.
Week 13	I/O ports connection
Week 14	Controlling LED matrix using 8085 mic.
Week 15	Controlling stepper motor using 8085 mic.
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Goankar, 5th Edition, Prentice Hall	yes
Recommended Texts	1- Microprocessors, Atul P. Godse & Deepali A. Godse	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

برمجة ماتلاب

Module Information			
معلومات المادة الدراسية			
Module Title	Matlab Programming		Module Delivery
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11506		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGIII	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. Understand the MATLAB Environment – Navigate the interface, execute basic commands, and manage workspaces. 2. Work with Variables and Arrays – Define variables, perform mathematical operations, and manipulate matrices. 3. Use Control Structures and Functions – Implement loops, conditional statements, and create user-defined functions. 4. Create Basic Plots and Visualizations – Generate and customize graphs for data representation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Navigate and Utilize MATLAB – Efficiently use the MATLAB interface, command window, and workspace. 2. Perform Mathematical and Logical Operations – Execute arithmetic, relational, and logical operations on variables and matrices. 3. Manipulate Arrays and Matrices – Create, modify, and perform indexing, slicing, and element-wise operations. 4. Implement Control Structures – Use loops (for, while) and conditional statements (if, else) to control program flow. 5. Develop and Use Functions – Write user-defined functions with input arguments and return values. 6. Generate Plots and Visualizations – Create 2D plots, customize graphs, and represent data visually. 7. Read and Write Files – Handle file input/output operations to store and retrieve data efficiently
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none"> 1. MATLAB Environment and Basic Operations 2. Variables, Arrays, and Control Structures 3. Functions and Data Visualization 4. File Handling and Data Processing

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 coding exercises, while at the same time refining and expanding their problem-solving and critical thinking skills. This will be achieved through interactive lectures, hands-on coding tutorials, and engaging programming tasks that involve real-world applications and challenges relevant to the students.
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	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	Overview of MATLAB, interface navigation, executing basic commands.

Week 2	Defining variables, numerical and logical operations, working with strings.
Week 3	Creating and manipulating arrays, indexing, and matrix operations.
Week 4	Conditional Execution; Implementing conditional statements; Nested conditions and conditional expressions Using conditional statements (if, else, elseif)
Week 5	Loops; Understanding and using 'while' and 'for' loops; Loop control mechanisms: break, continue, and else clauses, loops (for, while).
Week 6	Using MATLAB's built-in functions for mathematical calculations and data processing (sum, mean, max, min, sort, find).
Week 7	Exploring common mathematical functions like sqrt, log, exp, sin, cos, tan, abs, round, floor, ceil, mod.
Week 8	Creating user-defined functions, input/output arguments, scope of variables.
Week 9	Solving linear and nonlinear equations using solve(), polynomial roots with roots(), and matrix equations using inv() and linsolve().
Week 10	Mid-Term Exam
Week 11	Creating 2D plots (plot, bar, pie), customizing plots, adding labels and legends.
Week 12	Introduction to 3D plots: meshgrid, surf, mesh, contour3, and customizing 3D plots.
Week 13	Introduction to symbolic differentiation with diff() and symbolic toolbox for calculating derivatives using syms and diff().
Week 14	Introduction to symbolic integration with integrate() and numerical integration with trapz() and integral().
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Installing MATLAB, Introduction to MATLAB, Example: Execute disp('Hello, MATLAB!') and explore the command window.
Week 2	Variables and Data Types, Example: Perform basic operations: $x = 5$; $y = 10$; $z = x + y$;
Week 3	Arrays and Matrices, Example: Create a matrix $A = [1, 2, 3, 4]$; and access elements.
Week 4	Implementing if, elif, and else statements, Writing programs with nested conditions, Using conditional expressions to simplify code
Week 5	Creating programs with 'while' and 'for' loops, Implementing loop control mechanisms like break, continue, and else clauses

Week 6	Operations on Built-in Functions, Example: Use sum(A), mean(A), max(A), min(A), and sort(A).
Week 7	Operations on Built-in Mathematical Functions Example: Compute sqrt(16), log(10), exp(2), sin(pi/4), abs(-5), round(3.7), and mod(10,3).
Week 8	Defining and invoking functions, Passing arguments and returning values, Understanding function scope and lifetime of variables
Week 9	Solving Equations, Example: Solve algebraic equations using solve('2*x + 3 = 7'), find polynomial roots , and solve a system of linear equations using linsolve(A, B).
Week 10	Mid-Term Exam
Week 11	Example: Create a 2D plot with plot ,using plotting many functions and use subplot()
Week 12	Example: Create a 3D surface plot with meshgrid and surf(). Plot a 3D contour with contour3() and visualize 3D data points with scatter3().
Week 13	Differentiation,Example: Use symbolic differentiation with syms x; f = x^2 + 3*x; diff(f) to calculate the derivative. Use diff() for numerical differentiation.
Week 14	Integration, Example: Perform symbolic integration with syms x; f = x^2; integral(f, 0, 2) to calculate definite integrals, and use trapz() for numerical integration.
Week 15	Course Review
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	A Guide to MATLAB for Beginners and Experienced Users	yes
Recommended Texts	An introduction To Matrix Manipulation In Matlab	yes
Websites	https://www.mathworks.com/	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
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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
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

تحليلات عددية

Module Information		
معلومات المادة الدراسية		
Module Title	Numerical Analysis	Module Delivery
Module Type	Basic	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11607	
ECTS Credits	4	
SWL (hr/sem)	100	

Module Level	UGIII	Semester of Delivery	2
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>17. Linear Algebra Techniques: Master methods for solving systems of linear equations using Gaussian elimination, Gauss-Jordan elimination, and matrix inversion. Understand eigenvalues and eigenvectors.</p> <p>18. Numerical Methods for Nonlinear Equations and Integration: Apply iterative methods (Jacobi's and Gauss-Seidel), interpolation techniques, and various methods for solving nonlinear equations (fixed point, bisection, false position, secant, and Newton-Raphson). Implement numerical integration methods,</p>
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	<p>including the trapezoidal and Simpson's methods.</p> <p>19. Numerical Solutions for Ordinary Differential Equations (ODEs): Solve initial value problems for first and second-order ODEs using methods such as Euler, modified Euler, Runge-Kutta, predictor-corrector, finite difference, and Runge-Kutta-Nyström methods.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>1- Problem Solving in Linear Algebra: Students will be able to effectively solve systems of linear equations using various techniques, including Gaussian elimination and Gauss-Jordan elimination, and compute matrix inverses.</p> <p>2- Application of Numerical Methods: Students will demonstrate proficiency in applying iterative methods (Jacobi's and Gauss-Seidel) and interpolation techniques to solve nonlinear equations and estimate function values.</p> <p>3- Numerical Integration and ODE Solutions: Students will be capable of utilizing numerical integration methods (trapezoidal and Simpson's) and solving ordinary differential equations (first and second order) using techniques such as Euler, Runge-Kutta, and predictor-corrector methods, analyzing their accuracy and stability.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>1- Linear Algebra</p> <ul style="list-style-type: none"> • Introduction to systems of linear equations • Gaussian elimination and Gauss-Jordan elimination • Matrix inversion techniques • Eigenvalues and eigenvectors • Properties of symmetric, skew-symmetric, and orthogonal matrices <p>2- Numerical Methods in Linear Algebra</p> <ul style="list-style-type: none"> • Iterative methods for solving linear systems <ul style="list-style-type: none"> ○ Jacobi's method ○ Gauss-Seidel method • Interpolation techniques <ul style="list-style-type: none"> ○ Lagrange interpolation ○ Newton's divided difference <p>3- Numerical Solutions of Nonlinear Equations</p> <ul style="list-style-type: none"> • Fixed point iteration • Bisection method • False position (regula falsi) method • Secant method • Newton-Raphson method <p>4- Numerical Integration</p> <ul style="list-style-type: none"> • Trapezoidal rule • Simpson's rule • Error analysis in numerical integration <p>5- Numerical Solutions of Ordinary Differential Equations (ODEs)</p>

	<ul style="list-style-type: none"> • Initial value problems for first-order ODEs <ul style="list-style-type: none"> ○ Taylor series method ○ Euler and modified Euler methods ○ Runge-Kutta methods ○ Predictor-corrector methods • Initial value problems for second-order ODEs <ul style="list-style-type: none"> ○ Finite difference methods ○ Runge-Kutta-Nystrom method <p>6- Applications and Case Studies</p> <ul style="list-style-type: none"> • Real-world applications of linear algebra and numerical methods • Case studies demonstrate the use of numerical techniques in engineering, physics, and data science
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Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> 1- Lectures and Interactive Discussions: Deliver foundational concepts through lectures, supplemented by discussions to engage students and clarify complex topics. 2- Hands-On Practice and Computer Simulations: Provide problem sets for practical application and utilize software tools (e.g., MATLAB, Python) for implementing algorithms and visualizing results. 3- Collaborative Projects and Case Studies: Encourage group projects on real-world applications of numerical methods and integrate case studies to enhance relevance. 4- Quizzes and Support: Implement regular quizzes for feedback and offer office hours for additional support, allowing students to clarify doubts. 5- Peer Teaching: Encourage students to present topics to their peers, reinforcing their understanding and developing communication skills
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Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 /Siminar	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	linear algebra: - solution of system linear equations; Gauss and Gauss-Jordon method
Week 2	Matrix inversion by Gauss-Jordan method.
Week 3	Eigenvalue and Eigen vectors

Week 4	Numerical method in linear algebra: - solution of system linear equations; by iteration (Jacobi's and Gauss-Siedel) method;
Week 5	Interpolation.
Week 6	Solution of nonlinear equation: -fixed point, bisection method
Week 7	false position method; secant method
Week 8	Newton-Raphson method
Week 9	Numerical integration: - trapezoidal method; Simpson method
Week 10	Mid -Term Exam
Week 11	Numerical solution of ordinary differential equations (ODE):- initial value problem for first order ODE
Week 12	Taylor's Series least square
Week 13	Euler and modified Euler
Week 14	Runge-Kutta; predictor corrector method; initial value problem for 2'nd order ODE
Week 15	finite difference; Runge-Kutta Nystrom method.
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics" by Erwin Kreyszig	Yes
Recommended Texts	"Introduction to Linear Algebra" by Gilbert Strang	No
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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

نظرية معلومات

Module Information		
معلومات المادة الدراسية		
Module Title	Information Theory	Module Delivery
Module Type	Core	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial
Module Code	ATU11608	

ECTS Credits	5	<input type="checkbox"/> Practical	
SWL (hr/sem)	125	<input type="checkbox"/> Seminar	
Module Level	UGIII	Semester of Delivery	2
Administering Department		College	
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- To provide a comprehensive understanding of the fundamental concepts of information theory. 2- To introduce students to the mathematical foundations of information, entropy, and channel capacity. 3- To equip students with the ability to design and analyze source coding and channel coding schemes. 4- To explore the applications of information theory in communication systems and related fields.
Module Learning Outcomes	Upon successful completion of this course, students will be able to: <ul style="list-style-type: none"> Define and calculate entropy, conditional entropy, and mutual information. Understand and apply Shannon's theorems for source and channel coding.

مخرجات التعلم للمادة الدراسية	<ul style="list-style-type: none"> Analyze the capacity of various communication channels. Design and implement efficient source coding schemes (Huffman, Shannon-Fano). Design and analyze linear block codes (Hamming, cyclic codes) for error detection and correction. Apply the Kraft-McMillan inequality and understand uniquely decodable codes. Understand and utilize Fano's Inequality. Understand syndrome decoding. Understand the applications of information theory.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>1- Entropy and Mutual Information:</p> <ul style="list-style-type: none"> This covers the fundamental measures of information: entropy (a measure of uncertainty), joint entropy (uncertainty of multiple variables), conditional entropy (uncertainty given another variable), and mutual information (amount of information shared between variables). Students will learn how to calculate these measures and understand their significance in quantifying information. <p>2- Channel Capacity and Shannon's Theorems:</p> <ul style="list-style-type: none"> This focuses on the theoretical limits of communication. Students will learn about the concept of channel capacity, which defines the maximum rate at which information can be reliably transmitted over a noisy channel. Shannon's source coding theorem and channel coding theorem will be covered, demonstrating the possibility of achieving these limits. <p>3- Source Coding (Data Compression):</p> <ul style="list-style-type: none"> This section deals with techniques for efficiently representing information sources. Students will learn about variable-length coding schemes like Huffman coding and Shannon-Fano coding, and the Kraft-McMillan inequality, which provides criteria for uniquely decodable codes. The goal is to minimize the average number of bits required to represent the source output. <p>4- Channel Coding (Error Correction):</p> <ul style="list-style-type: none"> This focuses on techniques for adding redundancy to transmitted data to enable error detection and correction. Students will learn about linear block codes (including Hamming codes and cyclic codes), Hamming distance, and decoding algorithms (especially syndrome decoding). This section emphasizes reliable communication in the presence of noise.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>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.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 /Siminar	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	General model of communication system.
Week 2	Information Source, Self Information, Entropy, Information Rate, Joint Entropy
Week 3 -4	Conditional Entropy and Mutual Information
Week 5-6	Communication Channel, Discrete Channel, Binary Symmetric Channel (BSC), Ternary Symmetric Channel (TSC), Lossless Channel, Deterministic Channel, Binary Erasure Channel (BEC), Noiseless Channels, Shannon's theorem, Channel Capacity (Discrete channel), Channel capacity of Symmetric channels, Channel capacity of Nonsymmetric channels, Cascading of Channel.
Week 7-8	Source Coding: Source coding of discrete sources, Fixed Length Code, Variable Length Code, Minimum Code Length, Code Efficiency and Redundancy
Week 9	Average Code Length, Requirements for a useful symbol code: Uniquely Decodable, Prefix Code, Kraft-McMillan Inequality.
Week 10	Mid -Term Exam
Week 11	Shannon-Fano code, Huffman Code, Huffman vs. Shannon.
Week 12-13	Channel coding: error detecting codes; error correcting codes; systematic and nonsystematic codes; Hamming distance; Hamming bound; Hamming weight; linear block codes; encoding of linear block codes; decoding of linear block codes; cyclic codes; systematic and nonsystematic codes; encoding with an (n-k) stage shift register; encoding with a k-stage shift register; syndrome calculation and error detection;
Week 14	Channel Coding: Hamming Codes
Week 15	Channel Coding: Cyclic Codes
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Elements of Information Theory" by Thomas M. Cover and Joy A. Thomas	No
Recommended Texts	<ul style="list-style-type: none"> "Information Theory, Inference, and Learning Algorithms" by David J.C. MacKay 	No

	<ul style="list-style-type: none"> "A First Course in Information Theory" by Raymond W. Yeung 	
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

معالجة إشارة رقمية

Module Information

معلومات المادة الدراسية

Module Title	Digital Signal Processing		Module Delivery	
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11609			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGIII	Semester of Delivery		
Administering Department		College	NETC	
Module Leader		e-mail		
Module Leader's Acad. Title		Module Leader's Qualification		
Module Tutor	Name (if available)	e-mail		
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>68. Understand how to mathematically describe signals and how to perform calculations on signals.</p> <p>69. Studying the performance of convolution between signals and understanding its impact on the analysis of time invariant linear systems. Understand the idea of impulsive response. Learn to calculate the output of an LTI system</p>
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	<p>given the input and impulse response by torsion sum and torsion integral.</p> <p>70. Study the calculation of a Fourier series or Fourier transform of a well-defined set of signals from first principles. Furthermore, using the properties of the Fourier transform to compute the Fourier transform (and its inverse) for a broader class of signals.</p> <p>71. A good understanding of the fundamentals of discrete-time signals and systems</p> <p>72. Familiarity with techniques of analysis of discrete-time signals and the use of Z-transforms.</p> <p>73. Knowledge of spectral properties of discrete-time systems through the use of Discrete Fourier transform (FFT) of sequences.</p> <p>74. Skills in the design of digital filters.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Illustrate digital signals, systems and their significance. 2. Analyses the digital signals using various digital transforms DFT, FFT etc. 3. Design and develop the basic digital system. 4. Interpret the finite word length effects on functioning of digital filters.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A - Functions</u></p> <ol style="list-style-type: none"> 1. Concept of frequency in continuous time and discrete time signals –Sampling theorem – Discrete time signals. Discrete time systems –Analysis of Linear time invariant systems –Z transform –Convolution and correlation. 2. THE Z-TRANSFORM 3. Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 and Radix-4 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms – Use of FFT algorithms in Linear Filtering and correlation. 4. System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance. Bilinear transformation – Approximation derivatives – Design of IIR filter in the Frequency domain. 5. Quantization, round off errors and overflow errors. Multi rate digital signal processing: Concepts, design of practical sampling rate converters, Decimators, interpolators. Poly phase decompositions. Application of DSP – Model of Speech Wave Form.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in presenting this unit is to encourage students to participate in solving exercises, and at the same time improve and expand their critical thinking skills through some group and individual scientific activities and competitions.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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
Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11

Formative assessment	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	Convolution and correlation
Week 2	Analysis of Linear time invariant systems –Z transform
Week 3	Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 and Radix-4 FFT algorithms
Week 4	Decimation in Time – Decimation in Frequency algorithms – Use of FFT algorithms in Linear Filtering and correlation
Week 5	System Design of Discrete time IIR filter from continuous time filter
Week 6	IIR filter design by Impulse Invariance. Bilinear transformation –Design of IIR filter in the Frequency domain
Week 7	Realization of the System Design of Discrete time IIR filter from continuous time filter
Week 8	Realization of the System Design of Discrete time FIR filter from continuous time filter
Week 9	Linear phase filter – Windowing techniques – rectangular, triangular, Blackman and Kaiser windows
Week 10	Mid Term
Week 11	Frequency sampling techniques – Structure for FIR systems
Week 12	Quantization, round off errors and overflow errors.
Week 13	Poly phase decompositions. Application of DSP – Model of Speech Wave Form

Weeks 14&15	Multi rate digital signal processing: Concepts, design of practical sampling rate converters, Decimators, interpolators.
Week 16	Final Exam.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	.Oppenheim A V and Sehafer R W, "Discrete Time Signal Processing"	No
Recommended Texts	Proakis J G and Manolakis D G, "Digital Signal Processing", Pearson Education India.	No
Websites	https://umdearborn.edu/cecs/departments/electrical-and-computer-engineering/undergraduateprograms/bse-electrical-engineering/program-educational-objectives https://umdearborn.edu/cecs/departments/electrical-and-computer-engineering/undergraduateprograms/bse-electrical-engineering/student-outcomes	

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

الياف ضوئية

Module Information			
معلومات المادة الدراسية			
Module Title	Optical Fiber		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11610		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	During this course, students will be: 1- Study the basic principle of optical communication and optical fiber and its elements 2- Understand the available analytical methods to evaluate their performance and key design features. 3- Examine and think critically about historical technology solutions in the evolution of optical communication. 4- Understand the design of transceiver in optical communications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course students will be able to: 1- Describe and mathematically analyze optical components used in communication systems. 2- Understand the principles of optical communication system design. 3- Identify and describe the major sources of noise and signal impairments in an optical communication system.
Indicative Contents المحتويات الإرشادية	1- Principle of optical communication and optical fiber. 2- Degradation in optical fiber 3- Optical transmitters and receiver.

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 للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
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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	Overview of Optical fiber: Introduction, Historical development, general system, advantages & disadvantages, applications of optical fiber communication, and optical fiber waveguides.
Week 2	Ray theory transmission: internal reflection, Acceptance angle, Numerical aperture, Skew rays.
Week 3	Electromagnetic mode theory for optical propagation: Modes in a planar guide, Phase, group velocity.
Week 4	Manufacturing: Manufacture of optical fiber, Modified chemical vapor deposition (MCVD), outside vapor deposition (OVD), Fiber materials.
Week 5	Cylindrical fiber: Modes in optical fiber, Mode coupling, Step & Graded index fibers, normalized frequency, plastic and glass OF, propagation of light in OF
Week 6	Single-mode fibers: Cutoff wavelength, Mode-field diameter and spot size, Effective refractive index, Group delay and mode delay factor.
Week 7 & 8	Degradation optical fiber: Attenuation, Material absorption losses in silica glass fibers (Intrinsic & Extrinsic absorption), Linear scattering losses (Rayleigh & Mie scattering), Bending losses, core and cladding losses, Nonlinear scattering losses (Stimulated Brillouin & Stimulated Raman scattering).

Week 9	Dispersion: Chromatic dispersion:, material dispersion, waveguide dispersion, polarization mode dispersion, polarization maintaining fiber.
Week 10	Mid-Term Exam
Week 11	Intermodal dispersion: Multimode step index fiber, Multimode graded index fiber, waveguide dispersion,
Week 12	Modulation: Nonlinearity in optical fiber, self-phase modulation, cross-phase modulation, four-wave mixing.
Week 13&14	Optical sources and transmitters: transmitter in optical system, Light Emitting Diode, LED power and efficiency, LED structures, LED characteristics, Modulation, Laser diode, principle of working of laser diode, laser diode characteristic. laser diode driver circuit.
Week 15	Optical Receiver: Fundamentals, Optical Detectors, Noise Sources in a Receiver, Quantum efficiency, Responsivity, Avalanche photodiodes, Phototransistors.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to optical communication system components (sources, fibers, detectors)
Week 2	Study of light and lasers used in optical communications.
Week 3	Measurement of laser characteristics (wavelength, beam width, stability).
Week 4	Characteristics of Light Emitting Diode (LED) vs. Laser Diode (LD).
Week 5	Basic optical link using LED – Fiber – Photodetector.
Week 6	Experiment: Measurement of attenuation in optical fibers.
Week 7	Effect of wavelength on attenuation.

Week 8	Bending loss in optical fibers.
Week 9	Splicing and connector losses.
Week 10	Fiber testing using OTDR (Optical Time Domain Reflectometer).
Week 11	Mid-Term Exam
Week 12	Characteristics of PIN photodiode.
Week 13	Characteristics of Avalanche Photodiode (APD).
Week 14	Digital optical link transmission.
Week 15	Analog optical link transmission.
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Optical Fiber Communication – Gerd Keiser, 4 th Ed., MGH, 2008. 2- Optical Fiber Communications – John M. Senior, Pearson Education. 3 rd Impression, 2007.	yes
Recommended Texts	Fiber optic communication – Joseph C Palais: 4 th Edition, Pearson Education	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

مسيطر دقيق

Module Information		
معلومات المادة الدراسية		
Module Title	Microcontroller	Module Delivery
Module Type	C	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab
Module Code	ATU11611	

ECTS Credits	6	<input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
SWL (hr/sem)	150		
Module Level	UGIII	Semester of Delivery	2
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- Understand FPGA Fundamentals and provide students with a comprehensive understanding of FPGA technology, including its definition, historical development, and various applications. 2- To familiarize students with the basic components and structure of FPGAs, including LUTs, flip-flops, registers, multiplexers, CLBs, I/O blocks, and interconnects. 3- To introduce students to VHDL as a hardware description language, including design flow, EDA tools, and translating VHDL code into circuit implementations. 4- Design Digital Systems by providing practical experience in designing digital systems such as Multiply Accumulate Circuits (MAC), digital filters, and neural networks using VHDL and FPGA. 5- Integrate MATLAB with FPGA to explore the integration of MATLAB with FPGAs for system design and simulation purposes.
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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the fundamental concepts of FPGA technology and its applications in various fields. 2. Identify and explain the components of FPGA architecture and their functions. 3- Write basic VHDL code and implement both parallel and sequential VHDL code, including FSMs for digital design. 6. Design and simulate digital circuits such as MAC and digital filters using VHDL on an FPGA platform. 7. Utilize MATLAB for modeling and simulating FPGA designs effectively.
Indicative Contents المحتويات الإرشادية	9. FPGA Overview & architecture 10. Logic circuit application using VHDL 11. FPGA with MATLAB

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.
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	Overview of FPGA: Definition, History, and Applications - FPGA vs ASIC: Differences and use cases - FPGA architecture: Basic Components and Structure - Look-up tables (LUT) - Flip-flops, Registers, and Multiplexers - CLBs (Configurable Logic Blocks) - I/O Blocks and Interconnects
Week 2	About VHDL - Design Flow - EDA Tools - Translation of VHDL Code into a Circuit
Week 3	Fundamental VHDL Units- LIBRARY Declarations- Entity Declaration - Architecture body - Behavioral model
Week 4	VHDL Data Types - VHDL Data Classes
Week 5	VHDL Parallel Code
Week 6	VHDL for Sequential code inside Processes
Week 7	Finite State Machines (FSM)
Week 8	Arithmetic Logic Elements- Logic Implementation Using FPGA
Week 9	Packages and Components

Week 10	Mid-Term Exam
Week 11	Function and Procedure
Week 12	System Design Multiply Accumulate Circuits (MAC)
Week 13	Design of Digital Filters
Week 14	System Design of Neural Network
Week 15	FPGA with MATLAB
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	An introduction to the FPGA board - Vivado IDE
Week 2	VHDL code for Shift Register
Week 3	VHDL code for Multiplexer
Week 4	VHDL code for a counter
Week 5	VHDL code for SSD counter
Week 6	VHDL code for Full Adder
Week 7	VHDL code for Traffic Light Controller
Week 8	VHDL code for ALU
Week 9	VHDL code for Function and Procedure
Week 10	Mid-Term Exam
Week 11	VHDL code for MAC
Week 12	VHDL code for FIR Filter
Week 13	VHDL code for LPF Filter
Week 14	VHDL code for NN
Week 15	MATLAB to FPGA
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Volnei A. Pedroni, "Circuit design with VHDL", MIT Press, 2004.	yes
Recommended Texts	Stephan Brown and Zvonko Vranesic, "Fundamentals of Digital Logic with VHDL Design", McGraw-Hill, 2000	no
Websites	https://nandland.com/fpga-101/	

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

برمجة بلغة بايثون

Module Information			
معلومات المادة الدراسية			
Module Title	Python Language Programing		Module Delivery
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11612		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGIII	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents			
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أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	20. To define the fundamental concepts of Python programming. 21. To introduce the principles of coding 22. To learn problem-solving using Python. 23. To learn various programming techniques and structures in Python.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	17. Understand the fundamental concepts, syntax of Python, write and execute scripts Python. 18. Utilize variables, data types & operators, loops and conditional statements. 19. Define and use functions to create modular code. 20. Work with data structures like lists, tuples, dictionaries, and sets. 21. Handle files and perform basic input/output operations.
Indicative Contents المحتويات الإرشادية	12. Syntax of Python 13. Loops and conditional statements 14. Data structures 15. Input / Output operations.

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 coding exercises, while at the same time refining and expanding their problem-solving and critical thinking skills. This will be achieved through interactive lectures, hands-on coding tutorials, and engaging programming tasks that involve real-world applications and challenges relevant to the students.
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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	
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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	12	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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	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 Python and Computer Programming; Python as a programming tool; Different Python versions; Setting up the Python environment
Week 2	Data Types and Variables; Writing your first Python program; Understanding literals and variables; Basic input and output operations
Week 3	Basic Operators; Arithmetic, comparison, and logical operators; Operator precedence and associativity
Week 4	Conditional Execution; Implementing conditional statements; Nested conditions and conditional expressions
Week 5	Loops; Understanding and using 'while' and 'for' loops; Loop control mechanisms: break, continue, and else clauses
Week 6	Lists and List Processing; Creating and modifying lists; List operations and methods; Sorting algorithms, including bubble sort
Week 7	Logical and Bitwise Operations; Boolean logic in Python; Bitwise operators and their applications
Week 8	Functions; Defining and invoking functions; Function parameters, arguments, and return values; Scope and lifetime of variables
Week 9	Tuples and Dictionaries; Creating and using tuples; Understanding dictionaries and their methods
Week 10	Mid-Term Exam
Week 11	Exception Handling; Understanding errors and exceptions; Try-except blocks; Handling multiple exceptions and using 'finally'
Week 12	Modules and Packages; Importing and using modules; Exploring Python packages; Standard libraries and third-party modules
Week 13	String and List Methods; String operations and methods; Advanced list methods and comprehensions
Week 14	Course Review; Comprehensive review of all topics; Hands-on project to apply learned concepts; Preparation for PCEP and PCAP certifications
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Installing Python, Exploring Python versions, Writing and running a basic Python program
Week 2	Declaring and using different data types (int, float, string), Understanding literals and variables, Implementing basic input and output operations

Week 3	Writing programs that use arithmetic, comparison, and logical operators, Understanding operator precedence and associativity
Week 4	Implementing if, elif, and else statements, Writing programs with nested conditions, Using conditional expressions to simplify code
Week 5	Creating programs with 'while' and 'for' loops, Implementing loop control mechanisms like break, continue, and else clauses
Week 6	Writing programs that create and modify lists, Using list operations and methods, Implementing sorting algorithms like bubble sort
Week 7	Writing programs that use Boolean logic, Implementing bitwise operators for efficient data manipulation
Week 8	Defining and invoking functions, Passing arguments and returning values, Understanding function scope and lifetime of variables
Week 9	Writing programs to create and use tuples, Implementing dictionaries and utilizing their methods for efficient data storage and retrieval
Week 10	Mid-Term Exam
Week 11	Writing programs that use try-except blocks, Handling multiple exceptions, Using 'finally' for clean-up operations
Week 12	Creating and importing custom modules, Exploring Python packages, Using standard and third-party libraries in programs
Week 13	Implementing string manipulation and advanced list operations, Writing programs using string methods, List comprehensions for efficient data processing
Week 14	Developing a comprehensive project that incorporates all course topics, Applying learned concepts to build a functional Python application, Preparing for PCEP and PCAP certification exam scenarios
Week 15	Course Review
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Python Crash Course" by Eric Matthes	yes

Recommended Texts	"Automate the Boring Stuff with Python" by Al Sweigart	no
Websites	https://realpython.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

شبكات الحاسبات

Module Information معلومات المادة الدراسية		
Module Title	Computer Networks	Module Delivery

Module Type	C	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11701		
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	UGIV	Semester of Delivery	1
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<p>24. To introduce the basic concepts related computer networks.</p> <p>25. To overview the layers of the most common models of computer networks.</p> <p>26. To present the main concerns of the Physical Layer of the OSI reference model.</p> <p>27. To detail Ethernet and Wi-Fi as two of the most important Data-link Layer protocols.</p> <p>28. To cover the details regarding IPv4 as the most important Network Layer protocol.</p> <p>29. To illustrate in details TCP and UDP as the most common Transport Layer protocols.</p> <p>30. To give brief description about the most common services, protocols and applications of the Application Layer.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>1. Recognize the basic components of computer networks.</p> <p>2. List the main functions and responsibilities of each layer of OSI reference model and TCP/IP model.</p> <p>3. Discuss Ethernet and WiFi protocols as well as their MAC mechanisms.</p> <p>4. Explain IPv4 and describe fragmentation and routing of the Network Layer.</p> <p>5. Detail and specify addressing and subnetting scenarios of IPV4.</p> <p>6. Present the main protocols, functions and services of the Transport Layer.</p> <p>7. List the main functions and protocols of the Application Layer.</p> <p>8. Design, install, manage and maintain wired and wireless LANs.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>1. Basic Concepts and networking models [8 hrs]</p> <p>2. Physical Layer. [4 hrs]</p> <p>3. Data-link Layer. [8 hrs]</p> <p>4. Network Layer. [28 hrs]</p> <p>5. Transport Layer. [8 hrs]</p> <p>6. Application Layer. [4 hrs]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>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.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	Introduction/ Categories, Protocols, Switching, Transmission modes, Transfer Rates
Week 2	Networking Models/ OSI reference model , TCP/IP model
Week 3	Physical Layer/ Mediums, Topologies, Noise, Losses , Timing, Coding, repeaters, hubs
Week 4	Data-link layer/ Ethernet: Evolution and Standards, format , CRC, CSMA/CD, bridges, switches
Week 5	Data-link layer/ WiFi: Evolution and Standards, Signaling, Link budget, Format, CSMA/CA, DCF , PCF, access points
Week 6	Network Layer/ IPv4: Format, Fragmentation, Routing, routers
Week 7	Network Layer/ Ipv4: Classful Addressing
Week 8	Network Layer/ IPv4: Classless Addressing
Week 9	Network Layer/ NAT, ICMP, ARP
Week 10	Mid-Term Exam
Week 11	Network Layer/ IPv6 : Format, Extension Headers, Addressing, Tunneling
Week 12	Network layer/ Introduction to Routing protocols: RIP, OSPF
Week 13	Transport layer/ UDP: Format, Services, Applications; TCP: Format, Services, Applications
Week 14	Transport Layer/TCP: Flow Control, Error Control, Connection Establishment, Connection Termination
Week 15	Application Layer/ E-Mail (SMTP, POP3), File Transferring (FTP), DNS , Web (HTTP, HTML)

Week 16	Final Exam
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Cabling
Week 2	Ethernet LANs
Week 3	WLANs
Week 4	Sharing resources in Windows Oss
Week 5	Cisco Packet Tracer, CLI of Cisco IOS
Week 6	Physical Layer Devices, Data Link Layer Devices, Network Layer Devices
Week 7	Subnetting (FLSM)
Week 8	Subnetting (VLSM)
Week 9	IPv6
Week 10	Mid-Term Exam
Week 11	Routing (static)
Week 12	Routing (dynamic)
Week 13	VLANs
Week 14	DHCP
Week 15	DNS
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<i>Data Communications and Networking</i> , Behrouz A. Forouzan, 5 th Edition, McGraw-Hill	No
Recommended Texts	<i>TCP/IP Protocol Suite</i> , Behrouz A. Forouzan, 4 th Edition, McGraw-Hill	No
Websites	https://cnj.atu.edu.iq/wp-content/uploads/2023/06/YouTubelinks-laith-wajeeh.pdf	

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

اتصالات لاسلكية

Module Information			
معلومات المادة الدراسية			
Module Title	Wireless Communications		Module Delivery
Module Type	C	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11702		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGIV		
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<ul style="list-style-type: none"> To provide students with a foundational understanding of wireless communication systems and their challenges. To introduce the characteristics of wireless channels, including path loss, shadowing, and multipath fading. To familiarize students with modulation techniques and multiple access schemes used in wireless communications. To provide an overview of emerging wireless technologies and applications.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> Explain the fundamental principles of wireless communication systems. Analyze and model wireless channel characteristics, including path loss, shadowing, and multipath fading. Understand and apply various modulation and multiple access techniques used in wireless communications. Describe the architecture and operation of wireless sensor networks. Explain the principles of the Global Positioning System (GPS). Discuss emerging wireless technologies and their applications. Understand the challenges of wireless communications. Understand the frequency spectrum and regulatory issues.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative Contents (by Week):</p> <ul style="list-style-type: none"> Week 1: Introduction to wireless communication systems, applications, challenges, and frequency spectrum. Weeks 2-3: Wireless channel characteristics: path loss models, shadowing, measurements, and link budget analysis. Weeks 4-5: Wireless channel characteristics: multipath propagation, small-scale fading (Rayleigh, Ricean), Doppler spread, and coherence time. Week 6: Multiple Access Techniques (TDMA/FDMA/CDMA/SDMA).

	<ul style="list-style-type: none"> • Week 7: Diversity techniques: concepts, time, frequency, and space diversity, selection combining, and maximal ratio combining. • Week 8: Mid-term exam. • Weeks 9-11: Cellular networks: cellular network principles, cell splitting, sectoring, frequency reuse, and handoff, coverage, interference. • Weeks 12-14: Wireless sensor networks: introduction, architecture, and energy efficiency. • Weeks 15: Emerging wireless technologies and applications: Internet of Things (IoT), wireless sensor networks, millimeter-wave communications, and visible light communication (VLC).
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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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 /Seminar	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 Communications <ul style="list-style-type: none"> Overview of wireless communication systems.

	<ul style="list-style-type: none"> • Applications and evolution of wireless technologies. • Challenges of wireless communications. • Frequency spectrum and regulatory issues.
Week 2-3	Wireless Channel Characteristics: Path Loss and Shadowing <ul style="list-style-type: none"> • Path loss models (free-space, two-ray). • Shadowing/log-normal fading. • Path loss and shadowing measurements. • Link budget analysis.
Week 4-5	Wireless Channel Characteristics: Multipath Fading <ul style="list-style-type: none"> • Multipath propagation and its effects. • Small-scale fading (Rayleigh, Ricean). • Doppler spread and coherence time.
Week 6	Multiple Access Techniques <ul style="list-style-type: none"> • Time / Frequency / Code division multiple access (TDMA, FDMA, CDMA). • Space division multiple access (SDMA).
Week 7	Modulation Techniques for Wireless Channels <ul style="list-style-type: none"> • Review of digital modulation (ASK, FSK, PSK, QAM). • Modulation techniques for fading channels (OFDM). • Performance analysis in fading channels.
Week 8	Mid -Term Exam
Week 9-11	Cellular Networks <ul style="list-style-type: none"> • Cellular network principles. • Cell splitting, sectoring, frequency reuse. • Handoff and mobility management. • Co-channel interference and S/I ratio. • Coverage and Capacity in Cellular Systems.
Week 12	Introduction to Wireless Sensor Networks <ul style="list-style-type: none"> • Definition and characteristics of WSN.

	<ul style="list-style-type: none"> • Applications of WSN (Healthcare, Military, Smart Cities, IoT, etc.) • Comparison with other wireless networks.
Week 13	WSN Architectures <ul style="list-style-type: none"> • Sensor node architecture (Hardware and Software components). • Network topologies (Star, Mesh, Cluster-based). • Communication stack for WSN (MAC, Network, Transport layers).
Week 14	Energy Efficiency in WSN <ul style="list-style-type: none"> • Energy consumption sources in sensor nodes. • Energy-efficient communication protocols. • Duty-cycling and sleep scheduling.
Week 15	Emerging Wireless Technologies and Applications <ul style="list-style-type: none"> • Internet of Things (IoT) and wireless sensor networks. • Millimeter-wave communications. • Visible light communication (VLC).
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Wireless Communications" by Andrea Goldsmith	No
	Gary S. Rogers and John S. Edwards, "An Introduction to Wireless Technology", 1st Edition. ISBN-13: 978-0130949868.	Yes
	Simon O. Haykin and Michael Moher, "Modern Wireless Communications", 1st Edition. ISBN-13: 978-0130224729.	Yes

	X. Wang and H. Vincent Poor "Wireless communication systems: Advanced techniques for signal reception, ISBN-13: 978-0130214355.	Yes
Recommended Texts	"Wireless Communications: Principles and Practice" by Theodore S. Rappaport.	No
	"Fundamentals of Wireless Communication" by David Tse and Pramod Viswanath.	No
	Andreas F. Molisch," Wireless communications: from fundamentals to beyond 5G", ISBN-13: 978-1119117209.	NO
	H. Kim, "Wireless Communications Systems Design" 1st Edition, ISBN-13978-1118610152.	No
Websites	https://www.elprocus.com/wireless-communication-seminar-topics/	

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

اتصالات ضوئية

Module Information			
معلومات المادة الدراسية			
Module Title	Optical Communication		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11703		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIV	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	During this course, students will study the major elements of optical communication systems and analytical methods to evaluate their performance and key design features. Students will examine and think critically about historical technology solutions in the evolution of optical communication systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course students will be able to: 4- Be conversant in the major application areas for optical communication systems. 5- Analytically evaluate the performance and technical merits of an optical communication system. 6- Analyze and design an optical communication system.
Indicative Contents المحتويات الإرشادية	4- Optical communication system. 5- Multi-channel systems. 6- Optical Networks.

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.
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 1,2	Optical transmitter system: Optical modulator, intensity modulator/ direct detection, Optical Receiver system Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers.
Week 3,4	Optical receiver system (detectors): Introduction, Optical Receiver Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers.
Week 5	Optical fiber connection: joints, couplers and isolators.
Week 6	Optical repeaters.
Week 7	Multichannel system: WDM system: Components, multiplexers/demultiplexers, add/drop (de)multiplexers, spectral efficiency, crosstalk.
Week 8,9	Time -division multiplexing (TDM) Code-division multiplexing (CDM) Dence-wavelength division multiplexing (DWDM)

Week 10	Mid-Term Exam
Week 11,12	Optical amplifiers: basic applications and types, Semiconductor optical amplifiers, Fiber and waveguide amplifiers, Wavelength conversion, Optical regeneration, EDFA.
Week 13,14	Optical networks: Introduction, Basic concepts, Introduction, SONET / SDH, Optical Interfaces, SONET/SDH rings, High – speed light – waveguides.
Week 15	Optical network transmission modes, layers and protocols, Wavelength routing networks, Optical switching networks, Optical Ethernet, Network protection and survivability
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Effect of bandwidth on signal quality.
Week 2	Noise analysis in optical receivers.
Week 3	Temporal response of optical receivers.
Week 4	Dispersion in optical fibers. Experiment: Experiment:
Week 5	Mode study in multimode fibers.
Week 6	Effect of dispersion on data transmission rate.
Week 7	Amplitude Modulation (AM) in optical communication.
Week 8	Frequency Modulation (FM) using optical link.
Week 9	Digital modulation – On-Off Keying (OOK).

Week 10	Mid-Term Exam
Week 11	Optical interference using interferometer.
Week 12	Optical filters and their applications in communication.
Week 13	WDM (Wavelength Division Multiplexing) techniques. DWDM (Dense Wavelength Division Multiplexing) techniques.
Week 14	Simulation of optical systems using OptiSystem / MATLAB.
Week 15	Design and testing of a small optical communication link (transmitter–fiber–receiver) with performance analysis.
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	3- Optical Fiber Communication – Gerd Keiser, 4th Ed., MGH, 2008. 4- Optical Fiber Communications – – John M. Senior, Pearson Education. 3rd Impression, 2007.	yes
Recommended Texts	1- Fiber optic communication – Joseph C Palais: 4th Edition, Pearson Education. 2- Agrawal, G.: Fiber-Optic Communication Systems , 4th Ed., Wiley 2010	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

سيطرة

Module Information		
معلومات المادة الدراسية		
Module Title	Control	Module Delivery
Module Type	B	<input checked="" type="checkbox"/> Theory
Module Code	ATU11704	<input type="checkbox"/> Lecture

ECTS Credits	7	<input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
SWL (hr/sem)	175		
Module Level	UGIV	Semester of Delivery	1
Administering Department	COMM.	College	NTEC
Module Leader	Ahmad T Abdulsadda	e-mail	Coj.abdulsad@atu.edu.iq
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives	
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أهداف المادة الدراسية	<p>50. To provide an introduction to the classical control systems.</p> <p>51. To developing mathematical models to design electromechanical systems using transfer function root locus and frequency response design techniques.</p> <p>52. In additive, analysis and implementation of digital control system.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>75. Designing engineering</p> <p>76. Modelling engineering</p> <p>77. Simulator skills</p>
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>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.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	82	Structured SWL (h/w)	
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الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	93	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	Introduction Introduction to control system - Definitions - Historical background - Mathematical background - General natural of engineering control problem - Basic elements of control system - Type of control system - Closed loop - Open loop - Time variant - Time invariant system - linear & non-linear system.
Week 2	Mathematical model of dynamic system Mathematical model of writing differential equation - Electrical circuit components - Resistance - Capacitance - Inductance - Analogy of electrical system
Week 3	Mathematical model of mechanical system - Translation system - Mass - Spring - Dashpot - Rotational system - Analogy of mechanical system- Transfer function - How to determine the transfer function - Advantage - Disadvantage - Properties of transfer function - Multivariable of transfer function.
Week 4	Block diagram Definition of basic block elements - Procedure of drawing lock diagram - Block diagram reduction algebra - Mason's formula
Week 5	Time response analysis Transient and steady-state region of response - Standard test signals - How to determine order of system from transfer - First order system - Second order system - Time response specification - Example of first order and second order - Higher order system response.
Week 6	Steady-state error response Type of control system - How to determine order from transfer function - Position velocity and acceleration error constant - Method of dynamic error constant.

Week 7	System stability Routh-Hurwitz criteria - Poles and zeros definition - Relation between system parameter and poles location.
Week 8	a- Root-locus analysis.
Week 9	b- Root-locus analysis.
Week 10	Frequency response analysis Advantage and disadvantage of frequency analysis - Time concept of frequency response - Plotting of frequency response - Frequency response specification
Week 11	Phase margin - Gain margin - Bode plot phase margin and gain margin of bode plot.
Week 12	Nyquist stability analysis
Week 13	Design of control system Design of control system from frequency response - Lead compensator - lag compensator - lead-lag compensator.
Week 14	Tunable PID controllers
Week 15	Linear versus nonlinear systems
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: MATLAB overview: Laplace and Laplace Inverse function- Polynomial Representations- Transfer function- electrical control systems.
Week 2	Lab 2: Continuous Time ZPK model in MATLAB.
Week 3	Lab 3: Parital Fraction model in MATLAB.

Week 4	Lab 4: Block Diagram models: open loop- closed loop- feed back connection- series- parallel.
Week 5	Lab 5: Modeling control system using Simulink- system response characteristics.
Week 6	Lab 6: Frequency domain response: data, plot and characteristics.
Week 7	Lab 7: Root locus and Routh-Hurwits.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<p>Feedback Control Systems by philips and Harbor (3rd Edition).</p> <p>Digital Control and State variable methods: Conventional and Intelligent control systems, by M.Gopal, Tata McGraw Hill, 3rd Ed., 2009.</p>	Yes
Recommended Texts	<p>Modern Control System by Richard C. Dorf (5th Edition).</p> <p>Control Sytem Design using MATLAB by Bahram Shahian & Michael Hassul.</p> <p>User's Guide for The Student Edition of MATLAB by Duane Hanselman & Bruce Littlefield.</p> <p>H. K. Khalil, 'Nonlinear Systems', Prentice Hall, 3rd Ed., 2002.</p> <p>S.Sastry, 'Nonlinear Systems: Analysis, Stability and Control', Springer, 1999.</p>	Yes

Websites	
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Grading Scheme مخطط الدرجات				
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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

إدارة مشاريع

Module Information معلومات المادة الدراسية		
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Module Title	Projects Management	Module Delivery
Module Type	B	<input checked="" type="checkbox"/> Theory

Module Code	ATU11705		<input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	UGIV	Semester of Delivery	1	
Administering Department		College	NETC	
Module Leader		e-mail		
Module Leader's Acad. Title		Module Leader's Qualification		
Module Tutor	Name (if available)	e-mail		
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives</p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1- Project Foundations: Understand the project management life cycle, initiate projects effectively, and select suitable projects using decision-making tools. 2- Planning and Proposals: Develop comprehensive project proposals, define scope and responsibilities, and create a Work Breakdown Structure (WBS) for detailed planning. 3- Execution and Control: Implement scheduling, resource assignment, budgeting techniques, and risk management strategies to ensure project success. 4- Leadership and Communication: Enhance team engagement through effective leadership, ethical practices, and robust communication and documentation methods.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1- Project Feasibility and Alignment: Apply project selection methods to evaluate project feasibility and assess contributions to business strategy and goals. 2- Stakeholder Collaboration: Work closely with stakeholders to determine and document project goals, performance requirements, and deliverables. 3- Project Management Practices: Select and implement appropriate project management practices, tools, and methodologies tailored to project needs. 4- Requirements and Constraints: Define, analyze, and document project requirements, assumptions, constraints, and performance criteria for quality assurance. 5- Planning and Estimation: Develop a comprehensive project plan, including schedule, budget, resources, and a Work Breakdown Structure (WBS), while refining time and cost estimates. 6- Progress Management: Manage project progress through performance reporting and analysis, ensuring activities are executed as planned, and communicate updates to stakeholders. 7- Risk Management: Identify, assess, and respond to project risks and issues, implementing corrective actions as necessary. 8- Closure and Documentation: Facilitate project closure by obtaining final acceptance of deliverables, documenting lessons learned, preserving essential records, and ensuring compliance with legal requirements.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<ol style="list-style-type: none"> 1. Introduction to Project Management <ul style="list-style-type: none"> • Overview of project management principles • Importance of the project life cycle 2. Project Selection and Initiation <ul style="list-style-type: none"> • Methods for project selection • Evaluating project feasibility • Aligning projects with business strategy 3. Stakeholder Engagement <ul style="list-style-type: none"> • Identifying and analyzing stakeholders • Techniques for effective communication and collaboration 4. Project Planning

- Defining project goals and performance requirements
- Documenting deliverables and project scope
- Selecting project management methodologies and tools

5. Requirements and Constraints

- Defining and refining project requirements
- Identifying assumptions and constraints

6. Scheduling and Budgeting

- Developing project schedules and budgets
- Creating a Work Breakdown Structure (WBS)
- Time and cost estimation techniques

7. Project Execution and Monitoring

- Managing project progress and performance
- Applying performance reporting and analysis techniques
- Communicating progress to stakeholders

8. Risk Management

- Identifying and assessing project risks
- Developing risk response strategies
- Monitoring risk events and issues

9. Team Management

- Selecting, leading, and managing project teams
- Conflict resolution and team dynamics

10. Project Closure

- Final acceptance of deliverables
- Documenting lessons learned
- Administrative and financial closure procedures
- Preserving project records for compliance

11. Ethical Considerations in Project Management

- Understanding ethical responsibilities
- Promoting integrity and ethical practices in projects

12. Types of Project Organizations

- Exploring different organizational structures
- Impacts on project management effectiveness

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> 1- Clear Goals and Planning: Establish SMART goals and develop comprehensive project plans that outline scope, schedule, budget, and risk management. 2- Stakeholder Engagement and Communication: Actively involve stakeholders and maintain open communication channels to ensure transparency and alignment throughout the project. 3- Proactive Risk Management: Identify and assess potential risks early, implementing mitigation strategies to minimize impact on project outcomes. 4- Performance Monitoring: Use metrics and reporting tools to track progress, make adjustments as needed, and ensure deliverables meet quality standards. 5- Team Development and Continuous Improvement: Invest in team building and foster a culture of continuous improvement through regular reviews and knowledge sharing.
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 /Siminar	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	Course Introduction; Project Management Life cycle and processes; Initiating the Project
Week 2	Identifying and selecting projects (Decision Making)
Week 3	Developing Project Proposals; Proposed Solutions (Bid/No-Bid Decisions; Proposals)
Week 4	Techniques for planning a project; Defining Scope, Quality, Responsibility, and Activity Sequence; Create a Work Breakdown Structure
Week 5	The Project Manager (MBTI, VIA Strengths) Business Case for a Positive Workplace; Engagement
Week 6	Techniques for scheduling a project; Developing the Schedule
Week 7	Techniques for resource assignments to a project: Resource Utilization
Week 8	Techniques for budgeting a Project; Determining costs, budget, and Earned Value

Week 9	Techniques for assessing and managing project risks; Developing a risk matrix
Week 10	Mid -Term Exam
Week 11	Techniques for Controlling a project; Project performance measurement; Cost Control; Closing the project
Week 12	The Project Manager (Ethics)
Week 13	The Project Team (Leading vs. Managing; Conflict)
Week 14	Project Communication & Documentation
Week 15	Types of Project Organizations
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<i>Project Management</i> , Harold Kerzner, Wiley Publishing, 2013, 11th Edition, ISBN 9781118022276	Yes
Recommended Texts		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

اخلاقيات المهنة

Module Information			
معلومات المادة الدراسية			
Module Title	اخلاقيات المهنة		Module Delivery
Module Type	S		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11706		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGIV	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	

Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. To introduce the students to the basic elements of ethics. 2. To cover the principles of ethics, the philosophy of ethical concepts, the ethical decision-making models, and relevant case studies. 3- To introduce the basics concepts of research ethics. 4- To review the students of the university education ethics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. An understanding of the principles of ethics in applied professional situations. 2. An understanding of the research ethics. 3. An understanding of the university education ethics
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none"> 1. مفاهيم أخلاقيات المهنة. 2. أسباب عدم الالتزام بأخلاقيات المهنة. 3. أهم خصائص الاحتراف المهني. 4. أخلاقيات البحث العلمي. 5. أخلاقيات الطالب الجامعي.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1- Lectures.
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- 2- Group discussion and presentation.
- 3- Case studies.
- 4- Collaborative learning.
- 5- Teamwork.

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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

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 /Seminar	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

Summative assessment	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	أهمية أخلاقيات المهنة
Week 2	المفاهيم الأساسية في أخلاقيات المهنة
Week 3	القيم الأخلاقية للمهنة والمبادئ المشتقة منها
Week 4	الخصائص الخلقية الواجب توافرها في الفرد
Week 5	الاطار العام لتقييم أخلاقيات المهنة
Week 6	المبادئ التي تبعد الممارسات المهنية غير المقبولة و أسباب عدم الالتزام بأخلاقيات المهنة.
Week 7	أهمية ; أهمية الاخلاقيات المهنية للمجتمع ; أهم خصائص الاحتراف المهني : أهمية أخلاقيات المهنة للموظفين الاخلاقيات المهنية للمؤسسات المهنية.
Week 8	أخلاقيات المهنة في العمل المهني من الناحية الادارية والمهنية وفق الاطر الوظيفية والعائلية والمجتمعية
Week 9	مراحل كتابة ; فرضيات البحث ; شروط صياغة العنوان ; اخلاقيات البحث العلمي : اخلاقيات المقدمة واهمية البحث البحث.
Week 10	Mid -Term Exam
Week 11	كيفية وضع مقترح أو الية العمل الاخلاقي ومن اي مصدر ينبثق في مؤسسة أو شركة إذا كنت مسؤول (مع المسؤول/ مع الزملاء / مع الزبائن
Week 12	اخلاقيات الطالب الجامعي
Week 13	انماط الطالب الجامعي
Week 14	مشاكل الطالب في المرحلة الجامعية, واجبات الطالب الجامعي في الحياة الاكاديمية وغير الاكاديمية
Week 15	ترشيد الممارسات الاخلاقية للطلبة الشباب في الفضاءات الرقمية
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts		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

ذكاء صناعي

Module Information			
معلومات المادة الدراسية			
Module Title	Artificial Intelligence		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11807		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIV	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>In general, the Artificial Intelligence course aims to prepare a generation of professionals capable of contributing to the development and deployment of this transformative technology in a responsible and effective manner.</p> <ol style="list-style-type: none">31. Understand the basic concepts of artificial intelligence.32. Learn basic algorithms and techniques.33. Develop programming and application skills.34. Critical thinking and problem-solving.35. Apply artificial intelligence in diverse fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none">1 Analyze complex problems and determine the appropriateness of using AI techniques to solve them.2 Select the appropriate algorithm and approach to design an AI system for a specific problem.3 Evaluate the performance of AI and machine learning models using appropriate evaluation metrics.4 Apply critical thinking in analyzing research papers and articles related to AI.5 Identify the potential limitations and risks of AI systems in different contexts.
Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none">- Definition of Artificial Intelligence- Types of Artificial Intelligence- Areas of AI Applications- Challenges and Ethics in AI- Overview of Tools and Languages Used

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>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.</p>
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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)		
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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Supervised Learning, Linear Regression
Week 2	LMS Algorithm, The Normal Equations, Matrix Derivatives, Least Squares
Week 3	Classification: Logistic Regression, Perceptron Learning Algorithm, Multi-class Classification
Week 4	Generative Learning Algorithms: Gaussian Discriminant Analysis, Naive Bayes
Week 5	Generative Learning Algorithms: Naive Bayes
Week 6	Kernel Methods, Feature Maps, LMS with Kernel Trick, Properties of Kernels
Week 7	Support Vector Machines: Margins, Optimal Margin Classifier
Week 8	Deep Learning: Neural Networks, Backpropagation, Vectorization
Week 9	Generalization: Bias-Variance Tradeoff
Week 10	Mid-Term Exam
Week 11	Regularization and Model Selection: Cross Validation, Bayesian Regularization
Week 12	Unsupervised Learning: Clustering, K-Means Algorithm, EM Algorithms
Week 13	Principal Component Analysis, Independent Component Analysis
Week 14	Reinforcement Learning: Markov Decision Processes, Value Iteration, Policy Iteration
Week 15	Regularization and Model Selection: Cross Validation, Bayesian Regularization
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	<p>Implement Linear Regression using the Gradient Descent method</p> <p>Solve for the optimal parameters using the Normal Equation</p> <p>Visualize the linear regression results on a dataset</p> <p>Compare the performance of Gradient Descent vs. Normal Equation</p>
Week 2	<p>Implement the LMS algorithm to solve linear regression problems</p> <p>Use matrix operations to compute derivatives</p> <p>Analyze the performance of LMS algorithm on different datasets</p>
Week 3	<p>Implement the Normal Equation to solve linear regression</p> <p>Compare results of LMS vs. Normal Equation in terms of accuracy and computational efficiency</p>
Week 4	<p>Implement logistic regression for binary classification</p> <p>Train the model on a classification dataset (e.g.</p> <p>Evaluate the model performance using accuracy</p>
Week 5	<p>Implement the Perceptron algorithm for binary classification</p> <p>Extend the algorithm to solve multi-class classification problems</p> <p>Visualize the decision boundary of the classifier</p>
Week 6	<p>Implement Gaussian Discriminant Analysis (GDA) on a simple dataset</p> <p>Compare GDA with logistic regression for classification performance</p>

Week 7	Implement Naive Bayes classification for a dataset with both continuous and categorical features Evaluate the performance of Naive Bayes against other classifiers
Week 8	Implement kernel methods for feature transformation Apply the LMS algorithm with kernel trick on non-linear datasets Visualize the effect of kernels on the data
Week 9	Implement the SVM with a linear kernel Experiment with different SVM models and kernels Visualize the margins and support vectors on a 2D dataset
Week 10	Mid-Term Exam
Week 11	Implement a neural network from scratch Train a neural network on a simple dataset Visualize the training process and the learned weights
Week 12	Implement vectorized neural networks using NumPy Compare the performance of vectorized vs. non-vectorized implementations
Week 13	Implement and visualize Principal Components Analysis
Week 14	Visualize bias-variance tradeoff through learning curves
Week 15	Experiment with regularization techniques to combat overfitting
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
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Required Texts	"Pattern Recognition and Machine Learning" by Christopher M. Bishop	yes
Recommended Texts	"Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy	no
Websites	Coursera - Machine Learning by Andrew Ng	

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
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	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

الامن السبراني

Module Information			
معلومات المادة الدراسية			
Module Title	Cyber Security	Module Delivery	
Module Type	Core	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	ATU11809		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGIV	Semester of Delivery	2
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>53. To develop problem solving skills and understanding of cyber and security theory through the application of techniques.</p> <p>54. To understand play fair, Hill, AES, and DES algorithms.</p> <p>55. This course deals with the basic concept of Cyber system.</p> <p>56. This is the basic subject for all security algorithm.</p> <p>57. Rail fence and double Coolum transposition</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>The students will be able dealing with how does with cyber system , all types of algorithms of cipher system.</p>
Indicative Contents المحتويات الإرشادية	<p>Need some more information about mathematical Modula</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>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,</p>
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	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)		
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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to communication cyber : security trends; security attacks; security mechanisms.
Week 2	Classical encryption techniques: symmetric cipher model; substitution techniques (Caesar cipher, monoalphabetic cipher; Playfair cipher, Hill cipher, polyalphabetic ciphers, and one-time pad); transposition techniques (rail fence technique, columnar technique, double columnar technique).
Week 3	Block cipher and data encryption standard (DES): Block cipher principles (Feistel cipher, Feistel cipher structure, Feistel decryption algorithm); DES encryption; DES decryption; differential and linear cryptanalysis; block cipher design principles
Week 4	Advanced encryption standard (AES): substitution bytes transformation;; MixColumns transformation;
Week 5	ShiftRow transformation
Week 6	AddRoundKey transformation;
Week 7	Mid-term Exam
Week 8	Equivalent inverse cipher
Week 9	Multiple encryption: double DES; triple DES with two keys; triple DES with three keys.
Week 10	electronic codebook mode
Week 11	Security applications on computer networks:

	E-mail security; IP security; web security.
Week 12	Digital signatures and authentication protocols: digital signatures; digital signature standard; authentication protocols
Week 13	Block cipher modes of operation: electronic codebook mode; cipher block chaining mode; cipher feedback mode; output feedback mode; counter mode.
Week 14	Stream ciphers and RC4: stream cipher structure; RC4 algorithm
Week 15	Public-key cryptography: Public-key cryptosystem; Public-key cryptanalysis.
Week 16	RSA algorithm: description of the algorithm; computational aspects; RSA security.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➤ William Stallings, "Cryptography & Network Security," latest edition	Yes
Recommended Texts	➤ Bruce Schneier, "Applied Cryptography" latest edition	yes
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
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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

اتصالات الأقمار الصناعية

Module Information معلومات المادة الدراسية			
Module Title	Satellite Communication		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11808		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGIV	Semester of Delivery	

Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Wasan Kadhim Saad	e-mail	E-mail { was-saad@atu.edu.iq}
Module Leader's Acad. Title	Asst. Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. To study the satellite systems and their transmitting and receiving stations with knowledge of the different types of orbits. 2. To derive the antenna parameters and the power radiated by the isotropic antenna of ground stations.
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	<p>3. To study the effect of system noise temperature on the receiving equipment of the satellite systems.</p> <p>4. To understand the effect of different atmospheric conditions on signal transmission for the individual link performance over satellite systems.</p> <p>5. To study the overall link performance with transparent satellite</p> <p>6. To understand the basic characteristics of satellite networks</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Students will be able to identify the basic components of a satellite communications system.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Need some more information about mathematical Modula</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>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.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<p>Structured SWL (h/sem)</p>	<p>33</p>	<p>Structured SWL (h/w)</p>	
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الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	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
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Week 1	INTRODUCTION: The birth of satellite communications, Satellite com. services, Satellite com. system, The organization of a satellite communications system (Space segment, Earth segment).
Week 2	Types of orbits (Elliptical orbits, Circular Low Earth Orbits (LEO), Circular Medium Earth Orbits (MEO), Geostationary Orbits (GO)), The altitude of satellite in GO.
Week 3	LINK ANALYSIS: The characteristic parameters of an antenna (gain, the angular beam width), The power emitted in a given direction (Effective isotropic radiated power (EIRP), power flux density).
Week 4-5	Radio power, Received signal power (power received by the receiving antenna, Example 1: Uplink received power, Example 2: Downlink received power. Additional losses.
Week 6-7	Noise power spectral density at the receiver input: The origins of noise, Noise characterization, Noise temperature of a noise source, Effective input noise temperature, Effective input noise temperature of an attenuator, Effective input noise temperature of cascaded elements, Effective input noise temperature of a receiver.
Week 8	Noise temperature of an antenna: Noise temperature of a satellite antenna (uplink), Noise temperature of an earth station antenna (the downlink), 'Clear sky' conditions, Conditions of rain, System noise temperature,
Week 9	INDIVIDUAL LINK PERFORMANCE: Carrier power to noise power spectral density ratio at receiver input. Example 1: Uplink (clear sky), Example 2: Downlink (clear sky).
Week 10	Link performance under rain conditions: Example 3: Up link (with rain), Example 4: downlink (with rain).
Week 11	OVERALL LINK PERFORMANCE WITH TRANSPARENT SATELLITE: Characteristics of the satellite channel, Satellite power flux density at saturation, Satellite EIRP at saturation, Satellite repeater gain, Input and Output Back-Off, Carrier power at satellite receiver input.
Week 12	Expression for $(C/N_0)_T$: Expression for $(C/N_0)_T$ without interference from other systems or intermodulation, Expression for $(C/N_0)_T$ taking account of interference, Expression for $(C/N_0)_T$ taking account of intermodulation and interference.

Week 13-14	Example [calculation the repeater gain at saturation(G_{sat}) _{SL} , the $(C/N_0)_{U,sat}$, $(C/N_0)_{D,sat}$, and $(C/N_0)_{T,sat}$, the IBO, OBO, $(C/N_0)_U$, and $(C/N_0)_D$ for $(C/N_0)_T = 80\text{dB}$, the $(C/N_0)_T$ under the rain causing an attenuation of (6dB) on the up-link.
Week 15	The basic characteristics of satellite networks.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➤ Gerard Maral and Michel Bousquet ,”Satellite Communications Systems; Systems, Techniques and Technology”, <i>Fifth Edition, John Wiley & Sons Ltd., 2009.</i>	Yes
Recommended Texts	➤ Dennis Roddy,” Satellite Communications”, <i>Fourth Edition, McGraw-Hill Companies, Inc., 2006.</i>	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

اتصالات الموبايل

Module Information			
معلومات المادة الدراسية			
Module Title	Mobile communications		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11810		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIV	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	36. To expose the students to the most recent technological developments in Mobile communication systems. 37. To introduce universal cell phone coverage concept. 38. To understand the characteristics of cellular system. 39. To learn cellular system infrastructure.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	22. View the development of mobile networks. 23. Understanding the coverage concepts of the mobile networks. 24. Applying the probability, statistics and traffic theory in mobile networks. 25. Understanding mobile radio propagation and channel coding with error control. 26. Understanding the multiple division techniques. 27. Study the traffic channel allocation.
Indicative Contents المحتويات الإرشادية	16. Modulation. 17. Coverage concepts. 18. Traffic theory. 19. Radio propagation and channel coding. 20. Traffic channel allocation.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	
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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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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: history of cellular system; generation cellular systems and services
Week 2-5	GSM network: network structure; cell capacity; handoff region concept; bandwidth utilization by frequency reuse; clustering techniques; Probability, Statistics, and Traffic in GSM; Radio propagation in GSM; Channel coding in GSM; Multiple Accesses in GSM; GSM modulation techniques; Traffic Channel Allocation in GSM.
Week 6-8	3G network(UMTS): network structure; cell capacity; handoff region concept; bandwidth utilization by frequency reuse; clustering techniques; Probability, Statistics, and Traffic in UMTS; Radio propagation in UMTS; Channel coding in UMTS; Multiple Accesses in UMTS; UMTS modulation techniques; Traffic Channel Allocation in UMTS.
Week 9	Multi-Antenna Techniques: diversity, selective, Maximal ratio, equal gain, optimum combining; MIMO channels; MIMO detection; spatial modulation; massive MIMO.
Week 10	Mid-Term Exam
Week 11-12	3GPP Long Term Evolution (LTE): introduction; basic concepts of LTE; LTE protocols; LTE advanced.
Week 13-14	5G Mobile Network: network structure; cell capacity; handoff region concept; bandwidth utilization by frequency reuse; clustering techniques; Probability, Statistics, and Traffic in 5G; Radio propagation in 5G; Channel coding in 5G; Multiple Accesses in 5G; 5G modulation techniques; Traffic Channel Allocation in 5G.

Week 15	Global Positioning System (GPS): GPS system overview; segments of GPS; how GPS determines position; sources of errors; GPS receiver.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	

Week 15	
Week 16	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Principles of Mobile Communication By Gordon L. Stüber	yes
Recommended Texts	<p>- أنظمة الاتصالات النقالة : الدكتور خالد يزبك و المهندس محمد الشريف 1 -</p> <p>2-Modern digital and analog communication systems by B. P. Lathi & Zhi Ding</p>	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	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

صيانة أجهزة الاتصالات

Module Information			
معلومات المادة الدراسية			
Module Title	Communication Devices Maintenance		Module Delivery
Module Type	Core		<input type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	ATU11811		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIV	Semester of Delivery	
Administering Department		College	NETC
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Nasir Hussein Selman	e-mail	Coj.nas@atu.edu.iq

Scientific Committee Approval Date	01/05/2025	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>هدف مادة "صيانة أجهزة الاتصالات" إلى تزويد الطلاب بالمعرفة والمهارات العملية اللازمة لتشخيص وإصلاح وصيانة مختلف أنواع أجهزة وأنظمة الاتصالات، بما يضمن استمراريتها وكفاءتها التشغيلية.</p> <ol style="list-style-type: none"> 1. فهم أسس عمل أجهزة الاتصالات. 2. اكتساب مهارات التشخيص الفني للأعطال. 3. تطوير مهارات الإصلاح والصيانة. 4. التعامل مع أنواع مختلفة من الأجهزة والتقنيات.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>بناءً على الأهداف التي ذكرناها سابقاً، يمكن صياغة مخرجات التعلم على النحو التالي:</p> <p>عند الانتهاء من هذه المادة، يتوقع أن يكون الطالب قادراً على:</p> <ul style="list-style-type: none"> • وصف المبادئ الأساسية لعمل أجهزة الاتصالات المختلفة (اللاسلكية والسلكية). • تحديد المكونات الرئيسية والدوائر الإلكترونية في أجهزة الاتصالات ووظائفها. • تفسير أنواع الأعطال الشائعة في أجهزة الاتصالات وأسبابها المحتملة.

	<ul style="list-style-type: none"> • شرح إجراءات السلامة المهنية المتبعة عند التعامل مع أجهزة ومكونات الاتصالات. • فهم الوثائق الفنية والرسوم البيانية (Schematics) الخاصة بأجهزة الاتصالات. • تشخيص الأعطال المعقدة في أجهزة الاتصالات بشكل منهجي ومنطقي. • تحليل المشكلات الفنية وتحديد الأسباب الجذرية للأعطال. • اختيار أدوات الفحص والاختبار المناسبة لتحديد العطل بدقة. • تقييم جدوى إصلاح الجهاز مقارنة باستبداله بناءً على التكلفة والتعقيد.
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<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>1: مقدمة في صيانة أجهزة الاتصالات (Introduction to Telecommunications)</p> <p>2: الأدوات والمعدات المستخدمة في الصيانة (Tools & Equipment for Maintenance)</p> <p>3: صيانة الدوائر والمكونات الإلكترونية (Electronic Circuits & Components Maintenance)</p> <p>4: صيانة أجهزة الاتصالات اللاسلكية (Wireless Communication Devices Maintenance)</p> <p>5: صيانة أجهزة الاتصالات السلكية وشبكات البيانات (Wired & Data Network Devices Maintenance)</p>
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<p>Learning and Teaching Strategies</p> <p>استراتيجيات التعلم والتعليم</p>	
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<p>Strategies</p>	<p>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.</p>
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<p>Student Workload (SWL)</p> <p>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا</p>			
<p>Structured SWL (h/sem)</p> <p>الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>93</p>	<p>Structured SWL (h/w)</p> <p>الحمل الدراسي المنتظم للطالب أسبوعيا</p>	

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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	
Week 2-5	
Week 6-8	
Week 9	
Week 10	
Week 11-12	
Week 13-14	
Week 15	
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	<p>مقدمة في الصيانة وأخلاقيات العمل :</p> <ul style="list-style-type: none"> تعريف الصيانة :مفهومها، أهميتها في قطاع الاتصالات. أنواع الصيانة :وقائية، تصحيحية، تنبؤية (مع أمثلة من أجهزة الاتصالات والموبايل). أهداف الصيانة :تقليل الأعطال، زيادة عمر الجهاز، تحسين الأداء. سلامة العمل المهنية :التعامل مع الكهرباء الساكنة ، استخدام أدوات الوقاية الشخصية، سلامة التعامل مع المكونات الكيميائية. أخلاقيات مهنة الصيانة :التعامل مع بيانات العملاء، الشفافية، الاحترافية.
Week 2	<p>(Technical Tools & Equipment) الأدوات والمعدات الفنية</p> <ul style="list-style-type: none"> الأدوات اليدوية :مفكات دقيقة، كماشات، ملاقط، أدوات فتح الأجهزة.

	<ul style="list-style-type: none"> • أجهزة القياس الأساسية : <ul style="list-style-type: none"> ○ متعدد القياسات: (Multimeter) قياس الجهد، التيار، المقاومة، فحص التوصيل. ○ راسم الذبذبات: (Oscilloscope) فهم الإشارات الكهربائية. ○ مزود الطاقة الكهربائية: (DC Power Supply) استخدامه في تشغيل الأجهزة. • أجهزة اللحام وفك اللحام : <ul style="list-style-type: none"> ○ كاوية اللحام (Soldering Iron) للمكونات التقليدية. ○ محطة اللحام الهوائي الساخن (Hot Air Rework Station) للمكونات السطحية. (SMD) ○ شفاطات القصدير، مواد اللحام. (Flux, Solder) <p>سوائل التنظيف، فرش التنظيف، مجففات: معدات تنظيف وصيانة الأجهزة</p>
Week 3	<p>(Electronic Circuits & Components) الدوائر والمكونات الإلكترونية الأساسية في أجهزة الاتصالات والموبايل</p> <ul style="list-style-type: none"> • مراجعة مكونات الدوائر: مقاومات، مكثفات، ملفات، دايودات، ترانزستورات. • الدوائر المتكاملة: (ICs) أنواعها، وظائفها، وكيفية التعامل معها (مثل المعالجات، شرائح الذاكرة، شرائح الطاقة). • قراءة المخططات الهندسية (Schematics) والرسوم البيانية (Block Diagrams) للأجهزة: فهم مسارات الإشارة والطاقة. • أعطال المكونات الشائعة: ارتفاع درجة الحرارة، التلف الفيزيائي، القصر، الفصل. <p>الممارسة العملية: تقنيات اللحام وفك اللحام للمكونات الدقيقة والسطحية</p>
Week 4-6	<p>(Mobile Device Hardware Maintenance) صيانة أجهزة الموبايل - الجانب المادي</p> <ul style="list-style-type: none"> • مكونات الهاتف المحمول الرئيسية: الشاشة (LCD/OLED)، لوحة اللمس (Digitizer)، البطارية، الكاميرات، الميكروفونات، السماعات، منافذ الشحن. • تشخيص أعطال الشاشة واللمس: الكسر، عدم الاستجابة، الألوان. • مشاكل البطارية والشحن: استنزاف سريع، عدم الشحن، التلف. • أعطال الكاميرا، الصوت، والمستشعرات. • مشاكل أضرار الطاقة والصوت. • صيانة منافذ الشحن والسماعات: التنظيف، الاستبدال. • إجراءات فك وتركيب المكونات الداخلية للهاتف. (Disassembly & Reassembly) <p>(الشاشات، البطاريات، الكاميرات، منافذ الشحن): استبدال المكونات التالفة</p>
Week 7-10	<p>(Mobile Device Software Maintenance) صيانة أجهزة الموبايل - الجانب البرمجي</p> <ul style="list-style-type: none"> • نظم تشغيل الموبايل (Android, iOS): نظرة عامة. • مشاكل البرمجيات الشائعة: التوقف المفاجئ، التهنيج، بطء الأداء، عدم الاستجابة.

	<ul style="list-style-type: none"> • تحديثات نظام التشغيل (OS Updates) والبرامج الثابتة (Firmware). • إعادة ضبط المصنع (Factory Reset) والمسح الآمن للبيانات. • استخدام أدوات الفلاش والبرمجيات الخاصة: لإعادة تثبيت النظام أو إصلاح الأخطاء. • التعامل مع مشاكل الشبكة في الموبايل: عدم وجود إشارة، عدم الاتصال بالإنترنت، مشاكل الواي فاي والبلوتوث. <p>إزالة الفيروسات والبرامج الضارة</p>
Week 11-12	... مع اختبارات تشخيص وإصلاح أعطال متعددة في أجهزة موبايل حقيقية
Week 13-14	<p>(Wireless Telecommunication Devices Maintenance) صيانة أجهزة الاتصالات اللاسلكية</p> <ul style="list-style-type: none"> • مكونات أجهزة الإرسال والاستقبال اللاسلكية: وحدات RF ، الهوائيات، المذبذبات. • تشخيص أعطال الهوائيات وخطوط التغذية: (Feedlines) قياس SWR ، تحديد فقدان الإشارة. • صيانة أجهزة شبكة Wi-Fi ونقاط الوصول: (Access Points) مشاكل التغطية، التداخل، الاتصال. • مشاكل أجهزة الراديو المحمولة والثابتة. (Walkie-Talkies, Base Stations) <p>مكوناتها الأساسية وأعطالها: (Base Transceiver Stations - BTS) فهم أعطال الأجهزة في أنظمة الاتصالات الخلوية (الشائعة - نظرة عامة).</p>
Week 15-16	<p>(Wired & Data Network Devices Maintenance) صيانة أجهزة الاتصالات السلكية وشبكات البيانات</p> <ul style="list-style-type: none"> • الكابلات وأنواعها. (UTP, STP, Coaxial, Fiber Optic) : • اختبار الكابلات: باستخدام Cable Testers ، OTDR للألياف الضوئية. • أجهزة الشبكات: الموجهات Routers ، المحولات Switches ، المودم (Modems) • تشخيص أعطال الشبكة: مشاكل الاتصال، سرعة البيانات، الحزم المفقودة. • صيانة وربط الألياف البصرية: التنظيف، اللحام. (Fusion Splicing) • صيانة أجهزة الاتصالات الهاتفية: (PBX/VoIP) مشاكل الاتصال، جودة الصوت.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Mobile Phone Repairing: A Complete Guide for Beginners to Advanced Professionals"	

	"Basic Electronics for Mobile Phone Repair"	
Recommended Texts	- "Troubleshooting & Repairing Consumer Electronics" (Schematics) ومخططات الدوائر (Service Manuals) - كتيبات الخدمة الخاصة بالشركات المصنعة	
Websites	1. قنوات ومواقع متخصصة في صيانة الموبايل على: YouTube 2- منتديات ومجتمعات الصيانة عبر الإنترنت	

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.

