

Academic Program Description Form

University Name: Northern Technical University

Faculty/Institute: Technical Engineering College for Computer and AI

Scientific Department: Computer Techniques Engineering

Academic or Professional Program Name: Bachelor of Computer Techniques Engineering

Final Certificate Name: Bachelor of Computer Techniques Engineering

Academic System: Bologna Process and Courses

Description Preparation Date: 1/7/2025

File Completion Date: 1/9/2025

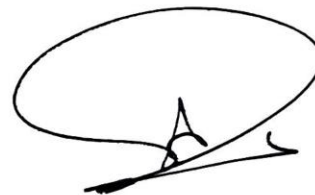
Signature:



Head of Department Name: Dr. Emad
A. Mohammed

Date:

Signature:



Scientific Associate Name: Dr.
Ali Qasim Saeed

Date:

15-9-2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:



Omar I. Dallal Bashi
Approval of the Dean

15/9/2025

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**



Academic Program and Course Description Guide

2024

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

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Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean

1. Program Vision

The Computer Techniques Engineering Department aims to be one of the most distinguished scientific departments and to be a pioneering and active department within the college in the field of computer engineering. Making it scientifically prominent, raising the quality of higher education and academic research by using advanced technologies to contribute to the development and service of the local and regional community by providing competent and qualified personnel, highly qualified in acquiring knowledge and using the latest scientific technologies in the presence of an open competitive market. It also aims to develop scientific research that contributes to the effectiveness of education.

2. Program Mission

The Computer Techniques Engineering Department contributes to the implementation of the academic message that the college aims to achieve. It also prepares competent computer engineers who are able to meet the needs of the local labor market in the fields of network and communications engineering and electronics engineering. Thus the computer engineer can link the theoretical and scientific sides with the applied programs to comply with quality standards and to meet the needs of the government, mixed, and private sectors. It also adopts modeling of computer and mathematical principles and reaching intellectual integration and raising the student to a level of ambition that serves the Iraqi

society. It also aspires to reach the international level.

3. Program Objectives

- 1- Recruiting a high number of technical engineers with high levels of understanding, knowledge, and psychological abilities to deal with electronic and control systems using computers, in addition to communications and computer networks, and implementing quality in the field of computer engineering technology.
- 2- Continual development of study programs through cooperation with related departments to adapt to local development program requirements and market needs, and providing a suitable environment for theoretical and practical teaching using the latest educational means and equipment, and adopting quality measurement and academic accreditation.
- 3- Acquiring students' knowledge related to developing large and medium-sized software projects within a specified time and towards set objectives.
- 4- The graduate is able to evaluate alternative solutions to problems encountered in their work and is able to use information technology in applying the solution.
- 5- Activating programs that serve the specialty and are supported by official sponsors at the international level in order to provide the graduate with international certificates in addition to their academic certificate.
- 6- Understanding the reasons and how technology affects the working environment.
- 7- Acquiring sound educational foundations for interacting with future developments in the field of computers and communications.
- 8- Making practical and scientific research and applying them in the field of specialization.
- 9- Building bridges with the community by organizing scientific courses, workshops, and training sessions for its service.

10- Continual development of the capabilities of teaching staff, technicians, and administrators in the department through participation in workshops, conferences, and work sessions organized by the department or related departments in local universities.

11- Preparing and qualifying specialists to meet the requirements of the public and private sector job market in the field of computer engineering through diversifying ways of learning, teaching and training students to apply acquired knowledge and skills to solve real-world problems, to ensure active contribution to community service after graduation according to a future-oriented development and expansion plan of community participation.

12- Adopting an effective, realistic perspective for developing the department's capabilities in conducting research and studies, and preparing advanced study requirements to comply with quality standards in the Ministry of Higher Education and Scientific Research, and Community Service through graduates who possess various knowledge, qualify them for excellence in their field of work, and are able to adapt to various work conditions, and keep up with rapid developments in the field of specialization with respect to professional ethics.

13- Preparing scientific and specialized leadership through postgraduate studies programs to provide the community with scientific and technical qualifications.

4. Program Accreditation

Accreditation has been submitted

5. Other external influences

non

6. Program Structure				
Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	7	15	6	
College Requirements	3	18	8	
Department Requirements	46	203	84	
Summer Training	2	4	2	
Other				

* This can include notes whether the course is basic or optional.

7. Program Description				
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
First year	CTE100	Digital Logic	2	2
First year	CTE101	Electrical Engineering Fundamentals	2	2
First year	CTE102	Computer Organization	2	2
First year	CTE103	Engineering Drawing	1	2
First year	TECCA100	Mathematics	3	0
First year	NTU100	Democracy and Human Rights	2	0
First year	NTU101	English Language	2	0
First year	CTE104	Digital Circuits	2	2
First year	CTE105	Engineering Mathematics	3	0
First year	CTE106	Electrical Circuits	2	2
First year	CTE107	Electronic Workshop	0	2
First year	CTE108	Programming Principles	2	2

First year	NTU102	Computer Principles	1	2
First year	NTU103	Arabic Language	2	2
Second Year	CTE200	Microprocessors	2	2
Second Year	CTE201	Analog Electronics Fundamentals	2	2
Second Year	CTE202	Object Oriented Programming	2	2
Second Year	CTE203	Applied Mathematics	3	0
Second Year	CTE204	Data Structures	2	2
Second Year	CTE205	Measurements and Sensors	2	2
Second Year	NTU200	Crimes of Defunct Ba'ath Party	2	0
Second Year	CTE206	Computer Architecture	2	2
Second Year	CTE207	Electronic Circuits	2	2
Second Year	CTE208	Communication Fundamentals	2	2
Second Year	CTE209	Computer Applications	2	2
Second Year	CTE210	Website design	2	2
Second Year	CTE211	Summer Training 1	0	5
Second Year	NTU203	Arabic Language	2	0
Third year	CTE300	Control Engineering	2	2
Third year	CTE301	Microprocessor Supported Chips	2	2
Third year	CTE302	Digital Signal Processing	2	2
Third year	CTE303	Engineering Analysis	2	2
Third year	CTE304	Digital Communication Fundamentals	2	2
Third year	CTE305	Computer Networks Fundamentals	2	2
Third year	CTE306	Controllers	2	2
Third year	CTE307	Operating Systems	2	2
Third year	CTE308	Signals and Systems	2	2
Third year	CTE309	Wireless sensor network and IoT	2	2

Third year	CTE310	Digital Communication Systems	2	2
Third year	CTE311	Computer Networks Systems	2	2
Third year	CTE312	Summer Training 2	0	5
Fourth year	NTU401	English language 4	2	0
Fourth year	TEMO402	Management	2	2
Fourth year	TEMO403	Project 1	0	4
Fourth year	TEMO414	Project 2	0	4
Fourth year	CCT404	Information Theory	2	2
Fourth year	CCT405	Digital Communications 2	2	2
Fourth year	CCT406	Digital Signal Processing	2	2
Fourth year	CCT407	Artificial intelligence 1	2	2
Fourth year	CCT408	Coding	2	2
Fourth year	CCT409	Computer Security	2	2
Fourth year	CCT410	Microprocessor 2	2	2
Fourth year	CCT411	Artificial intelligence 2	2	2

8. Expected learning outcomes of the program

Knowledge

The most important learning outcomes for the Computer Engineering Technology program in the field of knowledge are:

1. The student will be able to understand computer hardware and software components.
2. The student will be able to comprehend and apply the fundamental concepts of mathematics and applied sciences that underpin computer engineering.
3. The student will be able to design logic and integrated circuits.
4. The student will be able to identify the components and layers of computer networks and analyze their protocols.
5. The student will be able to manage a computer's physical resources, such as memory and caching systems.
6. The student will be able to comprehend software development and engineering methodologies.

Skills

The key learning outcomes for the Computer Engineering Technology program in the field of knowledge are:

1. The student will be able to maintain and assemble computer components.
2. The student will be able to connect computer networks of various types.
3. The student will be able to design websites.
4. The student will be able to protect systems from malicious software.

Ethics

The most important learning outcomes for the Computer Engineering Technology program in the field of ethics are:

1. The student will be able to understand the ethical principles of the engineering profession.
2. The student will be able to communicate and collaborate with others through research teams.
3. The student will be able to demonstrate a sense of responsibility and accountability.
4. The student will be able to commit to standards of quality and precision.

9. Teaching and Learning Strategies

1. **Theoretical Education** through lectures in the lecture hall.
2. **Practical Education** through lab sessions.
3. **Field Education** through student summer training programs.

10. Evaluation methods

Weekly, monthly, and daily quizzes, and final term exams.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Dr. Emad A. Mohammed	Communication Engineering	Computer Networks			Staff	
Najwan Zuhair waisy	Computer science	Information Security			Staff	
Dr. Ahmad Faleh Mahmood	Electrical Engineering	Computer Networks			Staff	
Dr. Ziad Saeed Mohammed	Electrical Engineering	Solid state			Staff	
Dr. Aysha Ibrahim Mohammed	Arabic Language	Arabic Language			Staff	
Dr. Ahmed K. Younis	Computer Engineering	Computer Engineering			Staff	
Dr. Thabat F. Younis	Electrical Engineering	Electronics			Staff	
Hakam Marwan Zaidan	Computer Engineering	Computer Engineering			Staff	
Zaid G. Mohammed	Computer Engineering	Computer Engineering			Staff	
Naqaa Luqman Hammo	Computer Engineering	Computer Engineering			Staff	
Omar Zyad Tariq	Computer Engineering	Computer Engineering			Staff	
Azhar Waleed Talab	Computer Engineering	Computer Engineering			Staff	

Zaid Abdulsattar	Computer Engineering	Computer Engineering			Staff	
Ahmed Hashim Ahmed	Electrical Engineering	Power			Staff	
Yasir Mosleh Abdal	Computer Engineering	Computer Engineering			Staff	
Noor Saadallah Enad	Communication Engineering	Communication Engineering			Staff	
Lubab Sami Hareth	Computer Engineering	Computer Engineering			Staff	
Rasha Bashar M. Basheer	Communication Engineering	Communication Engineering			Staff	
Duha Abdulmuni	Electrical Engineering	Electronics			Staff	

Professional Development

Mentoring new faculty members

1. Developing an orientation program to introduce new faculty members to the institution, its policies, and its procedures.
2. Pairing new faculty members with experienced mentors to provide guidance, support, and advice.
3. Organizing regular training workshops on teaching methodologies, assessment, and research techniques.
4. Establishing a feedback mechanism for new faculty members to receive constructive feedback on their performance and areas for improvement.
5. Encouraging participation in conferences, seminars, and research projects to enhance professional growth.

Professional development of faculty members

1. **Assess faculty skills** to identify their educational and technical needs.
2. **Provide training courses** to help develop faculty skills in areas such as advanced pedagogy, educational technology, and accurate assessment methods.
3. **Encourage teamwork** among faculty members to exchange experiences and knowledge.
4. **Provide continuous updates** on the latest advancements in education and educational technology.
5. **Offer ongoing support** to faculty members to help them address problems and challenges they encounter.
6. **Conduct periodic evaluations** to review faculty professional development and identify strengths and

12. Acceptance Criterion

(The standards adopted in the central admissions process by the Ministry of Higher Education and Scientific Research.

13. The most important sources of information about the program

1. The university's website.
2. The department's website.
3. Academic program description and specification documents.
4. The academic program review form.

14. Program Development Plan

Program Skills Outline															
				Required program Learning outcomes											
Year/ Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Fourth Year	CCT404	Information Theory	Basic			*	*	*	*		*			*	
	CCT405	Digital Communications 2	Basic			*	*	*	*	*	*			*	
	CCT406	Digital Signal Processing	Basic	*	*	*	*	*			*			*	
	CCT407	Artificial intelligence 1	Basic			*	*		*	*	*			*	
	CCT408	Coding	Basic	*	*	*	*	*		*				*	
	CCT409	Computer Security	Basic			*	*	*	*						
	CCT410	Microprocessor 2	Basic	*	*	*	*	*	*	*	*				
	CCT411	Artificial intelligence 2	Basic			*	*	*	*	*	*				
	NTU401	English language 4	Basic										*		

	TEM0402	Management										*	*	*	*
	TEM0403	Project 1										*	*	*	*
	TEM0414	Project 2										*	*	*	*



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Digital Logic	Module Delivery	
Module Type	Core	✓	Theory
Module Code	CTE100	✓	Lecture
ECTS Credits	7	✓	Lab
SWL (hr/sem)	175	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 1	Semester of Delivery	1
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	Khalis A. Mohammed	e-mail	Khalis_am@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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"> To learn the basic techniques and methodologies for designing and analyzing digital systems and how to apply these techniques to build specific circuits. Define the problem (Inputs and Outputs), write its functions Implement functions using Combinational digital circuit. Minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh-Map or Tabulation Method). Have knowledge in analyzing and designing procedures of Combinational digital circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> Learning about the different number systems. Learning the arithmetic operations related to different number systems. Learning the different logic gates of computer system and their work. Ability to design, simplify and implement different logical and arithmetic circuits that considered the basic of digital system. Ability to design, simplify and implement different sequential circuits, counters and shift registers.

Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • Part 1 – Numbers Systems, Operations, and Codes Different Number Systems, Data representation (integer and fraction) using different number systems. Conversion Between Different Numbers Systems. Arithmetic operations using different number systems, and Digital Codes (BCD, Parity, Gray, Excess-3 etc.) [14 hrs] • Part 2- Logic Gates The Inverter (NOT Gate), AND Gate, OR Gate, NAND Gate, NOR Gate, the Exclusive-OR Gate and Exclusive-NOR Gates. [12 hrs] • Part 3 Boolean Algebra and Logic Simplification Boolean Operations and Expressions, Laws and Rules of Boolean Algebra, Simplification Using Boolean Algebra, DE Morgan's theorems, The Karnaugh Map (1, 2, 3 and 4 variables) , SOP and POS Minimization. [16 hrs] • Part 4 Combinational Logic Analysis Basic Combinational Logic Circuits, Implementing Combinational Logic, Combinational Logic Using NAND and NOR Gates, Logic Circuit Operation with Pulse Waveform Inputs. [10 hrs] • Revision problem classes [6 hrs]
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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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.93
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	101	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight % (Marks for each item)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	5% (10)	3,6,10	LO #2, 4 and 5
	Projects	3	5% (10)	2,5,11	All
	Lab.	1	10% (60)	12	LO # 1-4
	Reports	6	10% (10)	Continuous	All
	Assignments	3	5% (10)	4,7,12	LO #3, 4 and 5
	Seminars	3	5% (10)	2,5,11	All
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-4
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
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Week 1	1- Numbers Systems, Operations, and Codes: Decimal Numbers, Binary numbers.
Week 2	1- Numbers Systems, Operations, and Codes: Hexadecimal Numbers, Octal numbers.
Week 3	1- Numbers Systems, Operations, and Codes: Data representation (integer and fraction) using different number systems. Conversion Between Different Numbers Systems .
Week 4	1- Numbers Systems, Operations, and Codes: Arithmetic operations using 9's and 10's Complements of Decimal Numbers. Arithmetic operations using 1's and 2's Complements of Binary Numbers.
Week 5	1- Numbers Systems, Operations, and Codes: Signed Numbers, Arithmetic Operations with Signed Numbers.
Week 6	1- Numbers Systems, Operations, and Codes: Digital Codes (BCD, Excess-3, Parity, Gray etc.).
Week 7	2- Logic Gates: The Inverter (NOT Gate), The AND Gate, The OR Gate.
Week 8	2- Logic Gates: NAND Gate, NOR Gate, Exclusive-OR Gate and Exclusive-NOR Gates.
Week 9	3- Boolean Algebra and Logic Simplification: Boolean Operations and Expressions.
Week10	3- Boolean Algebra and Logic Simplification: Laws and Rules of Boolean Algebra.
Week11	3- Boolean Algebra and Logic Simplification Simplification Using Boolean Algebra. DeMorgan's theorems.
Week12	3- Boolean Algebra and Logic Simplification The Karnaugh Map (1, 2 , 3 and 4 variables) , SOP and POS Minimization.
Week13	4- Combinational Logic Analysis: Basic Combinational Logic Circuits. Implementing Combinational Logic.
Week14	4- Combinational Logic Analysis: Combinational Logic Using NAND and NOR Gates. Logic Circuit Operation with Pulse Waveform Inputs.
Week15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Introduction to digital laboratory kit operation
Week 2	Lab 2: Logic Gates (AND, OR, NOT, NAND, NOR).
Week 3	Lab 3: Logic Gates (XOR, XNOR).
Week 4	Lab 4: Design of (AND, OR, NOT) gates Using NAND gates.
Week 5	Lab 5: Design of (AND, OR, NOT) gates Using NOR gates.
Week 6	Lab 6: Implementation of logic circuits using NAND-gate only.
Week 7	Lab 7: Implementation of logic circuits using NOR-gate only.
Week 8	Lab 8: Implementation of DeMorgan theory, 1 st Law
Week 9	Lab 9: Implementation of DeMorgan theory, 2 nd Law
Week 10	Lab 10: Design of a combinational logic circuits . Part 1
Week 11	Lab 11: Design of a combinational logic circuits. Part 2
Week 12	Lab 12: Realization of Boolean equation. Part 1
Week 13	Lab 13: Realization of Boolean equation. Part 2
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
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Required Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Education 2015	Yes
Recommended Texts	M. Morris Mano, Michael D. Ciletti, Digital Design, 5th edition, Pearson Education 2013	No
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org/learn/digital-systems	

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

Module Information			
معلومات المادة الدراسية			
Module Title	<u>fundamentals of electrical engineering</u>		Module Delivery
Module Type	<u>Core</u>		✓ Theory
Module Code	<u>CTE101</u>		✓ Lecture
ECTS Credits	<u>7</u>		✓ Lab
SWL (hr/sem)	<u>175</u>		✓ Tutorial
			✓ Practical
			✓ Seminar
Module Level	UGx11 1	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Maysaloon Abed Qasim	e-mail	Maysaloon.alhashim@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	This course focuses on direct current (DC) circuit analysis and aims to: 1- Understanding of the fundamental laws and elements of electrical circuits design and application. 2- Understand the techniques to analyze different circuit configuration 3- Analyze resistive circuits and laws/theorems including Kirchhoff's Superposition, Thevenin's, Nortons, and Maximum Power Transfer. 4- Develop students computational skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Having successfully completed the course, students will be able to: 1- Know the various types of electric circuits. 2- Know the Elements of electric circuits and their roles 3- Apply different techniques to analyze electric circuits. 4- Solve Problem of different electric circuits 5- Compare the application of different type of electric circuits. 6- Appreciate the importance of electric circuit elements. 7- Compare and contrast the operation of different types of electrical elements. 8- Derive equations related to the circuit's performance and design. 9- Identify different types of electrical elements and their applications.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <ul style="list-style-type: none"> • <u>Part A – General Electric System.</u> Constituent parts of an electrical system (source, load, communication & control), Current flow in a circuit, Electromotive force and potential difference, Electrical units. Ohm’s law, Resistors, Resistivity, Temperature rise & Temperature coefficient of resistance, Voltage & Current sources [8 hrs] • <u>Part B DC circuits.</u> Series circuits, Parallel circuits. Kirchhoff’s laws. Power and energy [14 hrs] • <u>Part C Network Theorems</u> . Star-delta & delta-star transformation. Sources transformations Mesh analysis. Nodal analysis. Superposition theorem. Thevni’s theorem. Norton’s theorem. Maximum power transfer theorem. [32 hrs] • Revision problem classes [4 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> 1-Hands-on Experiments: Engage students in practical experiments to deepen their understanding of circuits. 2-Simulation Software: Use circuit simulation software for virtual circuit design and analysis. 3-Problem-solving Exercises: Include various problem-solving exercises to apply circuit analysis techniques. 4-Group Projects: Assign collaborative projects for circuit design and construction. 5-Real-world Applications: Discuss practical applications of circuits in different devices and systems. 5-Interactive Discussions: Encourage student participation and critical thinking through open-ended questions. 6-Conceptual Understanding: Focus on intuitive understanding alongside mathematical analysis. 7-Assessment Variety: Use diverse assessment methods to gauge student understanding. 8-Office Hours and Support: Offer individualized assistance through office hours or online support.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	117	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	8	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	8	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
Week 1	Constituent parts of an electrical system, Current flow in a circuit, Electromotive force and potential difference, Electrical units.
Week 2	Ohm's law, Resistors, Resistivity, Temperature rise & Temperature coefficient of resistance, Voltage & Current sources
Week 3	Series circuits , Parallel circuits.
Week 4	Kirchhoff's laws.
Week 5	Power and energy.
Week 6	Star-delta & delta-star transformation
Week 7	Sources transformations
Week 8	Mesh analysis.
Week 9	Nodal analysis.
Week 10	Superposition theorem.
Week 11	Thevenin's theorem
Week 12	Nortan's theorem
Week 13	Maximum power transfer theorem.
Week 14	Reciprocity theorem
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	<u>Lab 1: Connection of resistances in series and parallel.</u>
Week 2	<u>Lab 2: Verification of Ohm's law using hardware .</u>
Week 3	<u>Lab 3: Verification of Ohm's law using digital simulation.</u>
Week 4	<u>Lab 4: Verification of Kirchhoff's current law and Voltage law using hardware.</u>
Week 5	<u>Lab 5: Verification of Kirchhoff's current law and Voltage law using digital simulation.</u>
Week 6	<u>Lab 6: Determination of mesh currents using hardware.</u>
Week 7	<u>Lab 7: Determination of mesh currents using digital simulation.</u>
Week 8	<u>Lab 8: Measurement of nodal voltages using hardware and digital simulation.</u>
Week 9	<u>Lab 9: Verification of superposition theorem using hardware .</u>
Week 10	<u>Lab 10: Verification of superposition theorem using digital simulation.</u>
Week 11	<u>Lab 11: Verification of Thevenin's theorem using hardware.</u>
Week 12	<u>Lab 12: Verification of Thevenin's theorem using hardware.</u>
Week 13	<u>Lab 13: Verification of Nortan's using hardware.</u>
Week 14	<u>Lab 14: Verification of Nortan's using digital simulation.</u>

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Charles K. Alexander, Matthew N.O. Sdiku Fundamentals of Electrical Engineering, 4th Edition, 2009	Yes
Recommended Texts	Tony R. Kuphaldt, Lessons In Electric Circuits, Volume I - DC 5th edition, Pearson Education 2002	No

Websites	<u>Direct Current (DC)</u> https://www.allaboutcircuits.com/textbook/direct-current/
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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:				
<p>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.</p>				



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	<u>COMPUTER ORGANIZATION</u>		Module Delivery	
Module Type	<u>Core</u>		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	<u>CTE102</u>			
ECTS Credits	4			
SWL (hr/sem)	<u>100</u>			
Module Level	UGx11 1	Semester of Delivery		1
Administering Department	<u>Department of Computer Technology Engineering</u>		College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Mohammed G. Ayoub	e-mail	<u>Mohammed.ghanim@ntu.edu.iq</u>	
Module Leader's Acad. Title	<u>Lecturer</u>	Module Leader's Qualification	<u>M.Sc.</u>	
Module Tutor	None	e-mail	None	
Peer Reviewer Name	None	e-mail	None	
Review Committee Approval	14/06/2023	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>At the end of this course, following learning objectives are expected to be achieved:</p> <ul style="list-style-type: none"> -To understand principles of computer organization and the basic architectural concepts. -To understand the structure, function and characteristics of computer systems. -To understand how the various components of Computer Systems fit together and interact. -To explain the function of each element of a memory hierarchy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 6. Understand the basic concepts and structure of computers. 7. Understand the main architectures of computer systems. 8. Learn the concept of memory hierarchy. 9. Understand the architecture and functionality of memory and storage in the computer systems. 10. Understand the theory and architecture of central processing unit. 11. Understand the architecture and functionality of I/O units. 12. To be familiar with fundamental programming concepts and methodology. 13. Understand the theory and architecture of Intel Microprocessors.
Indicative Contents المحتويات الإرشادية	<ol style="list-style-type: none"> 1. Introduction to Computer Systems: [2 hr.] <ol style="list-style-type: none"> a. Overview of Computer Characteristics

	<ul style="list-style-type: none"> b. Introduction to Software and Hardware c. Comparison of different Computers Categories 2. Introduction to Computer Architecture: [2 hr.] <ul style="list-style-type: none"> a. Von Neumann and Harvard architectures b. Advantages and disadvantages of both architectures 3. The Memory Hierarchy: [4 hr.] <ul style="list-style-type: none"> a. Overview of memory hierarchy in computer systems b. Comparison of different memory types such as Registers, Caches, Main Memory c. Calculation of Average Memory Access Time d. Overview of Cache Miss and Cache Hit 4. Types of CPU Register and their Functions: [2 hr.] <ul style="list-style-type: none"> a. Operations of CPU Registers b. Types and Functions of CPU Registers 5. Computer Bus Types and Functions: [2 hr.] <ul style="list-style-type: none"> a. Data Bus, Address Bus, Control Bus b. Internal and External Buses 6. Semiconductor Memory Types & Technologies: [6 hr.] <ul style="list-style-type: none"> a. Memory Array, Capacity and Addressing b. Read and Write Operations in Memory c. SRAM, DRAM, RAM Family, ROM Family d. Flash Memory, Magnetic Storage, e. Optical Storage and Cloud Storage System 7. Basic Operation of Processors: [2 hr.] <ul style="list-style-type: none"> a. Fetch/Execute Cycle b. Pipelining and Processor Elements 8. Levels of Programming Languages: [2 hr.] <ul style="list-style-type: none"> a. Assembly Language and Machine Language 9. Introduction to the Intel Microprocessors: [6 hr.] <ul style="list-style-type: none"> a. Pre-Pentium Intel Process b. 4004,8080/8085,8086/8086 80386,80486 and Multicore
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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 type of simple experiments involving some sampling activities that are interesting to the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100
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Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (15)	3, 6, 9, 12	LO #1-2, 3-5, 6-8 and 10-11
	Assignments	2	5% (10)	2, 5, 11, 14	LO # 1, 3, 7-9 and 12-13
	Lab.	1	10% (30)	Continuous	All
	Report	6	10% (10)	Continuous	All
	Seminar	1	5% (10)	10	LO 1-8
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
Week 1	Introduction to Computer Systems
Week 2	Introduction to Computer Architecture
Week 3	The Memory Hierarchy
Week 4	Average Memory Access Time (AMAT)
Week 5	Types of CPU Register and their Functions
Week 6	Computer Bus Types and Functions
Week 7	Basics of Semiconductor Memory Types & Technologies Parts I
Week 8	Basics of Semiconductor Memory Types & Technologies Parts II
Week 9	Basics of Semiconductor Memory Types & Technologies Parts III
Week 10	Basic Operation of Processors
Week 11	Levels of Programming Languages
Week 12	Introduction to the Intel Microprocessors Parts I
Week 13	Introduction to the Intel Microprocessors Parts II
Week 14	Introduction to the Intel Microprocessors Parts III
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Introduction to Computer System Parts
Week 2	Lab 2: Peripherals Devices
Week 3	Lab 3: Computer Monitors
Week 4	Lab 4: Computer Cables
Week 5	Lab 5: Types of Microprocessors
Week 6	Lab 6: Types of Memory in Computer System
Week 7	Lab 7: Storage in Computer System
Week 8	Lab 8: Motherboards and Graphics Card
Week 9	Lab 9: Types of Computer Ports
Week 10	Lab 10: Computer Software Part I

Week 11	Lab 11: Computer Software Part II
Week 12	Lab 12: Programming Languages
Week 13	Lab 13: Computer Networks
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	1. 1- Computer Architecture & Organisation by Atul. P. Godse, Deepali. A. Godse. Publisher: Technical Publication 2019. 2. 2- Computer Systems Architecture by Yadin, Aharon. Publisher: Taylor & Francis Group, Year: 2016.	No
Websites	https://www.coursera.org , https://www.udemy.com	

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

Module Information

معلومات المادة الدراسية

Module Title	<u>Engineering Drawing</u>	Module Delivery	
Module Type	<u>Core</u>	✓ Theory	
Module Code	<u>CTE103</u>	✓	✓ Lecture
ECTS Credits	<u>3</u>	✓	✓ Lab
SWL (hr/sem)	<u>75</u>	✓	✓ Tutorial
		✓	✓ Practical
		✓	✓ Seminar
Module Level	UGx11 1	Semester of Delivery	1
Administering Department	Department of Computer Techniques Engineering	College	Engineering Technical College
Module Leader	Naqaa L. Mohammed	e-mail	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	Naqaa_alhamo@ntu.edu.iq
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	12/06/2023	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"> Define engineering drawing material, its uses and Engineering drawing tools Introduction to Engineering drawing through AutoCAD software Developing the student's mental and abilities in drawing simple and complex shapes Decomposes 3D shapes into binary projections
Module Learning Outcomes	14. Learning types of engineering lines and their uses and how to draw

مخرجات التعلم للمادة الدراسية	<p>15. Drawing geometric shapes such as square, rectangular, parallelogram and circle</p> <p>16. Learning dimensions in engineering drawing and how to put them on the drawing</p> <p>17. Learning Fundamentals of projection in engineering drawing</p> <p>18. Ability of drawing an anthropomorphic shape</p>
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<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • <u>Part A – AutoCAD interface</u> Setup, save, limits, grid, object snap and ortho mode [3 hrs.] • <u>Part B- Coordinate method</u> Direct distance method, Absolute coordinate, Relative coordinate, Polar coordinate[3hrs] • <u>Part C Draw menu</u> Line, polyline, rectangle, arc, circle, ellipse and hatch [12hrs] • <u>Part D Modify and Properties menu</u> Copy, move, offset, erase, extend, trim and array, line shape and line size [9 hrs.] • <u>Part D Projection</u> <u>Front, side and top ortho projections [6 hrs.]</u> • <u>Part E stereoscopic shapes</u> <u>Method for drawing stereoscopic shapes[6hrs]</u> • Revision problem classes [8 hrs.]
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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 type of simple experiments involving some sampling activities that are interesting to the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

<p>Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل</p>	45	<p>Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً</p>	3
<p>Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	30	<p>Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً</p>	2
<p>Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل</p>	75		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
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Formative assessment	Quizzes	3	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	3	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	5% (10)	Continuous	All
	Report	0	0% (0)	0	0
Summative assessment	Midterm Exam	2 hr	30% (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
Week 1	-Get a quick introduction to AutoCAD -Drawing Setup in AutoCAD -Use precision drawing tools such as Grid, Object Snap, and Limits to create accurate measurements in drawings.
Week 2	Coordinate method (Direct distance method, Absolute coordinate, Relative coordinate, Polar coordinate)
Week 3	Draw menu (line, poly line, polygon, rectangle).
Week 4	Drawing objects of Pentagonal, hexagonal and octagonal shapes
Week 5	Draw menu (arc, circle, ellipse, point and text).
Week 6	Draw several shapes containing circles and texts
Week 7	Modify menu (erase, copy, mirror, move offset,)
Week 8	Modify menu (rotate, trim, extend, explode)
Week 9	Properties and Layers in AutoCAD and dimension
Week 10	Orthographic projection
Week 11	Draw the three projection(front, side and top) of some shapes
Week 12	Basics of drawing stereoscopic shapes
Week 13	Draw stereoscopic shape
Week 14	Printing the graphic
Week 15	Preparatory Week
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Definition of AutoCAD interface
Week 2	Lab 2: Applications of Coordinate method
Week 3	<u>Lab 3: Draw figures of lines, polygons and rectangle</u>
Week 4	<u>Lab 4: Drawing objects of Pentagonal, hexagonal and octagonal shapes</u>
Week 5	<u>Lab 5: Drawing figures of circles and ellipse</u>
Week 6	<u>Lab 6: Draw several shapes containing circles and texts</u>
Week 7	<u>Lab 7: Applications of some order in modify menu</u>
Week 8	<u>Lab 8: Applications of other order in modify menu</u>
Week 9	<u>Lab 9: Practicing of using layers</u>
Week 10	<u>Lab 10: Practicing of projection of simple figure</u>
Week 11	<u>Lab 11: Draw three projection of figure</u>
Week 12	<u>Lab 12: Practicing of drawing stereoscopic shapes</u>
Week 13	<u>Lab 13: Draw stereoscopic shape</u>

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	AutoCAD 2017 2D Fundamentals Randy H. Shih © Tutorial First Level by Randy H. Shih	No
Recommended Texts	Introduction to AutoCAD 2011 2D and 3D Design, Alf Yarwood	No
Websites	https://youtu.be/XFO8VQT731M Introduction to AutoCad 2017 Tutorial series	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
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Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	<u>Human rights and Democracy</u>	Module Delivery
Module Type	<u>Supplement</u>	✓ Theory
Module Code	<u>NTU100</u>	✓ Lecture
		Lab

ECTS Credits	<u>2</u>	Tutorial Practical ✓ Seminar	
SWL (hr/sem)	<u>50</u>		
Module Level	UGx11 1	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Dr. Eesha I. Mohammed	e-mail	aysha.ibrahim@ntu.edu.iq
Module Leader's Acad. Title	Assist Prof.	Module Leader's Qualification	PHD
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	تهدف الديمقراطية وحقوق الانسان للحفاظ على كرامة الفرد وحقوقه الأساسية وتعزيزها كما تحقيق العدالة الاجتماعية وتشجيع التنمية الاقتصادية والاجتماعية للمجتمع وتماسكه فضلا عن توطيد الأمان الوطني وإرساء مناخ مؤات للسلام الدولي وذلك لان حقوق الانسان والديمقراطية مرجعاً أساسياً للجمع لحماية حقوق الانسان؛ وهي توفر بيئة لحماية حقوق الانسان واعمالها إعمالاً فعلياً. واليوم، بعد مضي فترة على تحقيق الديمقراطية في مختلف أنحاء العالم، يبدو أن العديد من النظم الديمقراطية تتراجع. ويظهر أن بعض الحكومات تتعمد إضفاء إجراءات عمليات تحقق مستقلة بشأن سلطاتها، والقضاء على أي نقد، وتفكيك الرقابة الديمقراطية وضمان حكمها لمدة طويلة، مع أثر سلبي على حقوق الشعب.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 - فهم ومعرفة وأدراك حقوقه التي أقرها الله له وللشعب جميعاً وبالتالي فهي هبة وليس مكسب من أحد ولا يحق لأي شخص انتزاعها. 2- يعب الطالب بأسلوبه الخاص عن هذه الحقوق ويدافع عنها. 3- تحليل الظواهر واعطاء التفسيرات لما يحدث امامه من انتهاك لحقوق الانسان وحرياته من خلال تحديد اوجه النقص او الثغرات الموجودة في ضوء المعلومات المتوفرة لديه 4- فهم اهم النظم السياسية والتي تعد ضمانه لحقوق الانسان وحرياته السياسية ومحاولة تطبيقه على ارض الواقع الا وهو النظام الديمقراطي.
Indicative Contents المحتويات الإرشادية	حقوق الانسان في التاريخ المعاصر والحديث: الاعتراف الدولي بحقوق الانسان منذ الحرب العالمية الأولى ❖ وعصبة الامم المتحدة (4 ساعات) حقوق الانسان، تعريفها، اهدافها وحقوق الانسان في الحضارات القديمة وخصوصا حضارة وادي الرافدين (6 ساعات) ❖ (ساعات) ضمانات واحترام وحماية حقوق الانسان على الصعيد الدولي: - دور الأمم المتحدة ووكالاتها المتخصصة في توفير الضمانات - دور المنظمات الاقليمية (الجامعة العربية، الاتحاد الأوربي، الاتحاد الافريقي، منظمة الدول الأمريكية، منظمة آسيان) دور المنظمات الدولية الاقليمية غير الحكومية والرأي العام في احترام وحماية حقوق الانسان (12) ❖ (ساعة)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	-استراتيجية التفكير حسب قدرة الطالب2-استراتيجية مهارة التفكير العالي 3-استراتيجية التفكير الناقد في التعلم 4-العصف الذهني
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Student Workload (SWL)

الحمل الدراسي للطلاب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	28	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	22	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعياً	1.5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	0	0	Continuous	All
	Projects / Lab. Report	0	0		
		4	10% (10)		
Summative assessment	Midterm Exam	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
Week 1	حقوق الانسان، تعريفها، اهدافها <u>حقوق الانسان في الحضارات القديمة وخصوصا حضارة وادي الرافدين</u>
Week 2	<u>حقوق الانسان في الفرائع السماوية مع التركيز على حقوق الانسان في الإسلام</u>
Week 3	<u>حقوق الانسان في التاريخ المعاصر والحديث : الاعتراف الدول بحقوق الانسان منذ الحرب العالمية الأولى وعصبة الامم المتحدة</u>
Week 4	<u>الاعتراف الاقليمي بحقوق الانسان : الاتفاقية الاوروبية ل حقوق الانسان 1950 ، الاتفاقية الامريكية ل حقوق الانسان 1969 ، الميثاق الافريقي ل حقوق الانسان 1981 ، الميثاق العربي ل حقوق الانسان 1994</u>
Week 5	<u>حقوق الانسان في التاريخ المعاصر والحديث : الاعتراف الدول بحقوق الانسان منذ الحرب العالمية الأولى وعصبة الامم المتحدة</u>
Week 6	<u>حقوق الانسان في الدساتير العراقية بين النظرية والواقع</u>

Week 7	<u>حقوق الانسان الاقتصادية والاجتماعية والثقافية و حقوق الانسان المدنية والسياسية</u>
Week 8	<u>حقوق الانسان الحديثة : الحقائق في التنمية ، الحق في البيئة النظيفة ، الحق في التضامن ، الحق في الدين</u>
Week 9	ضمانات احترام وحماية حقوق الانسان على الصعيد الوطني ، الضمانات في الدستور والقوانين <u>الضمانات في الرقابة الدستورية ، الضمانات في حرية الصحافة والرأي العام ، دور المنظمات على الحكومية في احترام وحماية حقوق الانسان</u>
Week 10	ضمانات واحترام وحماية حقوق الانسان على الصعيد الدولي : - دور الأمم المتحدة ووكالاتها المتخصصة في توفير الضمانات - دور المنظمات الاقليمية (الجامعة العربية ، الاتحاد الأوربي ، الاتحاد الافريقي ، منظمة الدول الأمريكية ، منظمة آسيان) <u>دور المنظمات الدولية الاقليمية على الحكومية والرأي العام في احترام وحماية حقوق الانسان</u>
Week 11	<u>مصطلح الديمقراطية ، نشأته ، دلالاته ، تاريخ الديمقراطية.</u>
Week 12	<u>الاسلام والديمقراطية ومساوي الحكم الاستبدادي .</u>
Week 13	<u>الانتقادات الموجهة للديمقراطية، ومحاسن النظام الديمقراطي</u>
Week 14	<u>الديمقراطى الأنظمة الديمقراطية في العالم/الديمقراطية في العالم الثالث/ المشاكل التي تواجه البلدان العربية في التحول</u>
Week 15	الامتحان النهائي

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	حقوق الانسان والديمقراطية - المفاهيم والمرتكزات للدكتور سماح مهدي الهياوي والدكتور سلمان كاظم البهالدي	Yes
Recommended Texts	الديمقراطية وحقوق الانسان في الاسلام للدكتور راشد الفوشى	No
Websites	https://www.neelwafurat.com https://studies.aljazeera.net	

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.



Ministry of Higher Education and
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Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	<u>English Language</u>	Module Delivery
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Module Type	SUPPLEMENT		✓ Theory
Module Code	NTU101		✓ Lecture
ECTS Credits	2		Lab
SWL (hr/sem)	50		Tutorial
Module Level	UGx11 1	Semester of Delivery	2
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	dr. Younis Anas Younis	e-mail	younis.alrozz@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	To enable the learner to communicate effectively and appropriately in real life situation. To use English effectively for study purposes across the curriculum. To develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, and Writing. To revise and reinforce structure already learned.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will heighten their awareness of the correct usage of English grammar in writing and speaking. Students will improve their speaking ability in English both in terms of fluency and comprehensibility. Students will give oral presentations and receive feedback on their performance. Students will increase their reading speed and comprehension of academic articles. Students will improve their reading fluency skills through extensive reading. Students will enlarge their vocabulary by keeping a vocabulary journal.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part 1 – Grammar [4 hrs] Tenses, Present tenses: Present Simple, Present Continuous Part 2 – Vocabulary [6 hrs] Irregular verbs, making connections, Nouns, verbs, and adjectives, Making negatives. Part 3 – Speaking [6 hrs] Information gap, people's lifestyles, comparing cities. Part 4 – Listening [4 hrs] Telling stories, Town survey, attitudes to shopping, comparing cities. Revision [2 hrs]

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 student's 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 interesting sampling activities for the students.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	22	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	28	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1.12
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3, 7, 11, 14	LO #1, 2, 10 and 11
	Assignments	0	0	0	0
	Projects / Lab.	0	0	0	0
	Report	4	10% (10)	5, 6, 8, 10, 13	LO # 5, 8 and 12
Summative assessment	Midterm Exam	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
Week 1	Grammar: Tenses, Questions, Questions words Vocabulary: Using a bilingual dictionary, Parts of speech, and Words with more than one meaning. Everyday English: Social expressions.
Week 2	Reading: the many ways we communicate Speaking: Information gap Listening: Neighbors
Week 3	Grammar: Present tenses: Present Simple, Present Continuous, have/have got Vocabulary: Describing countries, Collocation Everyday English: Making conversation
Week 4	Reading: three people talk about their experiences Speaking: people's lifestyles Listening: what annoys you about the people in your life?
Week 5	Grammar: Past tenses: Past Simple, Past Continuous Vocabulary: Irregular verbs, making connections, Nouns, verbs, and adjectives, Making negatives. Everyday English: Time expressions
Week 6	Reading: Newspaper stories Speaking: Telling stories Listening: A radio drama
Week 7	Grammar: Quantity, Articles Vocabulary: Buying things Everyday English: Prices and shopping
Week 8	Reading: 'The best shopping street in the world' Speaking: Town survey, attitudes to shopping Listening: Buying things
Week 9	Grammar: Verb patterns 1, Future intentions

	Vocabulary: Hot verbs Everyday English: How do you feel?
Week 10	Reading: Hollywood kids Speaking: Being a teenager Listening: You've got a friend
Week 11	Grammar: Comparative and superlative adjectives Vocabulary: Synonyms and antonyms Everyday English: Directions
Week 12	Reading: 'A Tale of two millionaires' Speaking: comparing cities Listening: Living in another country
Week 13	Grammar: Present Perfect and Past Simple Vocabulary: Past participles, Adverbs, Word pairs Everyday English: Short answers
Week 14	Review
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	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	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New Headway Intermediate Students Book	No
Recommended Texts		
Websites	You can visit the course page at the following link https://youtube.com/playlist?list=PLzQug2pV17x9JD3wR8mk5qst_1EQ1myF6	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group	A – Excellent	التميز	90 - 100	Outstanding Performance

(50 - 100)	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 بتكرار	(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.



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Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics	Module Delivery	
Module Type	Basic	✓ Theory	
Module Code	TECCAI100	✓ Lecture	
ECTS Credits	5	Lab	
SWL (hr/sem)	125	✓ Tutorial	
Module Level	UGx11 1	Practical	
Administering Department	Department of Computer Techniques Engineering	✓ Seminar	
Module Leader	Ayhan A. khaleel	Semester of Delivery	1
Module Leader's Acad. Title	Lecturer	College	Northern Technical University Engineering Technical College/Mosul
Module Tutor	None	e-mail	Ay_ahmed@ntu.edu.iq
Peer Reviewer Name	None	Module Leader's Qualification	M.Sc.
Review Committee Approval	21/06/2023	e-mail	None
		e-mail	None
		Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
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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	Mathematics is an important tool for understanding modern and scientific technologies, and the modern world today relies heavily on mathematics. Mathematics is also characterized by multiple benefits, including that it is an intellectual tool, a strong communication method, and it is in itself a way of thinking, through which the capabilities of individuals develop, and it helps us in advanced logical thinking. It also helps the student to understand the laws and issues needed for the purpose of solving simple and complex electrical circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	19. Learning about the basic Matrix and Determinants 20. Learning the Algebraic functions, natural logarithm, the exponential function, trigonometric functions, inverse trigonometric functions and hyperbolic functions. 21. Learning the Derivatives formula and chain rule. 22. Learning the Integration, Indefinite and Definite Integral 23. Learning the Integration method
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part A – the basic Matrix and Determinants Matrix, properties, and operations, Determinants and properties of determinants Inverse of square matrix by determinants, Solving linear System equations using the inverse of the coefficient matrix and Cramer's rule. [13 hrs] Part B – Algebraic functions Review of natural logarithm, the exponential function, trigonometric functions, inverse trigonometric functions and hyperbolic functions. [10 hrs] Part C – Derivatives of natural logarithm, the exponential function, trigonometric functions, inverse trigonometric functions and hyperbolic functions. Applications of differentiation. [20 hrs] Part D: Review of Integration, Indefinite and Definite Integral, Integration method and Applications of integration, approximation (trapezoidal rule, Simpson's rule) Area between curves [10 hrs] Revision problem classes [6 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in the delivery of this unit is to encourage students to participate in exercises, while improving and expanding their mathematical reasoning skills.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	8	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	13	10% (10)	Continuous	All
	Projects / Lab. Report	0	0		
		0	0		
Summative assessment	Midterm Exam	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المناهج الاسبوعي النظري

Week	Material Covered
Week 1	Matrix, properties, and operations
Week 2	Determinants and properties of determinants Inverse of square matrix by determinants
Week 3	Solving linear System equations using the inverse of the coefficient matrix and Cramer's rule
Week 4	Algebraic functions
Week 5	Review of natural logarithm, the exponential function, trigonometric functions
Week 6	inverse trigonometric functions and hyperbolic functions
Week 7	Derivatives formula and chain rule.
Week 8	Derivatives of natural logarithm, the exponential function, trigonometric functions
Week 9	inverse trigonometric functions and hyperbolic functions.
Week 10	Applications of differentiation.
Week 11	Review of Integration, Indefinite and Definite Integral
Week 12	Integration method
Week 13	Integration method
Week 14	Applications of integration, approximation(trapezoidal rule, Simpson's rule) Area between curves
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advance Engineering Mathematics, Alan Jeffrey, 2002	Yes
Recommended Texts	Calculus I, Paul Dawkins, 2007	No
Websites	https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx	

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

Module Information			
معلومات المادة الدراسية			
Module Title	Digital Circuits	Module Delivery	
Module Type	Core	✓	Theory
Module Code	CTE104	✓	Lecture
ECTS Credits	6	✓	Lab
SWL (hr/sem)	150	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 1	Semester of Delivery	2
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University ENGINEERING TECHNICAL COLLEGE/MOSUL
Module Leader	Khalis A. Mohammed	e-mail	Khalis_am@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Digital Logic	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none">To learn the basic techniques and methodologies for designing and analyzing digital circuits such as Adder – subtractor circuits.To learn the Decoder and Encoder circuits.To learn the Comparator, Multiplexer and Demultiplexer circuits.To learn and analysis sequential circuits such as flip-flop circuits and Registers.To learn the types of counters.
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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	24. Ability to design Adder and Subtractor circuits. 25. Knowledge of designing encoder and decoder circuits. 26. Knowledge the Comparator, Multiplexer, Demultiplexer and places of use. 27. Learn how to design an asynchronous and synchronous counters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <ul style="list-style-type: none"> • Part 1 – Functions of Combinational Logic. Half, Full and Parallel Binary Adders and Subtractors. 1's and 2's Complement Subtractor, 2's Complement Adder-Subtractor, BCD Adder, etc. Comparators, Decoders, Encoders, Multiplexers, Demultiplexer [14 hrs] • Part 2- Latches, Flip-Flops, and Timers. Latches, Edge-Triggered Flip-Flops. Flip-Flop operating (R-S, T, J-K, D) [12 hrs] • Part 3 Counters Synchronous Counters, Asynchronous Counters. Design of Counters. [26 hrs] • Part 4 Shift Registers Basic Shift Register Operations: SISO, SIPO, PISO, PIPO, Bidirectional and special Types Shift Register. [10 hrs] • Revision problem classes [6 hrs]

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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	89	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	3	5% (10)	4,6,10	LO # 2, 10 and 11
	Assignments	3	5% (10)	2, 5,8	LO # 3, 4 and 7
	Lab.(mid pract.)	2	10%(30)	Continuous	All
	Projects	3	5% (10)	3,9,11	LO # 5, 8 and 10
	Report	6	10% (10)	Continuous	All
	Seminars	3	5% (10)	4,10,12	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	15	All

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

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	1- Functions of Combinational Logic. Basic Adders; Half and Full Adders.
Week 2	1- Functions of Combinational Logic. Basic Subtractors; Half and Full Subtractors.
Week 3	1- Functions of Combinational Logic. Parallel Binary Adders and Subtractors. 1's, 2's Complement Subtractor, 2's Complement Adder-Subtractor, BCD Adder, etc.
Week 4	1- Functions of Combinational Logic. Comparators, Code converters.
Week 5	1- Functions of Combinational Logic. Decoders, Encoders.
Week 6	1- Functions of Combinational Logic. Multiplexers (Data Selectors), Demultiplexer.
Week 7	2- Latches, Flip-Flops, and Timers. Latches
Week 8	2- Latches, Flip-Flops, and Timers. Edge-Triggered Flip-Flops.
Week 9	2- Latches, Flip-Flops, and Timers. Flip-Flop operating (R-S, T, J-K,D)
Week 10	3- Counters Synchronous Counters.
Week 11	3- Counters Asynchronous Counters.
Week 12	3- Counters Design of Counters.
Week 13	4- Shift Registers Basic Shift Register Operations. Serial In/Serial out Shift Registers. Serial In/Parallel out Shift Registers.
Week 14	4- Shift Registers Parallel In/Serial Out Shift Registers. Parallel In/parallel Out Shift Registers. Bidirectional Shift Registers.
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Half Binary Adder
Week 2	Lab 2: Full Binary Adder
Week 3	Lab 3: Half Binary Subtractor
Week 4	Lab 4: Full Binary Subtractor
Week 5	Lab 5: 2's Complement Adder-Subtractor
Week 6	Lab 6: Binary Comparator
Week 7	Lab 7: Digital Multiplexer
Week 8	Lab 8: DeMultiplexer.
Week 9	Lab 9: Decoders
Week 10	Lab 10: Encoders
Week 11	Lab 11: D Flip-Flop
Week 12	Lab 12: JK- Flip-Flop
Week 13	Lab 13: T- Flip-Flop
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Education 2015	Yes
Recommended Texts	M. Morris Mano, Michael D. Ciletti, Digital Design, 5th edition, Pearson Education 2013	No
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org/learn/digital-systems	

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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Engineering Mathematics</u>	Module Delivery	
Module Type	<u>Basic</u>	✓ Theory ✓ Lecture Lab ✓ Tutorial Practical Seminar	
Module Code	<u>CTE105</u>		
ECTS Credits	<u>5</u>		
SWL (hr/sem)	<u>125</u>		
Module Level	UGx11 1	Semester of Delivery	2
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Ayhan A. khaleel	e-mail	Ay_ahmed@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	Mathematics is an important tool for understanding modern and scientific technologies, and the modern world today relies heavily on mathematics. Mathematics is also characterized by multiple benefits, including that it is an intellectual tool, a strong communication method, and it is in itself a way of thinking, through which the capabilities of individuals develop, and it helps us in advanced logical thinking. It also Introduce students to mathematics through the laws and issues necessary for the purpose of assisting them in their studies in their field of specialization .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	28. Learning about the complex numbers. 29. Learning the Functions of several variables. 30. Learning the Lines and planes in space, Tangent and normal in the plane 31. Learning the Triple integrals in rectangular coordinates 32. Double Integral in rectangular and polar form, Areas and volumes 33. Applications (Surface Area, Green's theorem and Stokes' theorem)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: ❖ Complex Numbers - For most students the assumptions I've made above about their exposure to complex numbers is the extent of their exposure. Problems tend to arise however because most instructors seem to assume that either students will see beyond this exposure in some later class or have already seen beyond this in some earlier class. Students are then suddenly expected to know more than basic arithmetic of complex numbers but often haven't actually seen it anywhere and have to quickly pick it up on their own in order to survive in the class. [13 hrs]

	<p>❖ <u>Vector Fields</u> – In this section we introduce the concept of a vector field and give several examples of graphing them. We also revisit the gradient that we first saw a few chapters ago.</p> <p>Line Integrals – Part I – In this section we will start off with a quick review of parameterizing curves. This is a skill that will be required in a great many of the line integrals we evaluate and so needs to be understood. We will then formally define the first kind of line integral we will be looking at : line integrals with respect to arc length.</p> <p>Line Integrals – Part II – In this section we will continue looking at line integrals and define the second kind of line integral we'll be looking at : line integrals with respect to x, y, and/or z. We also introduce an alternate form of notation for this kind of line integral that will be useful on occasion.</p> <p>Line Integrals of Vector Fields – In this section we will define the third type of line integrals we'll be looking at : line integrals of vector fields. We will also see that this particular kind of line integral is related to special cases of the line integrals with respect to x, y and z. [20 hrs]</p> <p>❖ <u>Part D: Multiple Integrals</u> - In this chapter will be looking at double integrals, i.e. integrating functions of two variables in which the independent variables are from two dimensional regions, and triple integrals, i.e. integrating functions of three variables in which the independent variables are from three dimensional regions. Included will be double integrals in polar coordinates and triple integrals in cylindrical and spherical coordinates and more generally change in variables in double and triple integrals.[20 hrs]</p> <p>❖ Revision problem classes [6 hrs]</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in the delivery of this unit is to encourage students to participate in exercises, while improving and expanding their mathematical reasoning skills.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	4	20% (25)	5, 7, 9, 11	LO #1, 2, 10 and 11
	Assignments	8	16% (10)	Continuous	All
	Projects / Lab.	0	0		
	Report	1	4%(20)		
Summative assessment	Midterm Exam	2 hr	10% (20)	7	LO # 1-7
	Final Exam	3 hr	50% (60)	15	All
Total assessment		100% (100 Marks)			

Delivery Plan (Weekly Syllabus)

المناهج الاسبوعي النظري

Week	Material Covered
Week 1	COMPLEX NUMBERS IN CARTESIAN COORDINATES AND POLAR FORM
Week 2	LINEAR ALGEBRA FOR COMPLEX NUMBER IN POLAR AND CARTESIAN EULER'S FORMULA.
Week 3	DEMOIVRE'S THEOREM TO FIND POWERS AND THE NTH ROOTS OF GIVEN COMPLEX NUMBERS
Week 4	Functions of several variables
Week 5	Partial differentiation and the chain rule
Week 6	Functions of a complex variable, Cauchy-Riemann equations
Week 7	Cartesian coordinates and vectors in space, Dot product and Cross product
Week 8	Lines and planes in space, Tangent and normal in the plane
Week 9	The two-dimensional Coordinate system, The three dimensional Coordinate .
Week 10	Directional derivatives, Gradient vectors
Week 11	Divergence, curl and the laplacian
Week 12	Double Integral in rectangular and polar form, Areas and volumes
Week 13	Triple integrals in rectangular coordinates
Week 14	Applications (Surface Area, Green's theorem and Stokes' theorem)
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advance Engineering Mathematics, Alan Jeffrey, 2002	Yes
Recommended Texts	Calculus II & Calculus III, Paul Dawkins, 2007	No
Websites	https://tutorial.math.lamar.edu/Classes/CalcIII/CalcIII.aspx https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx	

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 جداً	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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	<u>electrical Circuits</u>	Module Delivery

Module Type	Core		✓	Theory
Module Code	CTE106		✓	Lecture
ECTS Credits	6		✓	Lab
SWL (hr/sem)	150		✓	Tutorial
			✓	Practical
			✓	Seminar
Module Level	UGx11 1	Semester of Delivery	2	
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University ENGINEERING TECHNICAL COLLEGE/MOSUL	
Module Leader	Maysaloon Abed Qasim	e-mail	Maysaloon.alhashim@ntu.edu.iq	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PHD	
Module Tutor	None	e-mail	None	
Peer Reviewer Name	None	e-mail	None	
Review Committee Approval	21/06/2023	Version Number	1.0	

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	electrical Circuits	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1- Understand the fundamental concepts and principles of alternating current (AC) circuits. 2- Gain knowledge of the mathematical tools and techniques used to analyze AC circuits, including phasors, complex numbers, and impedance. 3- Develop the ability to solve AC circuit problems using circuit analysis techniques such as mesh analysis, nodal analysis, and Thevenin's theorem.. ect. 4- Learn how to calculate and analyze voltage and current phasors in AC circuits, including their amplitudes, phases, and frequency relationships. 5- Explore the behavior and characteristics of AC circuit elements, such as resistors, capacitors, and inductors, and understand their roles in AC circuit analysis. 6- Investigate the concept of impedance in AC circuits and its relationship to resistance, reactance, and frequency. 7- Study the principles of AC power and power factor, including real power, reactive power, apparent power, and power factor correction. 8- Gain a comprehensive understanding of three-phase AC systems, including the generation, transmission, and distribution of power in three-phase circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1- Knowledge Acquisition: Students will acquire a comprehensive understanding of the fundamental concepts and principles of alternating current (AC) circuits. 2- Circuit Design and Analysis: Students will gain the ability to design and analyze AC circuits, applying their knowledge of impedance, power factor, and component characteristics. They will learn to calculate voltage and current magnitudes, phase differences, and power relationships in AC circuits. 3- Phasor Diagram Interpretation: Students will be able to construct and interpret phasor diagrams to visualize and analyze the behavior of voltages and currents in AC circuits. 4- Three-Phase Systems: Students will acquire understanding of three-phase AC systems, including balanced and unbalanced configurations.

	Laboratory Skills: Students will develop practical skills in using circuit simulation software and laboratory equipment to design, analyze, and verify the performance of AC circuits.
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • <u>Part A – Inductance & Capacitance in Electric circuits.</u> General concept of capacitance (charge and voltage, capacitors in series and parallel) General concept of inductance (inductive and non-inductive circuits, capacitors in series and parallel) [4 hrs] • <u>Part B Alternating Quantities.</u> Ac systems, waveforms, terms and definitions. Average and R.M.S values of current and voltage. [10 hrs] • <u>Part C Single - phase of AC Circuits.</u> AC in resistive circuits, current and voltage in inductive circuits, current and voltage in capacitive circuits. Concept of complex impedance and admittance, AC series and parallel circuits. RL, RC and RLC circuit analysis and phasor representation. [12 hrs] • <u>Part D Power in AC circuits.</u> Power in resistive circuits. power in inductive and capacitive circuits ,power in circuit with resistance and reactance. Power factor, its practical importance, improvement of power factor, measurement of power in a single – phase AC circuits. [16 hrs] • <u>Part E Three – phase circuit analysis.</u> Basic concept and advantages of three – phase circuit. Phasor representation of star and delta connection. Phase and line quantities. Voltage and current computation in 3-phase balance and unbalance circuits. Real and Reactive power computation, measurement of power and power factor in 3-phase system. [12 hrs] • Revision problem classes [4 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>1-Conceptual Understanding: Explain the differences between AC and DC circuits, introduce the concept of impedance, reactance, and phasors, and highlight the significance of frequency and phase in AC circuits.</p> <p>2-Mathematical Foundations: Provide a solid mathematical foundation for AC circuits. Teach students the use of complex numbers and phasor notation to analyze AC circuits.</p> <p>3- Problem-Solving Skills: Dedicate adequate time to problem-solving exercises and examples.</p> <p>4-Laboratory Experiments: Incorporate laboratory experiments to reinforce theoretical concepts. Allow students to build and analyze AC circuits using oscilloscopes, function generators, and AC power sources.</p> <p>5-Simulation Tools: Introduce simulation software tools that allow students to simulate AC circuits and observe their behavior.</p> <p>6- Review and Assessment: Regularly review key concepts and provide formative assessments to gauge students' understanding. Offer constructive feedback on their performance to help them identify areas for improvement.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	89	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	5% (10)	5,7,10	LO #1, 2, 10 and 11
	Assignments	3	5% (10)	2,9,12	LO # 3, 4, 6 and 7
	Lab.(mid pract.)	2	10%(30)	Continuous	All
	Projects	3	5% (10)	2,9,12	LO # 3, 4, 6 and 7
	Report	6	10% (10)	Continuous	All
	Seminars	3	5% (10)	3,10,13	LO # 3, 4, 6 and 7
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)

المناهج الاسبوعي النظري

Week	Material Covered
Week 1	<u>1- Inductance & Capacitance in Electric circuits.</u> <u>1-General concept of capacitance (charge and voltage, capacitors in series and parallel)</u> <u>2- General concept of inductance (inductive and non-inductive circuits, capacitors in series and parallel)</u>
Week 2	<u>2- Alternating Quantities.</u> <u>Ac systems, waveforms, terms and definitions.</u>
Week 3	<u>2- Alternating Quantities.</u> <u>Average and R.M.S values of current and voltage.</u>
Week 4	<u>2- Alternating Quantities.</u> <u>Phasor diagram</u>
Week 5	<u>3- Single - phase of AC Circuits.</u> <u>AC in resistive circuits , current and voltage in inductive circuits, current and voltage in capacitive circuits.</u>
Week 6	<u>3- Single - phase of AC Circuits.</u> <u>Concept of complex impedance and admittance , AC series and parallel circuits .</u>
Week 7	<u>3- Single - phase of AC Circuits.</u> <u>RL , RC and RLC circuit analysis and phasor representation.</u>
Week 8	<u>4- Power in AC circuits.</u> <u>Power in resistive circuits ,power in inductive and capacitive circuits ,power in circuit with resistance and reactance.</u>
Week 9	<u>4- Power in AC circuits.</u> <u>Power factor ,its practical importance , improvement of power factor , measurement of power in a single – phase AC circuits.</u>
Week 10	<u>5- Three – phase circuit analysis.</u> <u>Basic concept and advantages of three – phase circuit.</u>
Week 11	<u>5- Three – phase circuit analysis.</u> <u>Phasor representation of star and delta connection.</u>

Week 12	<u>5- Three – phase circuit analysis.</u> <u>Phase and line quantities.</u>
Week 13	<u>5- Three – phase circuit analysis.</u> <u>Voltage and current computation in 3-phase balance and unbalance circuits.</u>
Week 14	<u>5- Three – phase circuit analysis.</u> <u>Real and Reactive power computation , measurement of power and power factor in 3-phase system.</u>
Week 15	<u>Final Exam.</u>

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	<u>Lab 1: Measurement amplitude, frequency and time with oscilloscope using hardware and digital simulation.</u>
Week 2	<u>Lab 2: Examine phase relation in RL & RC circuit using hardware and digital simulation.</u>
Week 3	<u>Lab 3: Calculate & verify average and RMS value,</u>
Week 4	<u>Lab 4: Impedance of series RL and RC circuit using digital simulation..</u>
Week 5	<u>Lab 5: Impedance of series RLC circuit using digital simulation..</u>
Week 6	<u>Lab 6: Determination of average value, RMS value, form factor, peak factor of sinusoidal wave using digital simulation.</u>
Week 7	<u>Lab 7: Measure currents and voltages in three-phase balanced AC circuits</u>
Week 8	<u>Lab 8: Prove Y-Δ transformation,</u>
Week 9	<u>Lab 9: Exercise on phasor diagrams for three-phase circuits</u>
Week 10	<u>Lab 10: Measurement of voltage, current & power in a three-phase circuit</u>
Week 11	<u>Lab 11: Ohm's LAW, KVL AND KCL in AC circuits using digital simulation..</u>
Week 12	<u>Lab 12: Determination of mesh currents in AC circuits using digital simulation.</u>
Week 13	<u>Lab 13: Measurement of nodal voltages in AC circuits using digital simulation.</u>
Week 14	<u>Lab 14: Review</u>

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Charles K. Alexander, Matthew N.O. Sdiku Fundamentals of Electrical Engineering, 4th Edition, 2009	Yes
Recommended Texts	Tony R. Kuphaldt, Lessons In Electric Circuits, Volume II - AC 5th edition, 2002	No
Websites	AC circuits https://byjus.com/physics/ac-circuit/	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

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Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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	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

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Ministry of Higher Education and
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Department of Computer Technology Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	<u>Electronic Workshop</u>	Module Delivery	
Module Type	<u>Core</u>	Theory	
Module Code	<u>CTE107</u>	Lecture	
ECTS Credits	<u>3</u>	✓ Lab	
SWL (hr/sem)	<u>75</u>	✓ Tutorial	
		✓ Practical	
		Seminar	
Module Level	UGx11 1	Semester of Delivery	2
Administering Department	DEPARTMENT OF COMPUTER TECHNIQUES ENGINEERING	College	<u>Northern Technical University</u> Engineering Technical College/Mosul
Module Leader	Thabat F. Thabet	e-mail	Thabet.tfy@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	10/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

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

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	6. To learn the basics of electrical elements (Symbols and Abbreviations, Units). 7. To learn how to use measurement devices for DC and AC 8. How to measure electrical elements by using measurement devices 9. To learn the basics of electronic devices 10. How to test electronic devices by using measurement devices 11. How to use Oscilloscope (CRO) 12. How to use Function Generator
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	34. Learning about the electrical elements. 35. Learning about the electronic devices. 36. Learning about the measurement devices. 37. Learning about Oscilloscope and Function Generator 38. Learning about the integrated circuits. 39. Learning about the printed circuit board
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <ul style="list-style-type: none"> Part A – Basic information and electrical elements [12 hrs] Basic information Color of resistance Capacitors values Measurement devices How to measure resistors and capacitors values How to measure DC and AC values Part B – Electronic devices and AC circuits [10 hrs] Diodes Transistors. Operating of Oscilloscope Function Generator DC and AC circuit Part C – Circuit Implementation [6 hrs] Electric circuit schematic diagram Integrated circuits Printed circuit board Review [2 hrs]

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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation					
تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2/6	30% (30)	2, 4, 5, 7, 8 and 10	LO # 1, 2, 3 and 4
	Assignments	1/4	10% (20)	3, 11, 12 and 13	LO # 1, 2, 4, 5 and 6
	Projects	5/1	10% (10)	14	all
	Report	3/4	20% (20)	4, 5, 6 and 9	LO # 1, 2, 3 and 4
	LAB.	10/4	20% (20)	3-12	all
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختب	
Week	Material Covered
Week 1	Lab 1: Basic information
Week 2	Lab 2: Color of resistance
Week 3	Lab 3: Capacitors values
Week 4	Lab 4: Measurement devices
Week 5	Lab 5: How to measure resistors and capacitors values
Week 6	Lab 6: How to measure DC and AC values
Week 7	Lab 7: Diodes
Week 8	Lab 8: Transistors.
Week 9	Lab 9: Operating of Oscilloscope
Week 10	Lab 10: Function Generator
Week 11	Lab 11: DC and AC circuit
Week 12	Lab 12: Electric circuit schematic diagram
Week 13	Lab 13: Integrated circuits
Week 14	Lab 14: Printed circuit board
Week 15	Lab 15: Review

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	ELECTRONIC WORKSHOP & PCB LAB MANUAL	Yes
Recommended Texts	Integrated Circuits	Yes
Websites	https://www.youtube.com/watch?v=YJr-kHy6STg https://www.youtube.com/watch?v=VxMV6wGS3NY	

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 جداً	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:				



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Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



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

Module Information معلومات المادة الدراسية			
Module Title	<u>Computer Programming</u>	Module Delivery	
Module Type	<u>Core</u>	✓	Theory
Module Code	<u>CTE108</u>	✓	Lecture
ECTS Credits	<u>4</u>	✓	Lab
SWL (hr/sem)	<u>100</u>	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 1	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Najwan Z. Waisi	e-mail	Najwan.tuhafi@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	Object Oriented Programming	Semester	S3

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	Introduce the students with computer programming techniques using C++ language, and how it can be used to solve problems related to their specialization.
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<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>The learning outcomes for a module on computer programming in C++ can vary depending on the specific objectives of the course or program:</p> <p>1- Understanding the basics of C++: Students should be able to comprehend the fundamental concepts of C++ programming, including syntax, data types, variables, operators, control structures, and functions.</p> <p>2- Proficiency in C++ programming: Students should develop the skills required to write, compile, and execute C++ programs. They should be able to implement various programming constructs and algorithms using C++.</p> <p>3- Problem-solving and algorithm design: Students should gain the ability to analyze problems and design efficient algorithms to solve them using C++. They should be able to break down complex problems into smaller, manageable tasks and implement them in code.</p> <p>4- Debugging and error handling: Students should develop skills in debugging C++ programs and identifying and fixing errors. They should learn techniques for error handling, exception handling, and writing robust code.</p> <p>5- Code optimization and efficiency: Students should be able to optimize their C++ code for efficiency, considering factors such as algorithm complexity, data structures, and code organization. They should learn about performance analysis and profiling tools to identify bottlenecks in code.</p> <p>6- Software development practices: Students should understand and apply good software development practices, including code documentation, version control, and testing. They should learn how to write readable and maintainable code.</p>		
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • <u>Part A – Introduction to C++.</u> [14 hrs] • <u>Part B- Operators & Making Decisions</u> [12 hrs] • <u>Part C- Looping & Arrays</u> [16 hrs] • <u>Part D- Looping & Arrays</u> [10 hrs] • Revision problem classes [6 hrs] 		
<p>Learning and Teaching Strategies</p> <p>استراتيجيات التعلم والتعليم</p>			
<p>Strategies</p>	<p>When teaching and learning C++ programming, various strategies can be employed to enhance comprehension and mastery of the subject. Here are some effective learning and teaching strategies for C++ programming:</p> <p>Hands-on coding , Step-by-step approach , Visual aids and diagrams , Active learning , Real-world examples and projects , Online resources and coding platforms , Code documentation and commenting , Debugging and problem-solving techniques , Assessment and feedback , Continuous learning and staying updated</p>		
<p>Student Workload (SWL)</p> <p>الحمل الدراسي للطالب</p>			
<p>Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>59</p>	<p>Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً</p>	<p>4.2</p>
<p>Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	<p>42</p>	<p>Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً</p>	<p>3</p>
<p>Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل</p>	<p>100</p>		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab. Report	1	10% (10)	Continuous	All
		5	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
Week 1	Introduction to C++ (Structure of a program)
Week 2	Variables, Data Types, Declaration of variables, Scope of variables, Initialization of variables, Expressions and Basic Input/Output.
Week 3	Operators (Assignment, Arithmetic operators, Compound assignment, Increase and decrease, Relational and equality operators, Conditional operator)
Week 4	Making Decisions (if...else and switch).
Week 5	Looping (while loop and for loop).
Week 6	Bitwise Operators and Explicit type casting operator
Week 7	Arrays (Single Dimensional arrays, Arrays as parameters)
Week 8	Arrays (two Dimensional arrays, Arrays as parameters)
Week 9	Character Sequences and String handling.
Week 10	Structure
Week 11	Pointers (Reference operator, dereference operator, Declaring variables of pointer types,)
Week 12	Pointers and arrays, Pointers to pointers, void pointers and Pointers to functions
Week 13	Functions (Local and global variables, Arguments passed by value and by reference, Default values in parameters)
Week 14	Overloaded functions and Recursive functions.
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Introduction to C++ program using visual studio .
Week 2	Lab 2: my first program and how solve a problem.
Week 3	Lab 3: : if...else and switch programs
Week 4	Lab 4: while loop and for loop programs
Week 5	Lab 5: Bitwise Operators programs
Week 6	Lab 6: Single Dimensional arrays

Week 7	Lab 7: two Dimensional arrays ..part1
Week 8	Lab 8: two Dimensional arrays..part2
Week 9	Lab 9: : Character and String programs
Week 10	Lab 10: how implement a Structure
Week 11	Lab 11: Pointers and arrays
Week 12	Lab 12: Functions..part1
Week 13	Lab 13: Functions..part2
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The Complete Reference, 4th Edition – Herbert schildt	No
Recommended Texts	complete c++ programming fundamentals with examples projects- emenwa global	No
Websites	non	

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

Module Information

معلومات المادة الدراسية

Module Title	COMPUTER PRINCIPLES		Module Delivery	
Module Type	<u>SUPPORTED</u>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	TECCAI101			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	First	Semester of Delivery	First	
Administering Department	Med. Ins. Tech. Eng.	College	Technical Engineering College	
Module Leader	Zaid Abdulsattar Abdulrazzaq	e-mail	zaid.a.abdulrazzaq@ntu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	Master	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	N/A	Semester	2
Co-requisites module	N/A	Semester	2

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. Studying computer principles. 2. Defining keyboards and mice. 3. Presenting principles of memories. 4. Explaining disc drives. 5. Explaining principles of windows. 6. Illustrating accessories of windows.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Abilities to recognize different computer hardware parts. 2. Defining various types of keyboards and mice. 3. Getting knowledge about computer memories and drives. 4. Getting knowledge about windows. 5. Presenting different windows accessories.
Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none"> • Indicative content includes the following. • Computer types of: digital, analogues and hybrid. • Different memory types of: RAM, ROM, PROM, EPROM and EEPROM.

- Different drives types of: magnetic and optical.
- Windows facilities of: Notepad, Wordpad, Paint, Accessories and others.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Strategies that will be adopted for delivering this module are theoretical lectures, practical experiments, home works and exams. This will be achieved through classes, interactive tutorials and by considering practical experiments.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	43	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	29	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (20)	4,7	LO #2, #4
	Assignments	2	10% (20)	10	LO #1, #3, #5
	Projects / Lab.	1	10% (40)	Continuous	All
	Report	8	10% (5)	9	LO #3
Summative assessment	Midterm Exam	2hr	10% (10)	10	All
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
1 st	Introducing to the Computer System Including: What is Computer? Computer System, Functions of Computer Input Storage Process & Output, Classification of Computers and Computer Units
2 nd , 3 rd , 4 th	Explaining Types of Computer Keyboards and Types of Keyboard Keys
5 th	Explaining Types of Computer Mice and Mouse Functions
6 th	Explaining Different Plugs and Ports for Some Computer Parts

7 th	Illustrating Computer Discs and Drives
8 th	Illustrating RAM, Non-Volatile and Cache Memories
9 th , 10 th , 11 th	Demonstrating Computer Hardware Parts and Definitions
12 th , 13 th	Presenting Windows, Windows Desktop and Windows Taskbar
14 th , 15 th	Illustrating Start Menu and Windows Accessories

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي للمختبر

Week	Material Covered
1 st	Introducing to the Computer System Including: What is Computer?, Computer System, Functions of Computer Input Storage Process & Output, Classification of Computers and Computer Units
2 nd , 3 rd , 4 th	Explaining Types of Computer Keyboards and Types of Keyboard Keys
5 th	Explaining Types of Computer Mice and Mouse Functions
6 th , 7 th	Explaining Different Plugs and Ports for Some Computer Parts, and Illustrating Computer Discs and Drives
8 th	Illustrating RAM, Non-Volatile and Cache Memories
9 th , 10 th , 11 th , 12 th	Demonstrating Computer Hardware Parts and Definitions, and Presenting Windows, Windows Desktop and Windows Taskbar
13 th , 14 th , 15 th	Illustrating Start Menu and Windows Accessories

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	[1] Umar Farooq, "What is Computer - Definition & Basic Concept of Computer", Study Lecture Notes, 2016. [2] University Information Technology Services, "Microsoft Windows 10, Getting Started Guide", Kennesaw State University – UITS, 2016.	In the internet
Recommended Texts	Cre8te Opportunities, "Introduction to Computers (Windows 10)", Digital Skills Academy, 2016.	In the internet
Websites	[1] http://www.studylecturenotes.com/computer-science/what-is-computer-definition-basic-concept-of-computer [2] http://ergonomictrends.com/different-types-of-computer-keyboards/ [3] UKEssays, "Wireless Mouse: History and Types", 2018. [Online]. Available: https://www.ukessays.com/essays/computer-science/wireless-mouse-history-types-5302.php?vref=1 .	

- [4] <https://searchstorage.techtarget.com/definition/RAM-random-access-memory>
 [5] <https://tldp.org/HOWTO/Network-boot-HOWTO/a610.html#:~:text=PRONOUNCED%20PROM%3A%20Pronounced%20prom%2C%20an%20acronym,the%20computer%20is%20turned%20off.>

Grading Scheme

مخطط الدرجات

Group	Grade	التعبير	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 (فيد 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.



Ministry of Higher Education and
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 Engineering Technical College/Mosul
 Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	Arabic Language	Module Delivery
Module Type	<u>Supplement</u>	✓ Theory ✓ Lecture Lab Tutorial
Module Code	<u>NTU103</u>	
ECTS Credits	<u>2</u>	

SWL (hr/sem)	<u>50</u>	Practical Seminar ✓	
Module Level	<u>2</u>	Semester of Delivery	2
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Dr. Eesha I. Mohammed	e-mail	aysha.ibrahim@ntu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	Module Leader's Qualification	PHD
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	ينشأ الطالب على حب اللغة العربية لغة القرآن الكريم. التعرف على مواطن الجمال في اللغة العربية وأدائها، وأن يكتسب الطالب القدرة على دراسة فروع اللغة العربية. تعريف الطالب بألفاظ اللغة العربية الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة. تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير، وتعويد حسن الاستماع لما يسمع مما يبسر له أموره ويعينه على قضاء حوائجه. تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصوره. تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم. تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. إيقاظ وعي الطالب لإدراك شرف الكلمة وتوجيهه؛ للمحافظة على طهارتها ونقاها حتى لا تستعمل إلا في الخير. مساعدة الطالب على فهم التراكيب المعقدة والأساليب الغامضة .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- معرفة القواعد النحوية والصرفية. 2- التعرف بأبرز المصنفات اللغوية والأدبية. 3- تحديد المشكلات اللغوية والأدبية لدى الدارسين. 4- القراءة المعاصرة للنصوص اللغوية والأدبية. 5- قراءة النصوص الأدبية وكتابتها وفق المعايير النحوية والصرفية 6- تعزيز الثقة بالنفس والجرأة والفصاحة 7- المنافسة والتميز في سوق العمل.
Indicative Contents المحتويات الإرشادية	مقدمة عن الأخطاء اللغوية الناء المربوطة والتاء المقفوحة (4 ❖ ساعات) تطبيقات الأخطاء اللغوية الشائعة وأقسام الكلام (6 ❖ ساعات) همزة الوصل والقطع والهمزة المتوسطة والمتطرفة قواعد كتابة الالف المدودة والمقصورة ❖ الحروف الشمسية والقمرية والضاد والظاء (12 ساعة) المشاكل والمعوقات ونقاشات (6 ❖ ساعات)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>1- تبسيط المعلومات وتنظيمها 2- تسهيل عملية استرجاع المعلومات 3- ربط المفاهيم الجديدة بالمكتسبات السابقة 4- إيجاد العلاقة بين المفاهيم 5 - تسهيل تذكر المعارف</p>	والمعلومات
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Student Workload (SWL) الحمل الدراسي للطلاب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	31	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	19	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعياً	1
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	10	10% (10)	Continuous	All
	Seminar	1	10% (10)	8	#10
	Report	1	10% (10)	Continuous	All
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) المناهج الاسبوعي النظري	
Week	Material Covered
Week 1	<u>مقدمة عن الأخطاء اللغوية</u>
Week 2	<u>الناء المربوطة والناء المفتوحة</u>
Week 3	<u>همزة الوصل والقطع</u>
Week 4	<u>الهمزة المتوسطة والمتطرفة</u>
Week 5	<u>قواعد كتابة الالف الممدودة والمقصورة</u>
Week 6	<u>الحروف الشمسية والقمرية</u>
Week 7	<u>الضاد والظاء</u>
Week 8	<u>العدد</u>
Week 9	<u>المفاعيل</u>
Week 10	<u>أقسام الكلام</u>

Week 11	معاني حروف الجر
Week 12	تطبيقات الأخطاء اللغوية الشائعة
Week 13	النون والتثنية
Week 14	مقدمة عن الأخطاء اللغوية
Week 15	الامتحان النهائي

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	الكامل في اللغة والادب لابي عباس العميد	Yes
Recommended Texts	أخطاء لغوية شائعة لخالد بن هلال بن ناصر العبي	No
Websites	https://www.eshamel.ne https://www.ektebsa7.com	

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 جداً	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.				



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	<u>Microprocessors</u>	Module Delivery	
Module Type	<u>Core</u>	✓	Theory
Module Code	<u>CTE200</u>	✓	Lecture
ECTS Credits	<u>6</u>	✓	Lab
SWL (hr/sem)	<u>150</u>	✓	Tutorial
Module Level	2	✓	Practical
Administering Department	<u>Department of Computer Techniques Engineering</u>	✓	Seminar
		Semester of Delivery	1
		College	<u>Northern Technical University Engineering Technical College/Mosul</u>

Module Leader	Ahmad F. Al-Allaf	e-mail	Ahmed.faleh@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	13/06/2023	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>13. Understanding Microprocessor Architecture: The course provides a comprehensive understanding of microprocessor architecture, including its components, data path, control unit, memory hierarchy, and input/output systems. Students will learn about different microprocessor families and their characteristics.</p> <p>14. Instruction Set Architecture (ISA): Students gain proficiency in understanding and working with the instruction set architecture of a microprocessor. This involves learning about different instruction formats, addressing modes, data types, and the relationship between instructions and the underlying hardware.</p> <p>15. Assembly Language Programming: The course cover assembly language programming for a specific microprocessor. Students learn the syntax, conventions, and techniques for writing efficient assembly language programs. They also understand the translation process from assembly language to machine code.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>40. Understand the fundamental concepts and principles of microprocessor architecture, including the components, data path, control unit, memory hierarchy, and input/output systems.</p> <p>41. Analyze and interpret the instruction set architecture (ISA) of a microprocessor, including instruction formats, addressing modes, data types, and the relationship between instructions and hardware.</p> <p>42. Demonstrate proficiency in writing and debugging assembly language programs for a specific microprocessor, considering syntax, conventions, and efficient programming techniques.</p>
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> Part-A: Introduction to Microprocessor: Introduction and History of Microprocessors, Basic Block Diagram of a Microprocessor, Organization of Microprocessor Based System, Bus Organization, Processing Cycle of a Stored Program Computer. 8085 Microprocessor: Internal Architecture and Features of 8085 microprocessor, pin description. [6hrs.] Part-B: 8086/8088 Microprocessor: Internal Architecture and Features of 8086/8088 Microprocessor, components of BIU and EU. Pin descriptions and bus cycles. Pin descriptions and bus cycles, 8284 clock generator and 8288 bus controller circuits, Minimum and Maximum configurations, Memory and I/O organization, [24hrs] Part-C: 8086 programming and instruction sets: 8086 Addressing Modes, instruction groups, Data Movement instructions, Arithmetic and logical instructions, Jump instructions, String instructions, example. [24hrs] Part-D : Different Microprocessor Architectures: Register Based and Accumulator Based Architecture, RISC and CISC Architectures, Digital Signal Processors. [4hrs]

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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	89	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	3	5% (10)	4,6,10	LO # 2, 10 and 11
	Assignments	3	5% (10)	2, 5,8	LO # 3, 4 and 7
	Lab.(mid pract.)	2	10%(30)	Continuous	All
	Projects	3	5% (10)	3,9,11	LO # 5, 8 and 10
	Report	6	10% (10)	Continuous	All
	Seminars	3	5% (10)	4,10,12	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المناهج الاسبوعي النظري

Week	Material Covered
Week 1	1-Introduction to Microprocessor: Introduction and History of Microprocessors, Basic Block Diagram of a Microprocessor, Organization of Microprocessor Based System, Bus Organization, Processing Cycle of a Stored Program Computer.
Week 2	2-8085 Microprocessor: Internal Architecture and Features of 8085 microprocessor, pin description.
Week 3	3-8086/8088 Microprocessor: Internal Architecture and Features of 8086 Microprocessor, components of BIU and EU.
Week 4	4-8086 Microprocessor: Pin descriptions and bus cycles.
Week 5	5-8086 Microprocessor: Pin descriptions and bus cycles.

Week 6	6-8086 Microprocessor: 8284 clock generator and 8288 bus controller circuits
Week 7	7-8086 Microprocessor: Minimum and Maximum configurations, Memory and I/O organization.
Week 8	8-8086 programming and instruction sets 8086 Addressing Modes, instruction groups
Week 9	9-8086 instruction sets: Data Movement instructions
Week 10	10-8086 instruction sets: Arithmetic and logical instructions
Week 11	11-8086 instruction sets: Jump instructions
Week 12	12-8086 instruction sets: String instructions
Week 13	13-8086 instruction sets: Programming examples
Week 14	14-Different Microprocessor Architectures: Register Based and Accumulator Based Architecture, RISC and CISC Architectures, Digital Signal Processors.
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Introduction to debugging program
Week 2	Lab 2: 8086 instruction formats
Week 3	Lab 3: 8086 addressing modes
Week 4	Lab 4: Program examples of Data movement instructions
Week 5	Lab 5: Program examples of Arithmetic instructions
Week 6	Lab 6: Program examples of Arithmetic instructions (addition and subtraction)
Week 7	Lab 7: Program examples of Arithmetic instructions (Multiplication and division)
Week 8	Lab 8: Program examples of logical instructions
Week 9	Lab 9: Program examples of shift and rotate instructions
Week 10	Lab 10: Program examples of timing delay using counters
Week 11	Lab 11: Program examples of JMPs instructions
Week 12	Lab 12: Program examples of stack instructions
Week 13	Lab 13: Program examples of strings instructions
Week 14	Lab 14: Program examples of call and return instructions

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The Intel Microprocessors (8th Edition), BARRY B. BREY, 2009	No
Recommended Texts	MICROPROCESSOR 8086 Architecture, Programming and Interfacing, Sunil Mathur, 2011	No
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org https://www.edx.org	

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.



Ministry of Higher Education and
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Northern Technical University
Engineering Technical College/Mosul
Department of Computer Technology Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	Analog Electronics Fundamentals		Module Delivery	
Module Type	Core		✓	Theory
Module Code	CTE201		✓	Lecture
ECTS Credits	5		✓	Lab
SWL (hr/sem)	125		✓	Tutorial
			✓	Practical
			✓	Seminar
Module Level	UGx11 2	Semester of Delivery	1	
Administering Department	DEPARTMENT OF COMPUTER TECHNIQUES ENGINEERING	College	Northern Technical University Engineering Technical College/Mosul	
Module Leader	Thabat F. Thabet	e-mail	Thabet.tfy@ntu.edu.iq	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD.	
Module Tutor	None	e-mail	None	
Peer Reviewer Name	None	e-mail	None	
Review Committee Approval	10/06/2023	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	16. To learn the physics of material and the basics of electronic devices. 17. Study the structure and the characteristics of electronic devices (diodes and transistors). 18. To learn the applications of different types of diodes.
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	19. Study the principles of binary junction transistors (BJT), biasing, cutoff, saturation, operating point and DC load line.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	43. Learning about the physics of material. 44. Learning about the different electronic devices (structure and characteristics). 45. Ability to recognize and test different electronic devices (diodes and transistors). 46. Learning about the applications of diodes (circuits and their functions). 47. Ability to design, and implement different diode circuits (with a specific required output). 48. Ability to design, or analyze BJT biasing circuits to know the operating point.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <ul style="list-style-type: none"> Part A – Introduction to electronics Physics of material, atoms, electrons and energy bands, types of material (insulators, conductors, and semiconductors), N-type and P-type semiconductor. Diodes, forward bias, reverse bias, V-I characteristics [8 hrs] Part B- Application of diodes. Half-wave rectifier, average value, r.m.s. value, capacitor filter, ripple voltage. Full-wave rectifier, average value, r.m.s. value, capacitor filter, ripple voltage. Half-wave rectifier, average value, r.m.s. value, capacitor filter, ripple voltage. Diode limiters, output voltage signal. Clampers and Voltage Doubler. [16 hrs] Part C Other types of diodes Zener diodes, V-I characteristics. Voltage regulators using Zener diode (variable input voltage, and variable load). Zener limiters. Special purpose diodes, Varactor, Light Emitting diode LED, Photo diode, Schottky diode, Tunnel diodes. [16 hrs] Part D Transistors Bipolar junction transistor BJT, current, voltages, and parameters, maximum ratings. BJT biasing, cutoff, saturation, operating point. Transistor bias circuits, base-bias, voltage divider Transistor bias circuits, emitter-bias, collector-feedback. [16 hrs] Revision problem classes [4 hrs] 		
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 type of simple experiments involving some sampling activities that are interesting to the students.		
Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3, 7, 11, 14	LO #2, 4, 5 and 6
	Assignments	6	10% (10)	3, 5, 7, 9, 11, 14	LO # 2, 4, 5 and 6
	Projects / Lab. Report	1	10% (10)	Continuous	All
		5	10% (10)	5, 6, 8, 10, 13	LO # 2, 3, 4, 5 and 6
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
Week 1	Introduction to electronics.
Week 2	Physic of diode. Diode's equivalent circuits.
Week 3	Application of diodes.
Week 4	Half-wave rectifier.
Week 5	Full-wave rectifier .
Week 6	Diode Limiters
Week 7	Clampers.
Week 8	Zener diode Characteristics.
Week 9	Voltage regulator using Zener diode.
Week 10	Another typed of diode.
Week 11	Physic of transistor: Bipolar junction transistor BJT.
Week 12	DC operation point.
Week 13	Transistor bias circuits.
Week 14	Transistor bias circuits.
Week 15	Preparatory Week
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Introduction to the Electronic Laboratory
Week 2	Lab 2: Diode characteristics
Week 3	Lab 3: Half-wave rectifiers
Week 4	Lab 4: Full-wave rectifiers
Week 5	Lab 5: Filter for Half-wave rectifiers
Week 6	Lab 6: Filter for Full-wave rectifiers
Week 7	Lab 7: Clipping Circuits
Week 8	Lab 8: Clamper and Voltage Doubler
Week 9	Lab 9: Zener diode characteristics
Week 10	Lab 10: Voltage regulators using Zener diode
Week 11	Lab 11: Transistor Characteristics

Week 12	Lab 12: Transistor Biasing (part 1)
Week 13	Lab 13: Transistor Biasing (part 2)
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas L. Floyd, Electronic Devices, 9th Edition, Pearson Education 2012	Yes
Recommended Texts	R. BOYLESTAD and L. NASHESKY, "ELECTRONIC DEVICES AND CIRCUIT THEORY", 11th edition, Pearson Education , 2013	Yes
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org/learn/electronics	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
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	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
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Note:

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Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Object oriented programing	Module Delivery	
Module Type	Core	✓ Theory	
Module Code	CTE202	✓ Lecture	
ECTS Credits	5	✓ Lab	
SWL (hr/sem)	125	x Tutorial	
		✓ Practical	
		✓ Seminar	
Module Level	UGx11 2	Semester of Delivery	1
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	Anmar Burhan Mohammed	e-mail	Anmar.salih@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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>20. • Understanding OOP Concepts: Gain a solid understanding of fundamental OOP concepts such as encapsulation, inheritance, and polymorphism. Learn how these concepts promote code reusability, modularity, and maintainability.</p> <p>21. • Programming Language Proficiency: Develop proficiency in a specific programming language that supports OOP paradigms, such as Java, C++, Python, or C#. Learn the syntax, data types, control structures, and other language features necessary for implementing OOP concepts.</p> <p>22. • Class and Object Creation: Learn how to create classes and objects, define attributes and behaviors, and establish relationships between objects using techniques like composition and aggregation.</p> <p>23. • Encapsulation and Data Hiding: Understand the principles of encapsulation and data hiding to enforce proper access control and protect data integrity. Learn how to define public, private, and protected access levels for class members.</p> <p>24. • Inheritance and Polymorphism: Explore inheritance, where classes can inherit properties and behaviors from other classes, and polymorphism, where objects can take on different forms depending on their context. Understand the benefits and use cases for these concepts.</p>
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	<p>25. • Abstraction and Interface Design: Learn how to create abstract classes and interfaces to define common behaviors and establish contracts for implementing classes. Understand the advantages of abstraction in managing complex systems.</p> <p>26. • OOP Design Patterns: Study common design patterns used in OOP, such as the Singleton, Factory, Observer, and Strategy patterns. Learn how to apply these patterns to solve common software design problems.</p> <p>27. • Error Handling and Exception Handling: Understand how to handle errors and exceptions in an OOP context. Learn techniques for graceful error recovery, exception propagation, and creating custom exceptions.</p> <p>28. • OOP Software Development Practices: Gain familiarity with software development practices aligned with OOP, such as modular programming, code organization, and documentation. Learn about version control systems and collaboration tools commonly used in OOP projects.</p> <p>29. • OOP Analysis and Design: Learn how to analyze and design software systems using OOP principles. Understand the importance of modeling techniques like class diagrams and sequence diagrams in the software development lifecycle.</p>
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>49. Understand the principles of Object-Oriented Programming</p> <p>50. Design and implement classes and objects</p> <p>51. Apply access modifiers to control class member visibility.</p> <p>52. Utilize inheritance and polymorphism</p> <p>53. Implement function overriding and virtual functions for runtime polymorphism.</p> <p>54. Develop object-oriented programs and projects.</p> <p>55. Develop larger projects that demonstrate effective use of OOP concepts.</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Introduction to Object-Oriented Programming (4 hours)</p> <p>C++ Basics and Syntax Review (6 hours)</p> <p>Encapsulation and Access Control (8 hours)</p> <p>Inheritance and Polymorphism (10 hours)</p> <p>Dynamic Memory Management (8 hours)</p> <p>Object Relationships and Composition (6 hours)</p> <p>Operator Overloading (6 hours)</p> <p>Exception Handling (6 hours)</p> <p>Templates and Generic Programming (8 hours)</p> <p>Advanced OOP Concepts (8 hours)</p> <p>Design Patterns (8 hours)</p> <p>Project Development (16 hours)</p>
<p>Learning and Teaching Strategies</p> <p>استراتيجيات التعلم والتعليم</p>	
<p>Strategies</p>	<p>Understand the Core Concepts: Begin by grasping the fundamental principles of OOP, including encapsulation, inheritance, and polymorphism. Gain a clear understanding of how these concepts work together to create object-oriented systems.</p> <p>Hands-on Coding: Actively practice writing code in C++ to reinforce your understanding of OOP. Implement classes, objects, and inheritance hierarchies. Solve programming exercises and work on small projects to apply OOP concepts in practical scenarios.</p> <p>Read and Analyze Code Examples: Study well-written C++ code that utilizes OOP techniques. Analyze how classes and objects are structured, how inheritance is implemented, and how polymorphism is achieved. This will help you understand real-world applications of OOP.</p> <p>Work with Real-World Examples: Seek out real-world examples or case studies where OOP has been employed in C++ projects. Examine open-source projects or sample code to understand how OOP is used to solve complex problems and create modular, reusable code.</p>

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	8	10% (10)	5, 10	LO #1, 2, 6,7,8,9,10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6, 7,9,10,12,14
	Projects / Lab.	16	10% (10)	Continuous	All
	Report	5	10% (10)	2,4,8,10and13	LO#2,4,8,10 and 13
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)

المناهج الأسبوعي النظري

Week	Material Covered
Week 1	<u>Introduction to C++ and OOP Basics</u> <ul style="list-style-type: none"> • <u>Introduction to C++ programming language</u> • <u>Basic syntax, variables, and data types</u> • <u>Functions and control structures</u> • Introduction to object-oriented programming (OOP) concepts: classes, objects, and methods
Week 2	<u>Classes and Objects</u> <ul style="list-style-type: none"> • <u>Defining and declaring classes</u> • <u>Creating objects and using constructors</u> • <u>Encapsulation and access modifiers (public, private, protected)</u> • Member functions and data members
Week 3	<u>Inheritance and Polymorphism</u> <ul style="list-style-type: none"> • <u>Inheritance hierarchy and base/derived classes</u> • <u>Single inheritance and multiple inheritance</u> • <u>Polymorphism and function overriding</u> • Abstract classes and pure virtual functions asses
Week 4	<u>Dynamic Memory Allocation and Pointers</u> <ul style="list-style-type: none"> • <u>Dynamic memory allocation with new and delete</u> • <u>Introduction to pointers and references</u> • <u>Memory management and deallocation</u> • Object lifetime and scope
Week 5	<u>Operator Overloading</u> <ul style="list-style-type: none"> • <u>Overloading unary and binary operators</u> • <u>Overloading comparison and assignment operators</u> • <u>Friend functions and operator overloading</u> • Best practices and guidelines for operator overloading

Week 6	<u>Templates and Generic Programming</u> <ul style="list-style-type: none"> • <u>Introduction to templates and generic programming</u> • <u>Function templates and class templates</u> • <u>Template specialization</u> • Standard Template Library (STL) containers and algorithms
Week 7	<u>Exception Handling</u> <ul style="list-style-type: none"> • <u>Introduction to exception handling</u> • <u>try-catch blocks and handling exceptions</u> • <u>Throwing and catching exceptions</u> • Exception specifications and best practices
Week 8	<ul style="list-style-type: none"> • Midterm exam
Week 9	<u>File Handling and Streams</u> <ul style="list-style-type: none"> • <u>Input/output streams and file handling</u> • <u>Reading from and writing to files</u> • <u>Error handling and file status flags</u> • Working with text and binary files
Week 10	<u>Advanced OOP Concepts</u> <ul style="list-style-type: none"> • <u>Polymorphism and virtual functions</u> • <u>Virtual base classes and diamond problem</u> • <u>Type casting and runtime type identification (RTTI)</u> • Object slicing and dynamic casting
Week 11	<u>Standard Library Algorithms</u> <ul style="list-style-type: none"> • <u>Overview of the standard library algorithms</u> • <u>Sorting and searching algorithms</u> • <u>Numeric algorithms and iterators</u> • Practical applications and usage examples
Week 12	<u>Memory Management</u> <ul style="list-style-type: none"> • <u>Smart pointers: unique_ptr, shared_ptr, weak_ptr</u> • <u>Memory management strategies and pitfalls</u> • <u>Resource Acquisition Is Initialization (RAII)</u> • Memory leaks and debugging techniques
Week 13	<u>Namespaces and Organizing Code</u> <ul style="list-style-type: none"> • <u>Using namespaces for code organization</u> • <u>Creating and managing namespaces</u> • <u>Namespace conflicts and resolutions</u> • Best practices for code modularization
Week 14	<u>Namespaces and Organizing Code</u> <ul style="list-style-type: none"> • <u>Using namespaces for code organization</u> • <u>Creating and managing namespaces</u> • <u>Namespace conflicts and resolutions</u> • Best practices for code modularization
Week 15	Review
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	<ul style="list-style-type: none"> • <u>Introduction to C++</u> • <u>Basic syntax, variables, and data types</u> • Functions and control structures
Week 2	<ul style="list-style-type: none"> • <u>Classes and Objects</u> • classes, objects, and methods document analysis

Week 3	<ul style="list-style-type: none"> • <u>Encapsulation and access modifiers (public, private, protected)</u> • Member functions and data member
Week 4	<ul style="list-style-type: none"> • <u>Introduction to templates and generic programming</u> • Function templates and class templates
Week 5	<ul style="list-style-type: none"> • <u>Template specialization</u> • Standard Template Library (STL) containers and algorithms
Week 6	<ul style="list-style-type: none"> • <u>Introduction to exception handling</u> • try-catch blocks and handling exceptions
Week 7	<ul style="list-style-type: none"> • <u>Introduction to exception handling</u> • try-catch blocks and handling exceptions
Week 8	Midterm
Week 9	•OLID principles: Single Responsibility, Open-Closed, Liskov Substitution, Interface Segregation, Dependency Inversion
Week 10	Design patterns: overview and examples
Week 11	•Multithreading and concurrency in C++
Week 12	Assignment
Week 13	<ul style="list-style-type: none"> • <u>Applying design principles to real-world scenarios</u> Code refactoring and improvement
Week 14	Review
Week 15	Review
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14" by Scott Meyers. "C++ Primer" by Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo. "Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides.	No
Recommended Texts	Online tutorials and documentation specific to advanced C++ programming and libraries.	No
Websites	https://www.w3schools.com/cpp/cpp_oop.asp	

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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	<u>Applied Mathematics</u>	Module Delivery	
Module Type	<u>Basic</u>	✓ Theory	✓ Lecture Lab ✓ Tutorial Practical ✓ Seminar
Module Code	<u>CTE203</u>		
ECTS Credits	<u>4</u>		
SWL (hr/sem)	<u>100</u>		
Module Level	UGx11 2	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	<u>Ayhan A. khaleel</u>	e-mail	<u>Ay_ahmed@ntu.edu.iq</u>
Module Leader's Acad. Title	<u>Lecturer</u>	Module Leader's Qualification	<u>M.Sc.</u>

Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	Mathematics is an important tool for understanding modern and scientific technologies, and the modern world today relies heavily on mathematics. Mathematics is also characterized by multiple benefits, including that it is an intellectual tool, a strong communication method, and it is in itself a way of thinking, through which the capabilities of individuals develop, and it helps us in advanced logical thinking. It also Introduce students to mathematics through the laws and issues necessary for the purpose of assisting them in their studies in their field of specialization .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	56. Learning about the basic Matrix and Determinants Learning the Gaussian and Gauss-Jordan elimination, rank of a matrix. 57. Learning the Eigen values and Eigenvectors 58. Learning the First order differential equations, variable separable, homogeneous, linear first order and exact differential equations 59. Convergence and the Divergence tests, Alternating series ,Absolute and conditional convergence 60. Power series and Taylor and Maclaurin series
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part A - Review of matrices and their properties, Complex matrices, Hermitian, skew-Hermitian and unitary matrices, Inverse matrices and elementary row operation, Gaussian and Gauss-Jordan elimination, rank of a matrix. Eigen values and Eigenvectors. [20 hrs] Part B - First order differential equations, variable separable, homogeneous, linear first order and exact differential equations. [10 hrs] Part C - Convergence and the Divergence tests, Alternating series ,Absolute and conditional convergence, Power series and Taylor and Maclaurin series. [10 hrs] Revision problem classes [7 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in the delivery of this unit is to encourage students to participate in exercises, while improving and expanding their mathematical reasoning skills.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	8	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	13	10% (10)	Continuous	All
	Projects / Lab. Report	0	0		
	Report	0	0		
Summative assessment	Midterm Exam	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المناهج الأسبوعي النظري

Week	Material Covered
Week 1	Review of matrices and their properties
Week 2	Complex matrices, Hermitian, skew-Hermitian and unitary matrices
Week 3	Inverse matrices and elementary row operation
Week 4	Gaussian and Gauss-Jordan elimination.
Week 5	rank of a matrix
Week 6	Eigen values and Eigenvectors.
Week 7	First order differential equations, variable separable, homogeneous
Week 8	linear first order and exact differential equations
Week 9	Non-homogeneous second order with constant coefficients
Week 10	Convergence and the Divergence tests-part1
Week 11	Convergence and the Divergence tests-part2
Week 12	Alternating series ,Absolute and conditional convergence
Week 13	Power series
Week 14	Taylor and Maclaurin series
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advance Engineering Mathematics, Alan Jeffrey, 2002	Yes
Recommended Texts	Calculus II & Calculus III, Paul Dawkins, 2007	No
Websites	https://tutorial.math.lamar.edu/Classes/CalcIII/CalcIII.aspx https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx	

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.



Ministry of Higher Education and
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Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Data Structure	Module Delivery	
Module Type	Core	✓ Theory ✓ Lecture ✓ Lab x Tutorial ✓ Practical ✓ Seminar	
Module Code	CTE204		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGx11 2	Semester of Delivery	1
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	Mohand lokman Ahmed	e-mail	mohandaldabag@ntu.edu.iq
Module Leader's Acad. Title	Asst.Prof.	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
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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	<p>30. Understanding the basic concepts of Data structures such as arrays, stacks, queues, trees, graphs, and so on. for building blocks of algorithms and programs..</p> <p>31. Analyzing the algorithms that are used to manipulate data. By analyzing algorithms, we can determine their efficiency and optimize them to make them faster and more efficient.</p> <p>32. Choosing the right data structure is essential for developing efficient programs. The study of data structures helps in choosing the right data structure for a particular problem.</p> <p>33. The study of data structures helps in implementing data structures such as linked lists, trees, and graphs. By implementing data structures, we can create efficient programs that can handle large amounts of data.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>61. Understanding the fundamental concepts of data structures.</p> <p>62. Analyzing the performance of algorithms</p> <p>63. Choosing appropriate data structures.</p> <p>64. Implementing data structures.</p> <p>65. Designing algorithms.</p> <p>66. Applying data structures to real-world problems</p>
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • Part A – Introduction to data structures: Overview of data structures, their types, and applications. .[8 hrs] • Part B- Arrays and Linked lists:: One-dimensional and multi-dimensional arrays, array operations, and applications. Linked lists: Singly linked lists, doubly linked lists, circular linked lists, and their operations.[12hrs] • Part C -: Stacks and Queues Array-based and linked-list based implementation of stacks and queues, their operations, and applications.. [12 hrs] • Part D - Trees: Binary trees, binary search trees, AVL trees, red-black trees, and their operations. [14 hrs] • Part E – Graphs: Graph representation, graph traversal algorithms, shortest path algorithms, and minimum spanning tree algorithms..[10 hrs] • Revision problem classes [4 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be used in Data structure courses to introduce the concepts of data structures and explain the theoretical aspects of algorithms that operate on data structures, provide hands-on exercises to help students implement data structures and algorithms using programming languages such as C++, Java, or Python, provide practice problems to help students improve their problem-solving skills and prepare for exams and assess students' understanding of data structures and algorithms through quizzes, exams, programming assignments, and group projects..
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125
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Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (15)	3, 6, 9, 12	LO #1-2, 3-5, 6-8 and 10-11
	Assignments	2	5% (10)	2, 5, 11, 14	LO # 1, 3, 7-9 and 12-13
	Lab.	1	10% (30)	Continuous	All
	Report	6	10% (10)	Continuous	All
	Seminar	1	5% (10)	10	LO 1-8
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
Week 1	General introduction to data structures: Introduce to the Basic types of Data Structures and the common algorithm
Week 2	Linear data structures: What is linear data structure, characteristics of linear data structure and types of linear data structure
Week 3	Algorithm Analysis: Algorithm Analysis types and methods,experimental of analysis algorithm
Week 4	Recursion: Introduction to recursion, some problems that solved by recursion and the difference between recursion and iteration
Week 5	Back tracking technique: Introduction to back tracking technique ,general method of back tracking technique ,when to use a Backtracking algorithm and How does Backtracking work.
Week 6	Linked Lists: Introduction linked lists data structures ,comparison between linked lists and array .
Week 7	Linked Lists: basic operations on linked lists(Insertion, Deletion and traversing).
Week 8	Types of linked lists: Doubly linked lists,circular linked lists,memory -efficient doubly linked list,unrolled linked lists
Week 9	Stacks: What is a Stack,how stacks are used and stack applications and implementations.
Week 10	Queue: What is queue ,how are queues used and queue exceptions and implementations
Week 11	Tree : What is tree,binary trees and types of binary trees and properties of binary trees.
Week 12	Tree: Binary tree traversals,generic trees(N-ary trees) and threaded binary tree traversals
Week 13	Sorting algorithm: What is sorting ,why is sorting necessary and classification of sorting algorithms.
Week 14	Sorting algorithm: Classification of sorting algorithm types:bubble sort, selection sort, insertion sort,shell sort,merge sort ,quick sort and tree sort.
Week 15	Review
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
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Week 1	Lab 1: function declaration and function expression
Week 2	Lab 2: pointer declaration and initialization.
Week 3	Lab 3:user defined data structures
Week 4	Lab 4: Implementation problems using iteration/recursion problems
Week 5	Lab 5: implementation of back tracking method
Week 6	Lab 6:how to define a linked list node and programming traversal operation.
Week 7	Lab 7:programming a linked list insertion operation.
Week 8	Lab 8: programming a linked list deletion operation.
Week 9	Lab 9: Implementation of push and pop operation on stack
Week 10	Lab 10: Programming some application using stack.
Week 11	Lab 11: Programming the queue to store some of data
Week 12	Lab 12: Programming a storing data as tree structure and implementation of various traversal techniques
Week 13	Lab 13: Programming a storing data as graph structure and implementation of various traversal technique
Week 14	Lab 14: Programming a bubble sort, selection sort and insertion sort algorithms
Week 15	Lab 15: Programming a shell sort,merge sort ,quick sort and tree sort algorithms
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Data Structures And Algorithms Made Easy by Narasimha Karumanch (Author)	YES
Recommended Texts	data structure, algorithm and application in c++ by Sartaj sahani	No
Websites	https://opendatastructures.org/	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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	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.



Ministry of Higher Education and
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Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Measurements & Sensors</u>	Module Delivery	
Module Type	<u>Core</u>	✓ Theory	
Module Code	<u>CTE205</u>	✓ Lecture	
ECTS Credits	<u>2</u>	✓ Lab	
SWL (hr/sem)	<u>50</u>	Tutorial	
Module Level	UGx11 2	Practical	
Administering Department	<u>Department of Computer Techniques Engineering</u>	✓ Seminar	
Module Leader	Ahmed Waled Kasim	Semester of Delivery	1
Module Leader's Acad. Title	Lecturer	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Tutor	None	e-mail	ahmadwaled1973@ntu.edu.iq
Peer Reviewer Name	None	Module Leader's Qualification	Ph.D.
Review Committee Approval	12/06/2023	e-mail	None
		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	<ul style="list-style-type: none">• Explain the basic working principle of various electronic measurement instruments used to measure electrical parameters like current, voltage, power etc.• Understand and describe the specifications, features, characteristics, error and the performance of an instrument.• Learn about various types AC bridges and their applications in measurements of capacitance, frequency, inductance etc.• Gain knowledge about the functional blocks of a CRO and do analysis, measurements of waveform display.• Explain working of various types of sensors, transducers and their applications.
Module Learning Outcomes	After the completion of course, the students will have ability to: 67. Learning about the principle of various electronic measurement instruments. 68. Ability to design the AVO-meter instrument from PMMC.

مخرجات التعلم للمادة الدراسية	69. Learning about the both types of electrical bridges (DC and AC) bridges. 70. Learning the main principles of Oscilloscopes instruments. 71. 5. Learning the main principles of the electrical sensors, transducers and taking some examples about them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <ul style="list-style-type: none"> Part A – Measurement & Errors: Definitions, significant figures, some examples, Types of Errors, Statistical Analysis with applications examples [2 hrs]. Part B- Electromechanical Indicating Instruments: The DC Ammeters and DC Voltmeters, Properties of DC Voltmeters and Series type Ohmmeter, Alternating - Current Indicating Instruments, Thermo-instruments(Thermocouple Instrument), Electro-dynamometer and their application [6 hrs] Part C Bridges and their Applications: DC and AC Bridges with some examples [4 hrs] Part D Oscilloscopes; [2 hrs] Part E Hall Effect Sensors: Types of Hall Effect Sensors, Some Examples about Hall Effect Sensors [4 hrs] Part F Signal Generation: [2 hrs] Part G Analogue and Digital Data Acquisition System: [2 hrs] Part H Computer – Controlled Test System: [2 hrs]

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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	29	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	21	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	5, 8,11,14	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 3,4,5,7,10	LO # 3, 4, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report				
	Midterm Exam	2 hr	20% (20)	9	LO # 1-9

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Measurement and Errors.
Week 2	Electromechanical Indicating Instruments.
Week 3	Electromechanical Indicating Instruments.
Week 4	Electromechanical Indicating Instruments.
Week 5	Bridges and their Applications.
Week 6	Bridges and their Applications.
Week 7	Oscilloscopes.
Week 8	1- Theory of Hall Effect, Hall Effect Sensors, Basic Hall Effect Sensors. 2- Analogue output Sensors.
Week 9	Mid-Term Exam.
Week 10	1- Digital output Sensors. 2- Some Examples about Hall Effect Sensors.
Week 11	Signal Generation.
Week 12	Analogue and Digital Data Acquisition System.
Week 13	Computer – Controlled Test System.
Week 14	Preparatory Week.
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
Week 1	Lab1: Measurements of DC current.
Week 2	Lab2: Measurements of DC voltage.
Week 3	Lab 3: Loading effect on Voltmeter.
Week 4	Lab 4: Series type Ohmmeter.
Week 5	Lab 5: AC Voltmeter using half wave rectifier.
Week 6	Lab 6: AC Voltmeter using full wave rectifier.
Week 7	Lab 7: DC Bridges (Wheatstone bridge).
Week 8	Lab 8: Comparison bridges.
Week 9	Lab 9: Maxwell and Hay bridges.
Week 10	Lab 10: Measurements of frequency.
Week 11	Lab 11: Measurements of phase angle using Lissajous method.
Week 12	Lab 12: Calibration of Thermocouple.
Week 13	Lab 13: Photosensitive.
Week 14	Lab 14: Review.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electronic Instrumentation and Measurement Techniques by: W. D. Cooper and A. D. Helfrick. 3 rd edition.	Yes

Recommended Texts	Principles of Measurement Systems" by John P. Bentley	No
Websites	Measurement systems: Application and design 4th Revised edition by Ernest O. Doebelin https://www.amazon.com/Measurement-Systems-Application-Design-Doebelin/dp/0070173389	

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 جداً	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.				



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Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Computer architecture</u>	Module Delivery	
Module Type	<u>Core</u>	✓ Theory ✓ Lecture ✓ Lab ✓ Tutorial ✓ Practical ✓ Seminar	
Module Code	<u>CTE206</u>		
ECTS Credits	<u>6</u>		
SWL (hr/sem)	<u>150</u>		
Module Level	2		Semester of Delivery
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Ahmad F. Al-Allaf	e-mail	Ahmed.faleh@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	13/06/2023	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	34. Microprocessor Interfacing: Students learn about interfacing microprocessors with external devices such as memory, input/output ports, and peripherals.. 35. Memory Systems: The course cover different memory types used in microprocessor systems, such as main memory, and secondary storage, types of semiconductor memories (ROMs and RAMs). 36. Interrupts: Students learn about interrupt handling mechanisms in 8086 microprocessors. This includes understanding interrupt prioritization, interrupt service routines, and designing hardware interrupt circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	72. Explain the principles and characteristics of different memory types used in microprocessor systems, including, main memory, secondary storage. 73. Design and implement interfaces between a microprocessor (16 and 32 bit) and external devices, such as memory, input/output ports, and peripherals, applying relevant protocols and techniques. 74. Interfacing different I/O deceives to the 8088 and 8086 microprocessors, such as Keyboard, &-segment displays, and ADC/DAC circuits. 75. Understand the concepts and mechanisms of interrupts in microprocessors, including interrupt prioritization, and interrupt service routines. 76. Designing hardware interrupt circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • <u>Part-A: Basic computer architecture and memory:</u> Computer organization, Primary and secondary memories, Memory hierarchy, types of ROMs and RAMs, primary memory architecture, Internal structure and operation of ROMs, and RAMs [8hrs.]

	<ul style="list-style-type: none"> • Part-B: Memory Interfacing: Memory address decoder, Simple address decode, 2-4 and 3-8 address decoders. Use programmable logic devices (PLDs) to decode memory addresses, Interfacing ROM and SRAM to the 8088 microprocessor, Expanding memory in size and words. Interfacing ROM and SRAM to the 8086 microprocessor, Interfacing ROM and SRAM to the 32-bit microprocessor, memory interfacing Design examples [20hrs] • Part-C: I/O interfacing: The I/O Instructions, Isolated and Memory-Mapped I/O, Basic Input and Output Interfaces, Interfacing simple devices (LEDs and switches) to the 8088/8086 microprocessor, Interfacing ADC and DAC to the 8088/8086 microprocessor, Interfacing Keyboard and 7-segment displays to the 8088/8086 microprocessor [20hrs] • Part -D : Interrupts: Basic Interrupt Processing, Interrupt Instructions, Interrupt Vector, Hardware Interrupts, Expanding the Interrupt Structure, Using the 74ALS244 to Expand Interrupts, Daisy-Chained Interrupt, Interrupt Examples, Real-Time Clock, Interrupt-Processed Keyboard. [12hrs]
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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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	89	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	4	10% (10)	6, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	4, 7,10,13	LO # 3, 4, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	5	10% (10)	3, 6,9,12	LO # 3,6, 9 and 12
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
Week 1	<ul style="list-style-type: none"> • Basic computer architecture:

	Computer organization, Primary and secondary memories, Memory hierarchy, types of ROMs and RAMs
Week 2	<ul style="list-style-type: none"> • Primary memory architecture: Internal structure and operation of ROMs, and RAMs
Week 3	<ul style="list-style-type: none"> • Memory address decoder: Simple address decode, 2-4 and 3-8 address decoders. Use programmable logic devices (PLDs) to decode memory addresses.
Week 4	<ul style="list-style-type: none"> • Memory interfacing: Interfacing ROM and SRAM to the 8088 microprocessor, Expanding memory in size and words.
Week 5	<ul style="list-style-type: none"> • Memory interfacing: Interfacing ROM and SRAM to the 8086 microprocessor.
Week 6	<ul style="list-style-type: none"> • Memory interfacing: Interfacing ROM and SRAM to the 32-bit microprocessor.
Week 7	<ul style="list-style-type: none"> • Memory Interfacing: Memory interfacing Design examples
Week 8	<ul style="list-style-type: none"> • I/O system: The I/O Instructions, Isolated and Memory-Mapped I/O, Basic Input and Output Interfaces
Week 9	<ul style="list-style-type: none"> • I/O system interfacing: Interfacing simple devices (LEDs and switches) to the 8088/8086 microprocessor
Week 10	<ul style="list-style-type: none"> • I/O system interfacing: Interfacing ADC and DAC to the 8088/8086 microprocessor,
Week 11	<ul style="list-style-type: none"> • I/O system interfacing Interfacing Keyboard and 7-segment displays to the 8088/8086 microprocessor
Week 12	<ul style="list-style-type: none"> • Interrupts: Basic Interrupt Processing, Interrupt Instructions, Interrupt Vector, Hardware Interrupts.
Week 13	<ul style="list-style-type: none"> • Interrupts: Expanding the Interrupt Structure, Using the 74ALS244 to Expand Interrupts, Daisy-Chained Interrupt.
Week 14	<ul style="list-style-type: none"> • Interrupts: Interrupt Examples, Real-Time Clock, Interrupt-Processed Keyboard
Week 15	<ul style="list-style-type: none"> • Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Introduction to Proteus simulator for digital systems
Week 2	Lab 2: Introduction to Memory type and organization
Week 3	Lab 3: Address decoders
Week 4	Lab 4: SRAM interfacing
Week 5	Lab 5: ROM interfacing
Week 6	Lab 6: Expanding ROM and RAM
Week 7	Lab 7: Interfacing LEDs and switches to the microprocessor
Week 8	Lab 8: Interfacing Keyboard to the microprocessor
Week 9	Lab 9: Interfacing 7-segment display to the microprocessor
Week 10	Lab 10: Interfacing ADC to the microprocessor
Week 11	Lab 11: Interfacing DAC to the microprocessor
Week 12	Lab 12: Expanding the Interrupt Structure using the 74ALS244
Week 13	Lab 13: Interrupt design example

Week 14	Lab 14: Review
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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	The Intel Microprocessors (8th Edition), BARRY B. BREY, 2009	No
Recommended Texts	MICROPROCESSOR 8086 Architecture, Programming and Interfacing, Sunil Mathur, 2011	No
Websites	https://www.coursera.org https://www.edx.org https://ocw.mit.edu	

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:				
<p>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.</p>				



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Engineering Technical College/Mosul
Department of Computer Technology Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Information			
Module Title	<u>Electronic Circuits</u>	Module Delivery	
Module Type	<u>Core</u>	✓ Theory ✓ Lecture ✓ Lab ✓ Tutorial ✓ Practical ✓ Seminar	
Module Code	<u>CTE207</u>		
ECTS Credits	<u>6</u>		
SWL (hr/sem)	<u>125</u>		
Module Level	UGx11		Semester of Delivery
Administering Department	DEPARTMENT OF COMPUTER TECHNIQUES ENGINEERING	College	<u>Northern Technical University</u> Engineering Technical College/Mosul
Module Leader	Thabat F. Thabet	e-mail	Thabet.tfy@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None

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>37. To learn the applications of BJT .</p> <p>38. Study the types of BJT amplifiers (Common Emitter, Common Collector, and Common Base).</p> <p>39. Study the Frequency response of amplifiers.</p> <p>40. Differential and Operational Amplifiers</p> <p>41. Negative Feed-back (Inverting and Non-inverting Amplifiers) and other Applications of Operational Amplifiers.</p> <p>42. Study the family of Field Effect Transistors (FET).</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>77. Learning about the BJT applications.</p> <p>78. Learning about the types of BJT amplifiers.</p> <p>79. Frequency Response</p> <p>80. Learning about Differential and Operational Amplifiers</p> <p>81. Study the family of Field Effect Transistors (FET)..</p>
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • Part A – BJT Applications BJT as a Switch (cutoff and saturation). Linear operation and DC load line [8 hrs] • Part B- BJT Amplifiers. Common Emitter CE. Common Collector CC. Common Base CB. [12 hrs] • Part C Frequency Response The Decibel. Low Frequency Amplifier Response (Effect of the external capacitors). High Frequency Amplifier Response (Effect of the internal capacitors). Total Frequency Response (Bode Plot). [16 hrs] • Part D Differential and Operational Amplifiers Differential and Operational Amplifiers. Negative Feed-back (Inverting and Non-inverting Amplifiers). Applications of Operational Amplifiers. [12 hrs] • Part E Field Effect Transistors (FET). Junction Field Effect Transistors (JFET). Metal Oxide Semiconductor Field Effect Transistors (MOSFET). [8 hrs] • Revision problem classes [4 hrs]

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 type of simple experiments involving some sampling activities that are interesting to the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem)	89	Unstructured SWL (h/w)	6

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

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	4, 7, 9, 13	LO # 1, 2, 4 and 5
	Assignments	8	10% (10)	3, 4, 7, 9, 14	LO # 1, 2, 4, 5 and 6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	5	10% (10)	3, 7, 8, 11, 13	LO # 2, 3, 4, 5 and 6
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
Week 1	BJT as a Switch (cutoff and saturation).
Week 2	Linear operation and DC load line.
Week 3	Common Emitter CE.
Week 4	Common Collector CC.
Week 5	Common Base CB.
Week 6	The Decibel.
Week 7	Low Frequency Amplifier Response (Effect of the external capacitors)
Week 8	High Frequency Amplifier Response (Effect of the internal capacitors)
Week 9	Total Frequency Response (Bode Plot)
Week 10	Differential and Operational Amplifiers.
Week 11	Negative Feed-back (Inverting and Non-inverting Amplifiers).
Week 12	Applications of Operational Amplifiers.
Week 13	Junction Field Effect Transistors (JFET).
Week 14	Metal Oxide Semiconductor Field Effect Transistors (MOSFET).
Week 15	Preparatory Week
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Review of Transistor Biasing (operating point)
Week 2	Lab 2: BJT as a Switch (cutoff and saturation).
Week 3	Lab 3: Linear operation and DC load line.
Week 4	Lab 4: Common Emitter Amplifiers
Week 5	Lab 5: Common Collector Amplifiers
Week 6	Lab 6: Common Base Amplifiers
Week 7	Lab 7: Frequency response of OPAMP
Week 8	Lab 8: Inverting and Non-inverting OPAMPs

Week 9	Lab 9: Analogue Comparator
Week 10	Lab 10: The Integrator Circuit
Week 11	Lab 11: The Differentiator Circuit
Week 12	Lab 12: FET
Week 13	Lab 13: FET Amplifier
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas L. Floyd, Electronic Devices, 9th Edition, Pearson Education 2012	Yes
Recommended Texts	R. BOYLESTAD and L. NASHESKY, "ELECTRONIC DEVICES AND CIRCUIT THEORY", 11th edition, Pearson Education , 2013	Yes
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org/learn/electronics	

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.



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Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Communication Fundamentals	Module Delivery	
Module Type	Core	✓	Theory
Module Code	CTE208	✓	Lecture
ECTS Credits	7	✓	Lab
SWL (hr/sem)	175	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 2	Semester of Delivery	2
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	Dr. Emad A. Mohammed	e-mail	e.a.mohammed@ntu.edu.iq
Module Leader's Acad. Title	Asst. prof.	Module Leader's Qualification	PhD
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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. To learn the fundamentals of communications system architecture.
	44. To learn the basic components used in communication system and each component basic functions.
	45. To learn the types of channels that are used in communication system.
	46. To learn the basic techniques used in signal representation, modulation and demodulation.
	47. To learn the basics of transmission lines, their use and their equivalent circuits

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	82. To learn how to deal with different types of signals. 83. To learn how to utilize linear and nonlinear systems. 84. To learn how to design different types of filters. 85. To learn the basics of finding the spectrum of different types of signals. 86. To be familiar with various types of modulation. 87. To be familiar with how to use smith chart for transmission lines.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <ul style="list-style-type: none"> • <u>Part A – Signals and Systems</u> Signals and system definition, periodic signals, non-periodic signal, deterministic and non-deterministic signals Linear systems and nonlinear systems, filters, [8 hrs] • <u>Part B- Fourier Series and Transform</u> Fourier series, signal harmonics, Fourier transform, Frequency domain, exponential and trigonometric Fourier transform, Properties of Fourier Transform, application of Fourier transform [12 hrs] • <u>Part C -Signals Transmission</u> Baseband signal transmission, line coding, polar code, bipolar code, Manchester code, Analogue modulation Techniques, AM, FM, PM, Pulse modulation techniques, PAM, PPM, PWM [12 hrs] • <u>PartD- Digital Modulation and Digital Channels.</u> Digital modulation Techniques ASK, PSK, FSK, Multilevel modulation, QAM, Wireless channels, Shannon equation, channel capacity [12 hrs] • <u>PartE-Transmission lines.</u> Transmission lines and their equivalent circuits, TL characteristics, Incident wave, reflected wave, Smith Chart, matching techniques [10 hrs] • Revision problem classes [6 hrs]

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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	101	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	8	10% (10)	4,6,10,12	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 5,8,11	LO # 3, 4, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	8	10% (10)	1,3,9,13	LO # 5, 8 and 10

Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Signals and system definition, periodic signals, non-periodic signal, deterministic and non-deterministic signals
Week 2	Linear systems and nonlinear systems, filters
Week 3	Fourier series, signal harmonics
Week 4	Fourier transform, Frequency domain, exponential and trigonometric Fourier transform
Week 5	Properties of Fourier Transform, application of Fourier transform
Week 6	Baseband signal transmission, line coding, polar code, bipolar code, Manchester code
Week 7	Analogue modulation Techniques, AM, FM, PM
Week 8	Pulse modulation techniques, PAM, PPM, PWM
Week 9	Digital modulation Techniques ASK, PSK, FSK
Week 10	Multilevel modulation, QAM
Week 11	Wireless channels, Shannon equation, channel capacity
Week 12	Transmission lines and their equivalent circuits, TL characteristics
Week 13	Incident wave, reflected wave
Week 14	Smith Chart, matching techniques
Week 15	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Signals properties
Week 2	Lab 2: Linear systems and nonlinear systems, filters
Week 3	Lab 3: Harmonics determination
Week 4	Lab 4: Fourier transform, Spectrum analysis
Week 5	Lab 5: Fourier transform properties
Week 6	Lab 6: Types of Baseband signals
Week 7	Lab 7: Amplitude and phase modulation
Week 8	Lab 8: Frequency modulation
Week 9	Lab 9: PPM, PAM, PWM
Week 10	Lab 10: ASK
Week 11	Lab 11: FSK
Week 12	Lab 12: PSK
Week 13	Lab 13: QAM
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Ferrel Stremler "Introduction to Communication Systems" Addison Wesley Longman, 3rd Edition 1992	Yes

Recommended Texts	B.P. Lathi "Modern Digital and Analog Communication Systems" Oxford University Press, 4 th Edition, 2010	No
Websites	Communication Skills Courses & Tutorials Online https://www.udemy.com	

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

Module Information			
معلومات المادة الدراسية			
Module Title	Computer applications	Module Delivery	
Module Type	Core	✓	Theory
Module Code	CTE209	✓	Lecture
ECTS Credits	4	✓	Lab
SWL (hr/sem)	100	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 2	Semester of Delivery	1
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	Shaima Miqdad Mohamed Najeeb	e-mail	shaimamiqdad76@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	48. provide a foundation in programming for engineering problem solving using the MATLAB software package. 49. develop the skills analyze and break down a program and solve it . 50. study the creation and use of functions and scripts in MATLAB. 51. study the use of MATLAB for data analysis and visualization, including plotting functions. 52. Learn the capabilities and applications supported by the MATLAB program, implement them, and use them to solve various problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	88. Ability to use MATLAB: Students should be able to use the MATLAB software effectively, including navigating the MATLAB desktop, using the command window, and accessing the help system. 89. Ability to create scripts and functions: Students should be able to create and use MATLAB scripts and functions to solve problems and automate tasks. 90. Ability to perform data analysis and visualization: Students should be able to use MATLAB's built-in functions and tools for data analysis and visualization

	<p>91. Ability to perform simulations and modeling: Students should be able to use MATLAB for simulations and modeling of systems.</p> <p>92. Ability to perform Graphical User Interfaces(GUI) and apply to construct the front end for different applicatio</p>
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> Part A – Introduction to MATLAB and Data Structures Overview of MATLAB environment, history, and applications. Basic commands, arrays, matrices, vectors, and cell arrays. scripts, functions and File I/O and Data Manipulation: Importing and exporting data from files, data cleaning, and manipulation.[10 hrs] Part B- Numeric Data Types and Basic Operations: Numeric data types, arithmetic operations, and mathematical functions.[4 hrs] Part C - Control Structures: Conditional statements, loops, and logical operators. [10 hrs] Part D -Plotting and Visualization: Creating plots, customizing plots, and 2D/3D visualization. [6 hrs] Part E – Simulink and GUI Simulink concept, creating models, and simulation. Graphical User Interfaces(GUI) construct the front end for different applicatio.[10 hrs] Revision problem classes [3 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>The main strategy that will be used in MATLAB courses to introduce concepts, explain syntax and functions, and provide examples. Hands-on exercises are an effective learning strategy in MATLAB courses to help students apply what they have learned. Exercises may involve solving problems, writing functions, and working with data. Case studies are a useful teaching strategy in MATLAB courses to help students understand how MATLAB can be used in real-world applications. Overall, the learning and teaching strategies of a MATLAB course should be designed to maximize students' understanding and proficiency in using MATLAB for various applications in engineering, science, and other fields.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

<p>Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل</p>	45	<p>Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً</p>	3
<p>Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	55	<p>Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً</p>	4
<p>Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل</p>	100		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	5	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	2	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)		
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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	General introduction to matlab programming: Introduce to the basics of programming in general and programming MATLAB® in particular.Environment and Settings,Preferences and settings, platform differences, adding hardware and optional features
Week 2	Programming in MATLAB: Introduction to matrices and vectors , creating a Matlab Matrix, referencing the Elements of a Matrix, deleting a Row or a Column in a Matrix.
Week 3	Programming in MATLAB: Arithmetic ,logical and bitwise operations.
Week 4	Programming in MATLAB: Writing MATLAB scripts and functions, a custom-made Matlab functions.
Week 5	Programming in MATLAB : Loops and control flow (for-loops, if-statements)
Week 6	Function in MATLAB : Declare function name, inputs, and outputs(syntax) with examples.
Week 7	Plotting in matlab: Overview of MATLAB Plotting, Plotting Process graph components,figure tools,selecting plot types
Week 8	Plotting in matlab: Basic Plotting (Multiple Data Sets in One Graph, Specifying Line Styles and Colors, Multiple Plots in One Figure, Setting Axis Limits).
Week 9	Plotting in matlab: Mesh and surface plots, visualizing functions of two variables .
Week 10	Plotting in matlab: Handle graphics: Work with graphics objects and set object properties. Animations: Create moving graphics
Week 11	Matlab simulink: Simulink Concepts, simulink environment,basic elements,simulink librarys
Week 12	Matlab simulink: Block Libraries,modifying the blocks ,interactive model editing,programmatic model editing and running simulation .
Week 13	MATLAB GUI: Creating Graphical User Interfaces, introduces GUIDE, the MATLAB graphical user interface design environment, Laying out a GUI,
Week 14	3D Computer Graphics Operations: Programming a GUI, introduces callbacks to define behavior of the GUI components, Menu-driven programs, Controls: uimenu and uicontrol.
Week 15	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختب

Week	Material Covered
Week 1	Lab 1: Introduction to MATLAB .
Week 2	Lab 2: Basic commands
Week 3	Lab 3: Working with matrices part(I)
Week 4	Lab 4: Working with matrices part(II)
Week 5	Lab 5: Relational ,logical bitwise operations
Week 6	Lab 6: Input and output commands in a script file.

Week 7	Lab 7: Flow control(if and switch-case) statements
Week 8	Lab 8: Loop(for,while,break,continue)statements
Week 9	Lab 9: M-file functions
Week 10	Lab 10: 2D Plotting functions
Week 11	Lab 11: 3D Plotting functions
Week 12	Lab 12: Basics of Matlab simulink
Week 13	Lab 13:Graphical user interface part(I)
Week 14	Lab 14: Graphical user interface part(II)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-MATLAB for Engineering Applications 4th Edition by William Palm Iii (Author)	Yes
Recommended Texts	Getting Started with MATLAB® Version 7 by Mathwoks	No
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org/learn/matlab	

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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	<u>Website Design</u>	Module Delivery	
Module Type	<u>Core</u>	✓	Theory
Module Code	<u>CTE210</u>	✓	Lecture
ECTS Credits	<u>3</u>	✓	Lab
SWL (hr/sem)	<u>75</u>	x	Tutorial
Module Level	UGx11 2	✓	Practical
Administering Department	<u>Department of Computer Techniques Engineering</u>	✓	Seminar
Module Leader	Nawar Ali Ibrahim Al_Obaidy	Semester of Delivery	2
Module Leader's Acad. Title	<u>Assist Lecturer</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
		e-mail	<u>Nawar.ali@ntu.edu.iq</u>
		Module Leader's Qualification	PhD.

Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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>The objectives of a course on Website Design: Upon successful completion of the Diploma, students should be able to:</p> <ol style="list-style-type: none"> 1. Developing front-end website architecture 2. Designing user interactions on web pages 3. Developing back-end website applications 4. Creating servers and databases for functionality 5. Developing adaptive content for multiple devices (cell phones, tablets, etc.) ensure cross-platform optimization for mobile phones 6. Ensure responsiveness of applications 7. Working alongside graphic designers for web design features 8. Managing a project from conception to finished product 9. Designing and developing Application Programming Interfaces (APIs) 10. Meeting both technical and consumer needs for a web development project 11. Learning to research new methods of development in web applications and programming languages 12. Preparing mock-ups and storyboards for a web development project. 13. Consult with clients to develop and document website requirements. 14. Demonstrating communication skills, service management skills, and presentation skills. 15. Completing job preparation tasks including writing resumes and cover letters, conducting job interviews, and developing an ePortfolio
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>Upon successful completion of the Certificate, graduates should be able to:</p> <ul style="list-style-type: none"> • Use their learned skills, knowledge, and abilities to develop websites for the internet • Apply basic design principles to present ideas, information, products, and services on websites • Apply fundamental programming principles to the construction of websites • Effectively manage website projects using available resources • Demonstrate communication skills, service management skills, and presentation skills • Complete job preparation tasks including writing resumes and cover letters, conducting job interviews, and developing an ePortfolio • Apply employability skills including fundamental skills, personal management skills, and teamwork skills
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • Part A – Introduction to Website Building: Provide a historical review of web design and the stages it went through in the process of development. Learning the basics of web design and development [4 hrs.] • Part B- The Website and Its Future: Explaining how website design can provide students with great opportunities in many jobs. In addition to increasing the demand for web designers in the future because companies are in constant need of competencies in the field of web

	<p>work to provide them with all means of technical support for websites because the website is the first interface for companies and institutions. [2 hrs.]</p> <ul style="list-style-type: none"> • Part C -: The Language of the Web: HTML5: present the design of a web page by referring to the HTML5 semantic tags and using some CSS3 style properties. learning a simple structure of a web page with its associated style sheet. [8 hrs.] • Part D - Structuring the content of a web page: It covers the following concepts: <ul style="list-style-type: none"> ○ Structuring an HTML page (head/body/header/nav/main/article/aside/footer); ○ Importing elements (font/icons/style sheet/conditional import); ○ Organizing the elements of an HTML page (container/header/menu/sidebar/footer); ○ Adding style properties to these elements. [6 hrs.] • Part E – Style Sheets: CSS3: CSS – Cascading Style Sheets – is commonly used to format HTML-type web pages using display properties (colors, fonts, borders, etc.) and positioning properties (height, width, top-down, side-by-side, etc.). The display result of a web page can be completely changed without adding additional code to the web page. [6 hrs.] • Part F – Design and Creation a Website: The purpose is: <ul style="list-style-type: none"> ○ Avoid repeating the same formatting code in each web page; ○ Employ common styles, using clear names (e.g. employing the same shaded style for images or text); ○ Modify the appearance of an entire website by changing only one single file (the style sheet). [4 hrs.] • – understand the code of the web page. [4 hrs.]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>Following planned steps to teach students the basic skills that they must learn (in the correct order) as follow:</p> <p>Getting Started: Fundamentals of Web Design and Development</p> <p>Learn Essential Skills: Design and programming concepts that all new web designers should learn.</p> <p>Using the Best Resources: A complete list of the best resources for learning web design.</p> <p>Gain Experience: How to gain hands-on web design experience and build your portfolio.</p> <p>Choosing a Career Path: Decide if freelancing or working at home is right for them.</p> <p>Finding a job: How to find their first web design job and start their career.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	43	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
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Formative assessment	Quizzes	3	10% (10)	4, 6, 8, 10, 12, 14	LO # 2, 3, 8, 9, 10 and 11
	Assignments	4	10% (10)	2, 5, 8, 12	LO # 1-2, 4-5, 7, 11
	Projects / Lab. Report	16	10% (10)	Continuous	All
	Midterm Exam	2 hr	10% (10)	7	LO # 1-6
Summative assessment	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Background and Phases of Evolution of the Web.
Week 2	Web application architecture.
Week 3	Choosing a Domain Name and Hosting
Week 4	Installing WordPress and Account Setup
Week 5	WordPress Admin Dashboard and the Features
Week 6	Structure of an HTML5 document.
Week 7	CSS3 Overview.
Week 8	Process of creating a website.
Week 9	Different website types and ergonomics the website
Week 10	New Theme Installation
Week 11	Header and Landing Page Top Design
Week 12	How to Insert Logo, Site Title, and Setup Search Box on a Website
Week 13	Explanation of Post Screen Option and its Use
Week 14	Footer Design of a Website and Adding Social Media Link
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Step-by-Step Guide to Registering Domain Name.
Week 2	Lab 2: Structure of an HTML5 web page.
Week 3	Lab 3: How to Design the Menu Items.
Week 4	Lab 4: Simple Forms and Table Formatting.
Week 5	Lab 5: How to Add Search on the Website.
Week 6	Lab 6: How to Change Website Title and Description
Week 7	Lab 7: Steps in Adding Gallery to a Website using Gallery Widget Option.
Week 8	Lab 8: How to Place Slider on the Website.
Week 9	Lab 9: How to Publish with Post Tool.
Week 10	Lab 10: How to insert Page Break (Block) in a Post.
Week 11	Lab 11: How to Hyperlink in a Post.
Week 12	Lab 12: Inserting Image/Photo in the Post or Pages.
Week 13	Lab 13: Creating a template model.
Week 14	Lab 14: Creating a website from A to Z.
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Website Design and Development with HTML5 and CSS3. Authers: Hassen Ben Rebah, Hafedh Boukthir, and Antoine Chédebois	No
Recommended Texts	How to Build and Design a Website using wordpress, William S. Page, 2020	No
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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Summer Training 1</u>	Module Delivery	
Module Type	<u>Supplement</u>	Theory	
Module Code	<u>CTE211</u>	Lecture	
ECTS Credits	<u>2</u>	✓ Lab	
SWL (hr/sem)	<u>50</u>	Tutorial	
Module Level	UGx11 2	✓ Practical	
Administering Department	<u>Department of Computer Techniques Engineering</u>	✓ Seminar	
Module Leader	All Acadimic staf	Semester of Delivery	2
Module Leader's Acad. Title		College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Tutor	None	e-mail	
Peer Reviewer Name	None	Module Leader's Qualification	
Review Committee Approval	21/06/2023	e-mail	None
		e-mail	None
		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- القدرة على ربط المعرفة المكتسبة من الطالب خلال دراسته الأكاديمية بالمشاكل الحقيقية على أرض الواقع</p> <p>2- اكتشاف بيئة العمل واحتياجاتها وقيودها</p> <p>3- القدرة على تحديد المتطلبات المطلوبة لإيجاد حلول مناسبة وفعالة للمشاكل الحقيقية على أرض الواقع مع وجود قيود</p> <p>4- القدرة على تكوين رؤية واضحة حول الأهداف والمعوقات والعمل بشكل فعال</p> <p>5- إيجاد الطالب استقلاليته باكتسابه لمهارات جديدة مع إرشاف بسيط من قبل جهة التدريب</p> <p>6- القدرة على إيجاد حلول مناسبة في حال حدوث أي تعري في متطلبات العمل وقيوده</p> <p>7- القدرة على التواصل مع الكثرى من الشخصا المتواجدين في المجال العم يلى</p> <p>8- تعلم المسؤوليات الأخلاقية والأح رياقية</p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<ul style="list-style-type: none"> Understanding of Computer Architecture: Gain knowledge of the components and operation of computer systems, including processors, memory, input/output devices, and the organization of data. Programming Skills: Develop proficiency in programming languages commonly used in computer engineering, such as C, C++, Java, or Python. Learn to write efficient and well-structured code. Problem-Solving and Algorithm Design: Learn techniques for problem-solving and algorithm development. Understand various algorithmic approaches and their efficiency. Develop skills to analyze and optimize algorithms.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <p>تعريف الطالب على اقسام وشعب الموقع التدري يب . Part 1- [7 hrs]</p> <ul style="list-style-type: none"> Part 2- [7 hrs] : الصلب Part 3- [7 hrs] : التعرف الاعطال الشائعة في الاقراص الصلبة Part 4- [8 hrs] : انواع الطابعات الالك ريونية والاعطال ال ريب تواجه هذه الطابعات

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<p>Strategies</p>	<p>ان الإس رياتجية الرئيسة ال ريب سيتم تبنيها في تقديم هذه الوحدة:</p> <ul style="list-style-type: none"> تشجيع طلبة هندسة الحاسوب على المشاركة بشكل مه يب مع الأوساط العملية من خلال الممارسة الميدانية في دوائر الدولة . إيجاد حلول مبتكرة ريادة لسد الاحتياجات المحلية. بناء قيادة مهنية وأخلاقية وتعاونية في مكان العمل و في المجتمع. تطوير معرفتهم وخ ياتهم
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Student Workload (SWL)

الحمل الدراسي للطالب

<p>Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>20</p>	<p>Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً</p>	<p>5</p>
<p>Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	<p>30</p>	<p>Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً</p>	<p>7.5</p>
<p>Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل</p>	<p>50</p>		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
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Formative assessment	Quizzes				
	Assignments	8	15% (10)	1, 2,3,4	LO # 1, 2, 3 and 4
	Projects / Lab. Report	4	20% (10)	Continuous	All
		2	15% (10)	2,4	LO # 2 and 4
Summative assessment	Midterm Exam				
	Final Exam	1 hr	50% (50)	5	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	تعريف الطالب على اقسام وشعب الموقع التدريبي مع اعطاء نبذة مختصرة عن اجزاء الحاسبة وكيفية عملها وامكانية - صيانة بعض اجزائها.
Week 2	والطرق M2 و SSD التعرف على اجزاء القرص الصلب وكيفية تقسيمه وطريقة خزن البيانات ومقارنته مع قرص - (NTFS, FAT16, FAT32 المستخدمة لتصفري القرص)
Week 3	التعرف الاعطال الشائعة - ينفى الاقراص الصلبة وكيفية معالجتها والى اياج المستخدمة - ينفى عملية اصلاح الاقراص الصلبة - واس رجاع المعلومات المحذوفة او المفقودة بعد عملية الاصلاح
Week 4	اعطاء نبذة مختصرة عن انواع الطابعات الالكترونية والاعطال اللى يلى تواجه هذه الطابعات وكيفية معالجتها. - التعرف على طبيعة الاجهزة المسيطر عليها حاسوبياً وكيفية عملها - ينفى حال توفرها - ينفى الموقع التدريبي
Week 5	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
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 جداً	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

Module Information

معلومات المادة الدراسية

Module Title	<u>CONTROL ENGINEERING</u>	Module Delivery	
Module Type	<u>Core</u>	✓	Theory
Module Code	<u>CTE300</u>	✓	Lecture
ECTS Credits	<u>6</u>	✓	Lab
SWL (hr/sem)	<u>150</u>	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 3	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University ENGINEERING TECHNICAL COLLEGE/MOSUL</u>
Module Leader	Ziad Saeed Mohammed	e-mail	ziadsaeed@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	13/06/2023	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	53. To learn the basic definitions of a control systems and their types. 54. Methodologies and modeling for several types of control systems. 55. Learn the control system performances and their applications. 56. Learn the control system stability and their calculations. 57. Apply the Root locus analysis and Routh stability in control system. 58. Apply the frequency analysis (Bode plots). 59. Design the suitable type of controllers for improving the system performances.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	93. Learning about the automatic control systems. 94. Learning the Modelling of control systems. 95. Learning the control system stability and method of calculations. 96. Learning the system compensations techniques. 97. Ability to design, and implement different prototypes of control systems . 98. Ability to design, and analyze the several types of controllers and for suitable applications.
Indicative Contents	Indicative content includes the following: • <u>Part A</u> – presents an introduction to control systems:

المحتويات الإرشادية	<p>Classify the types of control systems, deals with mathematical modeling and transfer function of control systems. Derives mathematical models of mechanical systems and electrical systems. Block diagrams representation and reduction). Control system Stability_Definitions and method of stability_Routh's- Hurwitz stability criterion is presented for stability analysis of control systems. Applications for Routh stability in control system for calculating the range of gain to ensure the system stability [16hrs.].</p> <ul style="list-style-type: none"> • <u>Part B- Control system performance:</u> Introduction to system steady- state response. Definition of system types, order, and rank. Study the time response analysis, (transient response and steady-state analyses of control systems). Steady state error calculations for several system inputs and types. [16hrs.]. • <u>Part C- Graphical method for obtaining stability:</u> Discusses the Root-Locus analysis. Frequency response analysis (BODE PLOTS). [13hrs] • <u>Part D – Compensations:</u> Definitions and classify of compensators. Design of the controller using root locus method. [12hrs.] • Revision problem classes [3 hrs.].
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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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As	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	All
	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)

المناهج الاسبوعي النظري

Week	Material Covered
Week 1	<u>Introduction to linear control system, open and closed loop system.</u>
Week 2	<u>Mathematical modeling of physical systems and transfer functions,</u>
Week 3	<u>Mathematical modeling of D.C. Servo Motor. State space representation and analysis.</u>
Week 4	<u>Transfer function, block diagram representation and reduction diagram.</u>
Week 5	<u>Transfer function, block diagram representation and reduction diagram.</u>
Week 6	<u>Time domain analysis, steady-state transient analysis. Part-1</u>
Week 7	<u>Time domain analysis, steady-state transient analysis. Part-2</u>
Week 8	<u>Stability analysis and Routh stability criteria.</u>
Week 9	<u>Root Locus Technique. Part-1</u>
Week 10	<u>Root Locus Technique. Part-2</u>
Week 11	<u>Frequency Response analysis, phase, gain margin and bode plots. Part-1</u>
Week 12	<u>Frequency Response analysis, phase, gain margin and bode plots. Part-2</u>
Week 13	<u>Compensation, phase-lag compensation lag-lead compensation.</u>
Week 14	<u>P, PI, PD, and PID Modes of Feedback Control, Realization of PID Controller Using Active and Passive Elements.</u>
Week 15	<u>Final Exam.</u>

Delivery Plan (Weekly Lab. Syllabus)

المناهج الاسبوعي للمختب

Week	Material Covered
Week 1	<u>Lab1: Explanation of CKL003 Board+ D.C. motor speed control.</u>
Week 2	<u>Lab2: The linear operational amplifier as computational element.</u>
Week 3	<u>Lab 3: Dimmer light control+ Temperature control.</u>
Week 4	<u>Lab 4: Three steps control.</u>
Week 5	<u>Lab 5: Alternating current control motors using (ON-OFF) switching.</u>
Week 6	<u>Lab 6: Control on operation of two motors in sequences+ Liquid level control system.</u>
Week 7	<u>Lab 7: Transfer function part1+ Transfer function part2</u>
Week 8	<u>Lab 8: Response of second order system.</u>
Week 9	<u>Lab 9: Frequency response (Bode plots).</u>
Week 10	<u>Lab 10: Frequency response (polar plots and Nyquist plots).</u>
Week 11	<u>Lab 11: Speed control and error correction for C-L using PD controller.</u>
Week 12	<u>Lab 12: Proportional-integral controller.</u>
Week 13	<u>Lab 13: Proportional plus integral plus derivative controller or PID.</u>
Week 14	<u>Lab 14: The Control Function of Time Delay Valve 3/2 Way. (NORMALY CLOSED)</u>

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Modern control engineering: By OGATA. Pearson Education, Inc. fifth edition 2010. 2. Feedback and Control System. SCHAUM'S OUTLINE. JOSEPH J. DISTEFANO, McGraw-Hill Companies, Inc.1995.	Yes(and electronic version)
Recommended Texts	Automatic Control Systems: By BENJAMIN C. KUO, JOHN WILEY & SONS, INC.9 th edition2010.	No,(only electronic version-pdf)
Websites	https://www.tutorialspoint.com/control_systems/index.htm	

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

Module Information معلومات المادة الدراسية			
Module Title	<u>Microprocessor Supported Chips</u>	Module Delivery	
Module Type	Core	✓	Theory
Module Code	CTE301	✓	Lecture
ECTS Credits	6	✓	Lab
SWL (hr/sem)	152	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 3	Semester of Delivery	1
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	Abdullah Mohammed A. Hamdoon	e-mail	abd_comp@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Microprocessors	Semester	1
	Computer Architecture		2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The objective of studying the Microprocessor Supported Chips is to enable the student to connect the processor with various digital, analog, and serial devices. The student learns vary digital methods to input/output data by interrupt or polling methods, how to write/read data on RAM using Direct Memory Access. Also, for each chip has different inputs and outputs pins, the student learns the digital circuits that needed to connect it with the processor, in addition, the student is learned how to program Supported Chips to perform the function of the design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- The student can design interface circuit for connecting processor with varies devices (digital, analog, and serial). 2- The student can read and understand datasheets manuals for differences chips and programming their registers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • <u>Part A – Microprocessor interfacing Circuit Design</u> It contain the methods for design interface circuit to connect LEDs , Switches to microprocessor. [2 hrs] • <u>Part B- Programmable Peripheral Interface (PPI)</u>

	<p>The PPI provides a flexible parallel interface which includes features such as single bit, 4 bits, and 8 bits (Byte) wide input and output ports, buffered input, latched output, input and output port with handshaking. [4 hrs]</p> <ul style="list-style-type: none"> • <u>Part C Programmable Interval Timer(PIT)</u> Programmable Interval Timer contains three independent 16 bits counters that can be programmed to operate in a variety of ways to implement timing functions. For instance, they can be set up to work as a one-shot pulse generator, square-wave generator, or rate generator. [4 hrs] • <u>Part D Programmable Interrupt Controller(PIC)</u> The 8259A programmable interrupt controller (PIC) adds eight vectored priority encoded interrupts to the microprocessor. This controller can be expanded without additional hardware to accept up to 64 interrupt request inputs. This expansion requires a master 8259A and eight 8259A slaves. [6 hrs]. • <u>Part D Programming Direct Memory Access (DMA)</u> The DMA controller is capable to perform data transfer between either two sections of memory or between memory and I/O device. This controller bypass the μp during its data transfer. [4 hrs]. • <u>Programmable Communication Interface</u> is programmable communication interface designed to connect to virtually any type of serial interface. The 16550 is a Universal Asynchronous Receiver/Transmitter (UART) that is fully compatible with Intel microprocessors, and it is capable of operating at 0-1.5 M Baud. [4 hrs]. • <u>Analog-to-Digital Conversion</u> A common low-cost ADC is the ADC0804, which is compatible with a wide range of MPSs such as Intel family. There are faster ADCs available, & some with more resolution than 8-bits, but this device is ideal for many applications that do not required a high degree of accuracy. The ADC0804 requires a 100 μs to convert an analogy input into a digital output code. [2 hrs]. • <u>Digital-to-Analog Conversion</u> The ADC0808 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. [2 hrs]. • Revision problem classes [2 hrs]
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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 type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem)	59	Structured SWL (h/w)	4
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الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعياً	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	103	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	162		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1-5 and 6-10
	Assignments	5	10% (10)	3,5,8,10,12	LO #1-3, 4-5, 6-8,9-10 and 11-12
	Projects / Lab.	14	10% (10)	Continuous	All
	Report	8	10% (10)	1,3,5,7,9,11,13	All
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 النظري

Week	Material Covered
Week 1	Microprocessor interfacing Circuit Design
Week 2	8255 Programmable Peripheral Interface (PPI) I
Week 3	8255 Programmable Peripheral Interface (PPI) II
Week 4	8254 Programmable Interval Timer (PIT) I
Week 5	8254 Programmable Interval Timer (PIT) II
Week 6	Microprocessor Interrupts
Week 7	8259A Programmable Interrupt Controller(PIC) I
Week 8	8259a Programmable Interrupt Controller(PIC) II
Week 9	8237 Programming Direct Memory Access (DMA) Controller I
Week 10	8237 Programming Direct Memory Access (DMA) Controller II
Week 11	16550 Programmable Communication Interface
Week 12	16550 Programmable Communication Interface Applications
Week 13	Analog-to-Digital Conversion Application ADC0804
Week 14	Digital-to-Analog Conversion Application DAC0808
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Training on Proteus Program to Make Processor work
Week 2	Lab 2: Microprocessor interfacing Circuit Design in Protues (Leds and Switches)
Week 3	Lab 3: Microprocessor interfacing Circuit Design in Protues (Seven Segment Display (SSD))
Week 4	Lab 4: Programmable Peripheral Interface (Keypad and SSD)
Week 5	Lab 5: Programmable Peripheral Interface (Application)
Week 6	Lab 6: Programmable Interval Timer
Week 7	Lab 7: Programmable Interval Timer (Application)

Week 8	Lab 8: Microprocessor Interrupts Design
Week 9	Lab 9: Programmable Interrupt Controller
Week 10	Lab 10: Programmable Communication Interface
Week 11	Lab 11: Programmable Communication Interface Application
Week 12	Lab 12: Analog-to-Digital Conversion Application (ADC0804)
Week 13	Lab 13: Digital-to-Analog Conversion Application (DAC0808)
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro. Processor Architecture, Programming, and Interfacing. Eighth Edition, Barry B. Brey, Copyright © 2009	No
Recommended Texts	Advanced Microprocessors and Peripherals, Third Edition, K M Bhurchandi and A K Ray, Copyright © 2013	No
Websites	Data sheets of Chips on internet	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>DIGITAL SIGNAL PROCESSING</u>		Module Delivery
Module Type	<u>Core</u>	✓ Theory ✓ Lecture ✓ Lab x Tutorial ✓ Practical ✓ Seminar	
Module Code	<u>CTE302</u>		
ECTS Credits	<u>4</u>		
SWL (hr/sem)	<u>100</u>		
Module Level	UGx11 3	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Mohand lokman Ahmed	e-mail	mohandaldabag@ntu.edu.iq
Module Leader's Acad. Title	Asst.Prof.	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	The objectives of a course on digital signal processing (DSP): 1- To provide a comprehensive treatment of the important issues in design, implementation, and application of digital signal processing algorithms. 2- To make students familiar with the most important methods in DSP, including digital filter design, transform-domain processing, and importance 3- To describe signals mathematically and understand how to perform mathematical operations on signals 4- To introduce students to basic techniques in designing and implementing digital signal processing systems 5- To discover discrete-time signals and analyze them with the Fourier transform
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand the fundamental concepts and principles of digital signal processing, such as sampling, quantization, and digital filtering. 2- Apply mathematical tools and techniques, such as Fourier analysis, z-transforms, and digital signal processing algorithms, to analyze and process digital signals. 3- Design and implement digital signal processing systems using software tools and programming languages, and evaluate their performance through simulation and experimentation. 4- Analyze and interpret the results of digital signal processing experiments, and communicate them effectively through written reports and oral presentations. 5- Apply digital signal processing techniques to specific engineering applications, such as audio and speech processing, image and video processing, and control systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <ul style="list-style-type: none"> • Part A – Introduction to digital signal processing Analog versus digital signals, discrete-time signals and systems, sampling and quantization, signal representation and analysis. [8 hrs] • Part B- Time-domain analysis of discrete-time signals and systems: Convolution, difference equations, impulse response and frequency response, stability and causality. [12hrs] • Part C -: Frequency-domain analysis of discrete-time signals and systems: Discrete Fourier transform (DFT), properties of DFT, fast Fourier transform (FFT), power spectral density, windowing. [12 hrs] • Part D - Digital filtering: FIR filters, IIR filters, design and analysis of filters, filter structures, filter realization, frequency transformation. [14 hrs]: • Part E – Signal processing applications: Audio and speech processing, image and video processing, control systems, telecommunications and networking, biomedical signal processing. [10 hrs] • Revision problem classes [4 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be used in digital signal processing courses is introducing the fundamental concepts of digital signal processing, such as sampling, quantization, and digital filtering, provide real-world examples: Digital signal processing has many practical applications, such as audio and image processing, communications, and control systems and provide opportunities for students to work with digital signals using simulation software or laboratory experiments. This can help students develop a deeper understanding of the concepts and gain practical experience.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.06
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	39	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	9,8,12	LO #,8,9,10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6, 10
	Projects / Lab. Report	16	10% (10)	Continuous	All
	Midterm Exam	3	10% (10)	2,4,10	LO#2,4and10
Summative assessment	Final Exam	2 hr	10% (10)	7	LO # 1-7
		3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to Digital Signal Processing(DSP) system:
Week 2	What DSP,general block diagram, classification and its properties.
Week 3	A/D and D/A conversion :
Week 4	Understand how digital to analog (D/A) and analog to digital (A/D) converters operate on a
Week 5	signal and be able to model these operations mathematically
Week 6	Discrete-Time Signal processing:
Week 7	Define simple non-periodic discrete-time sequences such as the impulse and unit step, and
Week 8	perform time shifting and time-reversal operations on such sequences
Week 9	Discrete-Time Signal Transformations:
Week 10	Time –Reversal ,Time – Scaling and Time –Shifting
Week 11	Convolution of Discrete-Time Systems:
Week 12	Properties of Discrete-time systems with convolution .Convolution with impulse response and for definite discrete-time signals
Week 13	Time/Frequency Domain Representation of Signals:
Week 14	Perform time, frequency and Z-transform analysis on signals.
Week 15	Discrete-Time Fourier Transform :
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Represent basic signals like: Unit Impulse, Ramp, Unit Step, Exponential.
Week 2	Lab 2: Generate discrete sine and cosine signals with given sampling frequency
Week 3	Lab3: Illustrate the Nyquist sampling theorem
Week 4	Lab 4: Represent complex exponential as a function of real and imaginary part.
Week 5	Lab 5: Determine impulse and step response of two vectors.
Week 6	Lab 6: Perform convolution between two vectors .
Week 7	Lab7: Determine rational z-transform from the given poles and zeros .
Week 8	Lab 8: Compute DFT and IDFT of a given sequence .
Week 9	Lab 9: Compute the DFT of a sequence x (n) using DIT and DIF algorithm.
Week 10	Lab 10: Perform linear convolution of two sequence using DFT .
Week 11	Lab 11: Design Band pass and Band reject FIR linear phase filter using Hamming and Hanning windows
Week 12	Lab 12: Design a Type 1 Chebyshev IIR highpass filter.
Week 13	Lab 13: Design an IIR Elliptic low pass filter.
Week 14	Lab14: design an IIR Butterworth bandpass filter
Week 15	Lab 15: To study coefficient quantization effects on the frequency response of a cascade form IIR filter .
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Digital Signal Processing 4th Edition by John Proakis (Author), Dimitris Manolakis (Author)	YES
Recommended Texts	Discrete-Time Signal Processing (Prentice-Hall Signal Processing Series) 3rd Edition by Alan Oppenheim (Author), Ronald Schafer (Author)	No
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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	<u>engineering analysis – Computer Communication and networking</u>		Module Delivery
Module Type	<u>Core</u>	✓ Theory ✓ Lecture ✓ Lab ✓ Tutorial ✓ Practical ✓ Seminar	
Module Code	<u>CTE303</u>		
ECTS Credits	<u>3</u>		
SWL (hr/sem)	<u>75</u>		
Module Level	UGx11 3		Semester of Delivery
Administering Department	<u>Department OF COMPUTER Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Orjuwan M. Al-Jawadi	e-mail	Arjuwan_m@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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>60. To develop problem solving skills and understanding of engineering analysis mathematic concept.</p> <p>61. To understand Laplace Transform, Z-transform and their applications.</p> <p>62. This course deals with the basic concept of Mathematical Engineering.</p> <p>63. This is the basic subject for solving complicated problems using engineering transforms.</p> <p>64. To understand the concept of identity system in complex frequencies, as in S-domain and Z-domain.</p> <p>65. To perform integration in complex plane</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>99. Recognize how Engineering mathematic can be applied.</p> <p>100. Learn Laplace transform and its inverse.</p> <p>101. Learn Z-Transform and its inverse.</p> <p>102. Probability: Basic terminology, probability and set notation, law of probability, independent events</p> <p>103. Statistics: Graphical representation, and measurements</p>
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • <u>Part A – Laplace Transform and Z-Transform</u> Laplace Transform definition, properties and its applications to solve integrations, mathematical problems, differential equations and electrical circuits and transform them between continuous-time and complex frequency in S-domain, Z-Transform definition, properties and its applications to solve mathematical problems, differential equations and transform them between discrete-time and complex frequency in Z-domain. [18hrs] • <u>Part B- probability and Statics</u> Basic Terminology, set notation, law of probability independent events Statics with Graphical representation, measure of central tendency, measure of dispersion [14 hrs] • <u>Part C Numerical Computations</u> Bisection method, false position method , Newton-Raphson method: solution of algebraic equations, Newton-Raphson method: transcendental equations [16 hrs] • <u>Part D Solution of Linear Simultaneous Equations [12 hrs]</u> <u>Solution of linear simultaneous equations: 1) Direct methods (Gauss elimination, Gauss Jordan), 2) Iterative method (Jacobi's, Gauss-seidel iteration)</u> Numerical solution of ordinary differential equation (Picard's , Euler's method) NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATION (PICARD'S , EULER'S METHOD)

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 type of simple experiments involving some sampling activities that are interesting to the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	15	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

As		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. Report	28	10% (10)	Continuous	All
		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)

المناهج الاسبوعي النظري

Week	Material Covered
Week 1	Continues Unit Step Function and Impulse Function Definition
Week 2	Laplace transform, Properties, theorems and applications
Week 3	Laplace Inverse Transform, Properties, theorems and applications
Week 4	Z-transform, properties, theorems, and applications
Week 5	Z- Inverse Transform, properties, theorems, and applications
Week 6	Probability: Basic terminology, probability and set notation
Week 7	Probability: law of probability, independent events
Week 8	Statistics: Graphical representation, measure of central tendency
Week 9	Statistics: measure of dispersion
Week 10	Numerical computations: bisection method, false position method
Week 11	<u>Newton-Raphson method: solution of algebraic equations, Newton-Raphson method: transcendental equations</u>
Week 12	<u>Solution of linear simultaneous equations: 1) Direct methods (Gauss elimination, Gauss Jordan)</u> <u>2) Iterative method (Jacobi's, Gauss-seidel iteration)</u>
Week 13	Numerical solution of ordinary differential equation (Picard's , Euler's method)
Week 14	Solution of nonlinear equation (Newton-Raphson method)
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المناهج الاسبوعي للمختب

Week	Material Covered
Week 1	<u>Lab 1: Introduction to Unit Step Function and Impulse Function</u>
Week 2	<u>Lab 2: Plotting and Control Flow in MATLAB</u>
Week 3	<u>Lab 3: Laplace Transform Definition</u>
Week 4	<u>Lab 4: Laplace Transform Properties</u>
Week 5	<u>Lab 5: Inverse Laplace Transform</u>
Week 6	<u>Lab 6: Inverse Laplace Transform by Partial Fractions</u>
Week 7	<u>Lab 7: Solving Complex Electrical Circuits using Laplace Transform</u>
Week 8	<u>Lab 8: Z-Transform</u>
Week 9	<u>Lab 9: Z-Transform Properties</u>
Week 10	<u>Lab 10: Inverse of Z-Transform</u>
Week 11	<u>Lab 11: Solution of Special DE function using Simulink</u>

Week 12	Lab 12: System Stability using Z-Transform
Week 13	Lab 13: Newton –Raphson Method
Week 14	Lab 14: Taylor Series in MATLAB

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	SIGNALS, SYSTEMS AND TRANSFORMS, 4 th EDITION, CHARLES L. PHILIPS, JHON M. PARR	Yes
Recommended Texts	ADVANCED ENGINEERING MATHEMATICS, ERWIN KREYSZIG, 9 th	No
Websites	http://www.wiley.com/college/kreyszig	

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

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Fundamentals of Digital Communication</u>	Module Delivery	
Module Type	<u>Core</u>	✓	Theory
Module Code	<u>CTE304</u>	✓	Lecture
ECTS Credits	<u>5</u>	✓	Lab
SWL (hr/sem)	<u>125</u>	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 3	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Hakam Marwan Zaidan	e-mail	Hakam_m_zaidan@ntu.edu.iq
Module Leader's Acad. Title	<u>Assistant Lecturer</u>	Module Leader's Qualification	<u>MSc.</u>
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	<u>To introduce students to the fundamental concepts, principles, and techniques underlying digital communication systems. The course aims to provide a solid foundation in understanding various components of digital communication, including modulation techniques, channel coding, multiplexing, and error detection and correction. By the end of the course, students should be able to analyze and design digital communication systems, evaluate their performance in different channel conditions, and make informed decisions regarding the selection of appropriate modulation and coding schemes. The course also emphasizes the practical aspects of digital communication through hands-on experiments and simulations. Overall, the course aims to equip students with a comprehensive understanding of digital communication principles and the skills necessary for the design and implementation of efficient and reliable digital communication systems.</u>

<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<ul style="list-style-type: none"> • UNDERSTAND THE BASIC PRINCIPLES AND CONCEPTS OF DIGITAL COMMUNICATION SYSTEMS. • GAIN KNOWLEDGE OF VARIOUS MODULATION TECHNIQUES USED IN DIGITAL COMMUNICATION, SUCH AS AMPLITUDE SHIFT KEYING (ASK), FREQUENCY SHIFT KEYING (FSK), AND PHASE SHIFT KEYING (PSK). • DEVELOP AN UNDERSTANDING OF DIGITAL MODULATION SCHEMES, INCLUDING QUADRATURE AMPLITUDE MODULATION (QAM) AND ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING (OFDM). • LEARN ABOUT ERROR DETECTION AND CORRECTION CODES, SUCH AS PARITY CHECK, HAMMING CODES, AND CYCLIC REDUNDANCY CHECK (CRC). • ACQUIRE KNOWLEDGE OF DIFFERENT TYPES OF CHANNEL CODING, INCLUDING CONVOLUTIONAL CODES AND REED-SOLOMON CODES. • UNDERSTAND THE PRINCIPLES AND OPERATION OF DIGITAL COMMUNICATION SYSTEMS, INCLUDING DEMODULATION, EQUALIZATION, AND SYNCHRONIZATION. • EXPLORE THE CONCEPTS OF MULTIPLE ACCESS TECHNIQUES, SUCH AS TIME-DIVISION MULTIPLE ACCESS (TDMA) AND CODE-DIVISION MULTIPLE ACCESS (CDMA). • GAIN PRACTICAL SKILLS IN DESIGNING, ANALYZING, AND EVALUATING DIGITAL COMMUNICATION SYSTEMS THROUGH LABORATORY EXPERIMENTS AND PROJECTS. • UNDERSTAND THE EFFECTS OF NOISE, FADING, AND INTER-SYMBOL INTERFERENCE ON DIGITAL COMMUNICATION SYSTEM PERFORMANCE. • LEARN ABOUT CHANNEL CAPACITY AND INFORMATION THEORY, INCLUDING THE CONCEPTS OF ENTROPY, CHANNEL CODING THEOREM, AND CAPACITY-ACHIEVING CODES. • DEVELOP AN UNDERSTANDING OF SOURCE CODING TECHNIQUES, SUCH AS HUFFMAN CODING AND ARITHMETIC CODING, FOR EFFICIENT DATA COMPRESSION. • EXPLORE EMERGING TRENDS AND TECHNOLOGIES IN DIGITAL COMMUNICATION, SUCH AS SOFTWARE-DEFINED RADIOS (SDR) AND COGNITIVE RADIO. • APPLY THEORETICAL KNOWLEDGE TO SOLVE PRACTICAL PROBLEMS AND ANALYZE THE PERFORMANCE OF DIGITAL COMMUNICATION SYSTEMS USING MATHEMATICAL MODELING AND SIMULATION TOOLS.
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<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <p>Part 1 – General Introduction [16 hrs] Introduction to the digital communication.</p> <p>Part 2 – digital modulation [16 hrs]</p> <p>Part 3 – error detection and correction [16 hrs]</p> <p>Part 4 – coding techniques [8 hrs]</p> <p>Revision [4 hrs]</p>
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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 student's 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 simple experiments involving interesting sampling activities for the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

<p>Structured SWL (h/sem)</p> <p>الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>63</p>	<p>Structured SWL (h/w)</p> <p>الحمل الدراسي المنتظم للطالب أسبوعياً</p>	<p>4.2</p>
<p>Unstructured SWL (h/sem)</p> <p>الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	<p>62</p>	<p>Unstructured SWL (h/w)</p> <p>الحمل الدراسي غير المنتظم للطالب أسبوعياً</p>	<p>4.1</p>
<p>Total SWL (h/sem)</p> <p>الحمل الدراسي الكلي للطالب خلال الفصل</p>	<p>125</p>		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3, 7, 11, 14	LO #2, 4, 10 and 11
	Assignments	4	10% (10)	3, 7, 9, 14	LO # 3, 5, 6 and 7
	Projects / Lab. Report	14	10% (10)	Continuous	All
		5	10% (10)	5, 6, 8, 10, 13	LO # 5, 8 and 12
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to Digital Communication: <u>Overview of digital communication systems, Analog vs. digital communication, Elements of a digital communication system</u>
Week 2	Signals and Systems: <u>Signal representation and manipulation, Fourier analysis and frequency domain representation Time and frequency domain characteristics of signals.</u>
Week 3	<ul style="list-style-type: none"> Modulation Techniques: Introduction to digital modulation techniques (ASK, FSK, PSK), Performance metrics: modulation index, bandwidth, power efficiency
Week 4	<ul style="list-style-type: none"> Pulse Amplitude Modulation (PAM): Introduction to PAM and its applications, PAM waveform generation and detection, Performance analysis of PAM in the presence of noise.
Week 5	Pulse Code Modulation (PCM): <u>Sampling theorem and Nyquist criterion, Quantization and coding of PCM signals, Quantization noise and signal-to-noise ratio (SNR).</u>
Week 6	<ul style="list-style-type: none"> Baseband Transmission: Introduction to bandpass transmission, Analog and digital modulation schemes, Coherent and non-coherent detection techniques
Week 7	<ul style="list-style-type: none"> Bandpass Transmission: Introduction to bandpass transmission, Analog and digital modulation schemes, Coherent and non-coherent detection techniques
Week 8	<ul style="list-style-type: none"> Error Detection and Correction: Introduction to error detection and correction codes, Parity check, Hamming codes, and cyclic redundancy check (CRC), Bit error rate (BER) and its calculation
Week 9	Channel Capacity and Coding: <u>Shannon's channel capacity theorem, Channel capacity limits for various communication channels, Channel coding techniques (Block codes, Convolutional codes)</u>
Week 10	<u>Multiple Access Techniques</u>
Week 11	<u>Equalization and Diversity</u>
Week 12	<u>Spread Spectrum Techniques</u>
Week 13	<u>Wireless Communication Systems</u>
Week 14	<u>Introduction to Digital Modulation</u>
Week 15	<u>Final Exam.</u>

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
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Week 1	<u>Lab 1: Introduction to MATLAB/Simulink</u>
Week 2	<u>Lab 2: Signal Analysis and Fourier Transform</u>
Week 3	<u>Lab 3: Digital Modulation Techniques</u>
Week 4	<u>Lab 4: Pulse Amplitude Modulation (PAM)</u>
Week 5	<u>Lab 5: Pulse Code Modulation (PCM)</u>
Week 6	<u>Lab 6: Line Coding Techniques</u>
Week 7	<u>Lab 7: Baseband Transmission</u>
Week 8	<u>Lab 8: Analog and Digital Modulation</u>
Week 9	<u>Lab 9: Error Detection and Correction</u>
Week 10	<u>Lab 10: Channel Capacity and Coding</u>
Week 11	<u>Lab 11: Multiple Access Techniques</u>
Week 12	<u>Lab 12: Equalization and Diversity</u>
Week 13	<u>Lab 13: Spread Spectrum Techniques</u>
Week 14	<u>Lab 14: Review</u>

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"DIGITAL COMMUNICATIONS" BY JOHN G. PROAKIS AND MASOUD SALEHI.	No
Recommended Texts	"PRINCIPLES OF DIGITAL COMMUNICATION" BY ROBERT G. GALLAGER	No
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.

	Ministry of Higher Education and Scientific Research - Iraq Northern Technical University Engineering Technical College/Mosul Department of Computer Technology Engineering	
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Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Computer Networks Fundamentals</u>		Module Delivery
Module Type	<u>Core</u>	✓ Theory ✓ Lecture ✓ Lab ✓ Tutorial ✓ Practical ✓ Seminar	
Module Code	<u>CTE305-S1</u>		
ECTS Credits	<u>6</u>		
SWL (hr/sem)	<u>150</u>		
Module Level	UGx11 3		Semester of Delivery
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Dr. Ziyad Khalaf Farej	e-mail	drziyad.farej@ntu.edu.iq
Module Leader's Acad. Title	Asst. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None

Peer Reviewer Name	None	e-mail	None
Review Committee Approval	2/06/2023	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	66. To understand network architecture: Learning the different components and layers of computer networks. 67. To analyze network protocols: Studying the various protocols used in computer networks. 68. To exploring network security: Understanding the concepts and techniques related to network security. 69. To investigating network technologies: Exploring various network technologies, such as LANs, WANs, wireless networks. 70. To understanding network services and applications: Studying network services and applications. 71. To enhancing network design and implementation skills: Developing skills in designing and implementing computer networks 72. To examine network management: Learning about network management principles, tools, and techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	104. Understanding Network Concepts 105. Differentiate between LAN (Local Area Network), WAN (Wide Area Network), and MAN (Metropolitan Area Network). 106. Explain the purpose and components of the OSI model and the TCP/IP model 107. Understand the hierarchical structure of the layers in both models 108. Explain the different types of transmission media, encoding, modulation and multiplexing techniques used for data transmission 109. Analyzing Network Communication 110. Compare and contrast different network models, such as the TCP/IP model and the OSI model. 111. Applying Network Protocols: understanding how protocols like TCP/IP enable reliable data transmission and how they are used in real-world scenarios. 112. Understanding the functions and responsibilities of the data link layer in the OSI model. 113. Identify and apply error detection mechanisms, such as checksums or cyclic redundancy checks (CRC).
Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none"> • Introduction to Computer Networks: [12 h] Definition of computer networks Network architectures and types (LAN, WAN, MAN) Network components and their functions Network protocols and standards • Network Models and Protocols: [14 h] OSI (Open Systems Interconnection) model and TCP/IP model Layers of the OSI and TCP/IP models Protocols and services at each layer Encapsulation and de-encapsulation processes • Physical Layer: [20 h]

	<p>Transmission media (copper, fiber-optic, wireless)</p> <p>Data transmission techniques (analog vs. digital, modulation, multiplexing)</p> <p>Signal encoding (NRZ, Manchester, etc.)</p> <p>Switching (circuit, datagram and virtual).</p> <ul style="list-style-type: none"> Data Link Layer: [12 h] <p>Framing and error detection</p> <p>Flow control and error control mechanisms</p> <p>Media Access Control (MAC) protocols (Ethernet, Wi-Fi)</p> <p>Local Area Networks (LAN) and Ethernet technologies</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. When studying Computer Networks Fundamentals, there are several key strategies that can help you grasp the material effectively. These strategies include (Understanding the Fundamentals, Layered Approach, Analyze Network Protocols, Network Simulations: Visualize Networks and Practical Problem Solving. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطلاب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	58	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	92	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعياً	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	4	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	5	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)

المناهج الأسبوعي النظري

Week	Material Covered
Week 1	<u>Introduction to data communication and networks:</u> <u>Data Representations, Data Flows, and classify the computer networks according to application, size, transmission technology</u>
Week 2	<u>Network Models:</u> <u>Protocol Layering, The ISO reference Model, and TCP/IP Reference Model</u>
Week 3	Connection-Oriented Versus Connectionless Service, and Service Primitives
Week 4	<u>LANs Topologies:</u>

	<u>CSMA/CD, Token Access protocols, and IP addressing</u>
Week 5	Metropolitan Area Networks, Wide Area Networks, Internetworks, and VPNs
Week 6	<u>performance metrics, Bandwidth, Throughput, Latency (Delay), Bandwidth-Delay, Jitter</u>
Week 7	<u>Digital signals transmission: impairment (attenuation, distortion, noise, data rate limits) Channel capacity and Shannon Formula</u>
Week 8	<u>Bandwidth-Limited Signals, The Maximum Data Rate of a Channel</u>
Week 9	<u>Guided transmission media (twisted-pair cable, coaxial cable, fiber-optic cable), and wireless transmission, transmission modes, Parallel and Serial Transmissions</u>
Week 10	<u>Digital Signals and Digital Transmission: Line Coding Baseband, Passband,</u>
Week 11	<u>Multiplexing and Demultiplexing: FDM, TDM, and CDM</u>
Week 12	<u>Public Switched Telephone Network: Structure of the Telephone System, DSL Trunks and Multiplexing</u>
Week 13	<u>Switching: Circuit and Datagram Networks, Virtual-Circuit Networks Circuit switching, packet switching & virtual switching</u>
Week 14	<u>Wired LANs: Ethernet Standards, Bridged Ethernet, Switched Ethernet, Fast Ethernet And Gigabit Ethernet</u>
Week 15	<u>Final Exam.</u>

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Introduction to Network Lab
Week 2	Lab 2: Network Transmission media
Week 3	Lab 3: Cables and LAN tester
Week 4	Lab 4: Network Devices 1
Week 5	Lab 5: Network Devices 2
Week 6	Lab 6: Peer-to-peer Network
Week 7	Lab 7: Building LAN Network using Hub 1
Week 8	Lab 8: Building LAN Network using Hub 2
Week 9	Lab 9: Network Tools
Week 10	Lab 10: Network commands 1
Week 11	Lab 11: Network commands 2
Week 12	Lab 12: Introduction to Internet Protocol (IP)
Week 13	Lab 13: IP addressing 1
Week 14	Lab 14: IP addressing 2

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Behrouz A. Forouzan. Data communication and Networking, fifth edition	Yes
Recommended Texts	Michael Duck and Richard Read" Communications and Computer Networks, 2 nd edition, Pearson Education 2003	No
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org/learn/computes_networks	

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 جداً	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.



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Engineering Technical College/Mosul
Department of Computer Technology Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	Controllers	Module Delivery	
Module Type	<u>Supplement</u>	✓	Theory
Module Code	CTE306	✓	Lecture
ECTS Credits	4	✓	Lab
SWL (hr/sem)	102	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 3	Semester of Delivery	2
Administering Department	<u>Department of Computer Technology Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Zaid G. Mohammed	e-mail	zaid_gh@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	14/06/2023	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	Introduce the student to learn the architecture of a PIC Microcontroller and get acquainted with their use for control purposes. In addition, it will provide the knowledge of applications and interfacing of microcontrollers used in the field of instrumentation & control. Thus, this course is very useful for instrumentation engineers working in the area of embedded systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	114. Understand the architecture and features of PIC microcontrollers. 115. Program PIC microcontrollers using appropriate programming languages. 116. Interface and control external devices using PIC microcontrollers. 117. Design and implement practical projects utilizing PIC microcontrollers. 118. Understand and implement interrupt handling in PIC microcontrollers. 119. Optimize PIC microcontroller programs for performance and efficiency. 120. Debug and troubleshoot PIC microcontroller-based systems. 121. Apply knowledge of PIC microcontrollers to solve specific engineering problems.

<p style="text-align: center;">Indicative Contents المحتويات الإرشادية</p>	<ol style="list-style-type: none"> 10. Introduction to PIC Microcontrollers: [2 hr] <ol style="list-style-type: none"> a. Overview of microcontrollers and their applications b. Introduction to PIC microcontrollers and their features c. Comparison with other microcontroller families 11. PIC Microcontroller Architecture: [2 hr] <ol style="list-style-type: none"> a. CPU architecture and instruction set overview b. Memory organization (Flash, RAM, EEPROM) c. Special Function Registers (SFRs) and their functionalities d. Clock and reset systems 12. Development Tools and Environment: [4 hr] <ol style="list-style-type: none"> a. Introduction to development boards and programmers b. Integrated Development Environments (IDEs) for PIC microcontrollers c. Compiler options and configurations d. Debugging tools and techniques 13. Programming PIC Microcontrollers: [4 hr] <ol style="list-style-type: none"> a. Overview of programming languages (C, Assembly) for PIC microcontrollers b. Writing and compiling PIC microcontroller programs c. Uploading programs to the microcontroller d. Debugging and troubleshooting code 14. PIC Microcontroller Peripherals: [8 hr] <ol style="list-style-type: none"> a. GPIO (General-Purpose Input/Output) ports and their usage b. Timers and counters for timing and synchronization c. Analog-to-Digital Conversion (ADC) for reading analog signals d. Serial communication interfaces (UART, SPI, I2C) e. PWM (Pulse Width Modulation) for generating analog signals 15. Interrupts and Interrupt Handling: [4 hr] <ol style="list-style-type: none"> a. Introduction to interrupts and their importance b. Configuring and enabling interrupts in PIC microcontrollers c. Writing interrupt service routines (ISRs) d. Prioritizing and handling multiple interrupts 16. Advanced Topics: [8 hr] <ol style="list-style-type: none"> a. Power management techniques and low-power modes b. External memory interfacing (SRAM, EEPROM, external Flash) c. Implementing communication protocols (CAN, USB, Ethernet) d. Real-time operating systems (RTOS) for PIC microcontrollers e. Using peripheral libraries and frameworks 17. PIC Microcontroller Projects and Applications: [10 hr] <ol style="list-style-type: none"> a. Building basic electronic projects using PIC microcontrollers b. Sensor interfacing and data acquisition applications c. Motor control and robotics projects d. Human-Machine Interface (HMI) applications e. IoT (Internet of Things) projects with PIC microcontrollers
	<p>Learning and Teaching Strategies استراتيجيات التعلم والتعليم</p>
<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</p>

be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	102		

Module Evaluation

تقييم المادة الدراسية

As		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.	8	10% (10)	Continuous	All
	Report	6	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 النظري

Week	Material Covered
Week 1	Introduction to Microcontroller, Types of Microcontrollers, difference between Microprocessor and Microcontroller.
Week 2	PIC Microcontroller Architecture and PIC Family.
Week 3	Microcontroller Programming Model and Its Instruction Set
Week 4	Interface with Microcontroller Part1 (Push buttons, Switches and 7segment)
Week 5	Interface with Microcontroller Part2 (LCD, GLCD, Relay and Keypad)
Week 6	Interrupt
Week 7	A/D (Analog to Digital interface)
Week 8	Timers (Timer0 and Timer1)
Week 9	Timers (Timer2 and WDT)
Week 10	CCP (Capture and Compare)
Week 11	CCP (PWM)
Week 12	Memory
Week 13	Communication (UART, SPI, I2C)
Week 14	Application and projects of Microcontroller
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي المختبر

Week	Material Covered
Week 1	Lab 1: Introduction to MikroC Platform (LED Blinking)
Week 2	Lab 2: Introduction to Proteus Platform (LED Blinking)
Week 3	Lab 3: Switches and Bush button Interface

Week 4	Lab 4: Interface to 7Segment
Week 5	Lab 5: Interface to LCD
Week 6	Lab 6: Interrupt
Week 7	Lab 7: Analog to Digital
Week 8	Lab 8: Interface to keypad
Week 9	Lab 9: Relay Interface
Week 10	Lab 10: Timers (Timer0 and Timer1)
Week 11	Lab 11: CCP (Capture and Compare)
Week 12	Lab 12: CCP (PWM)
Week 13	Lab 13: Communication (UART, SPI, I2C)
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Microcontroller Fundamentals and Applications with PIC, 2009. 2. Embedded Systems Programming with PIC 16F877A, Timothy D. Green.	No
Recommended Texts	3. PIC Projects: A Practical Approach by H. Parchizadeh and B. Vuksanovic. Wiley 2009. 4. Designing Embedded Systems with PIC Microcontrollers, 2nd Edition: Principles and Applications, 2nd edition 2009.	No
Websites	https://www.coursera.org , https://www.udemy.com	

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 جداً	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.



Ministry of Higher Education and
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Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	<u>Operating Systems</u>	Module Delivery
Module Type	<u>Core</u>	✓ Theory
Module Code	<u>CTE307</u>	✓ Lecture
ECTS Credits	<u>5</u>	✓ Lab
		✓ Tutorial

SWL (hr/sem)	125	✓	Practical
		✓	Seminar
Module Level	UGx11 3	Semester of Delivery	2
Administering Department	Department of Computer Techniques Engineering	College	Northern Technical University Engineering Technical College/Mosul
Module Leader	dr. Younis Anas Younis	e-mail	younis.alrozz@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	Teaches students about the design and implementation of operating systems. The major components of most operating systems, include process management, memory management, and file systems. Students will learn about the tradeoffs between performance and functionality during the design and implementation of an operating system. The course may also cover the historical evolution of operating systems over the last fifty years.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Grasping the basic concepts of operating systems together with the modules needed to manage the different computer resources. 2. Grasping implementations of operating systems in reasonable detail together with hands-on experience.
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <p><u>Part 1 – General Introduction [16 hrs]</u> Introduction to the operating system, Types of operating systems.</p> <p><u>Part 2 – Process management [16 hrs]</u> Process management and scheduling, Processes, and Threads (address spaces, system calls, scheduling), Threads and concurrency.</p> <p><u>Part 3 – Resource management [16 hrs]</u> Memory management, File systems, and storage management, Input/Output (I/O) management.</p> <p><u>Part 4 – Virtualization and Cloud computing [8 hrs]</u></p> <p><u>Revision [4 hrs]</u></p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage student's 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 simple experiments involving interesting sampling activities for the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3, 7, 11, 14	LO #2, 4, 10 and 11
	Assignments	4	10% (10)	3, 7, 9, 14	LO # 3, 5, 6 and 7
	Projects / Lab.	14	10% (10)	Continuous	All
	Report	5	10% (10)	5, 6, 8, 10, 13	LO # 5, 8 and 12
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
Week 1	Introduction to operating system
Week 2	Types of operating systems (Windows, Linux, MacOS, Unix)
Week 3	Process management and scheduling
Week 4	Processes and Threads (address spaces, system calls, scheduling)
Week 5	Threads and concurrency
Week 6	Memory management
Week 7	File systems and storage management
Week 8	Input/Output (I/O) management
Week 9	Synchronization (algorithms and structures like locks, semaphores, and monitors)
Week 10	Virtual Memory (paging, page tables, eviction, segmentation)
Week 11	File Systems (the file abstraction, directory structures)
Week 12	File Systems (disk I/O)
Week 13	Virtualization and cloud computing
Week 14	Review
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي للمختبر

Week	Material Covered
Week 1	Lab1: Getting Started.
Week 2	Lab2: Process Scheduling Simulation
Week 3	Lab 3: Building a Simple Operating System - bootstrapping
Week 4	Lab 4: Building a Simple Operating System - memory management
Week 5	Lab 5: Building a Simple Operating System - process management
Week 6	Lab 6: File System Implementation - FAT or EXT.
Week 7	Lab 7: File System Implementation – EXT.

Week 8	Lab 8: Virtual Memory Simulation - virtual memory management - page replacement algorithms.
Week 9	Lab 9: Kernel Debugging -Linux
Week 10	Lab 10: Kernel Debugging - Windows
Week 11	Lab 11: Concurrency Control - synchronization primitives, semaphores
Week 12	Lab 12: Concurrency Control - synchronization primitives, monitors
Week 13	Lab 13: Device Driver Development - keyboard or mouse driver
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Operating System Concepts, Tenth Edition by Avi Silberschatz, Peter Baer Galvin, Greg Gagne John Wiley & Sons, Inc.	No
Recommended Texts	Modern Operating Systems, 4th Edition by Andrew Tanenbaum, Herbert Bos Pearson; 4th edition (March 10, 2014)	No
Websites	You can visit the course page at the following link https://youtube.com/playlist?list=PL6KMWPQP_DM-7tMNjUa7X2zGrc8jipPel	

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.



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Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	<u>Signals and systems</u>	Module Delivery	
Module Type	<u>Core</u>	✓ Theory ✓ Lecture ✓ Lab x Tutorial ✓ Practical ✓ Seminar	
Module Code	<u>CTE308</u>		
ECTS Credits	<u>4</u>		
SWL (hr/sem)	<u>100</u>		
Module Level	UGx11 3	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Mohand lokman Ahmed	e-mail	mohandaldabag@ntu.edu.iq
Module Leader's Acad. Title	<u>Asst.Prof.</u>	Module Leader's Qualification	<u>PhD.</u>
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	The main objectives of studying signals and systems are: 1-To understand the nature, properties, and representation of signals.
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<p>أهداف المادة الدراسية</p>	<p>2- To analyze and design linear time-invariant systems , learn about linear time-invariant systems, which are widely used in engineering applications, and how to analyze their behavior and design them to meet specific requirements.</p> <p>3- To understand the effects of system components on signals, behavior of a system is determined by its components and how they can be used to shape and manipulate signals for specific applications.</p> <p>4- To study the frequency domain representation of signals and systems</p> <p>5- To apply the concepts of signals and systems to practical engineering applications, in this module, you will learn about some practical applications of signals and systems and how to use these concepts to design and analyze engineering systems.</p>		
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>1- Understand the nature, properties, and mathematical representation of signals, including continuous-time and discrete-time signals, periodic and aperiodic signals, and deterministic and random signals.</p> <p>2- Analyze and design linear time-invariant systems, including their impulse response, frequency response, and transfer function.</p> <p>3- Understand the effects of system components on signals, including amplifiers, filters, and modulators, and how these components can be used to shape and manipulate signals.</p> <p>4- Analyze signals and systems in the frequency domain using Fourier analysis, including Fourier series and Fourier transforms.</p> <p>5- Apply signals and systems concepts to practical engineering applications, such as communication systems, control systems, and signal processing.</p> <p>6- Understand the basics of sampling, quantization, and digital signal processing.</p> <p>7- Analyze and design digital filters, including finite impulse response (FIR) and infinite impulse response (IIR) filters.</p>		
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • Part A – Introduction to signals and systems: Definition of signals, classification of signals, signal processing, classification of systems, system properties..[8 hrs] • Part B- Time-domain analysis of continuous-time signals and systems: Signal operations, system properties, convolution, impulse response, step response, and frequency response..[12hrs] • Part C - Fourier analysis of signals and systems: Fourier series, Fourier transform, properties of Fourier transforms, convolution and correlation in the frequency domain. [12 hrs] • Part D - Sampling and quantization: Sampling theorem, anti-aliasing filters, quantization error, and quantization noise. [14 hrs]: • Part E - Applications of signals and systems: Communication systems, control systems, image processing, audio signal processing,..[10 hrs] • Revision problem classes [4 hrs] 		
<p>Learning and Teaching Strategies</p> <p>استراتيجيات التعلم والتعليم</p>			
<p>Strategies</p>	<p>The main strategy that will be used in signals and systems courses to introducing the fundamental concepts of signals and systems, such as signal classification, system properties, and signal operations. assignments, and group projects, Provide real-world examples: Signals and systems are used in many engineering applications, so it is helpful to provide real-world examples to illustrate the concepts and show how they are used in practice.</p>		
<p>Student Workload (SWL)</p> <p>الحمل الدراسي للطالب</p>			
<p>Structured SWL (h/sem)</p> <p>الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>61</p>	<p>Structured SWL (h/w)</p> <p>الحمل الدراسي المنتظم للطالب أسبوعياً</p>	<p>4.06</p>
<p>Unstructured SWL (h/sem)</p>	<p>39</p>	<p>Unstructured SWL (h/w)</p>	<p>2.6</p>

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

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	9,8,12	LO #,8,9,10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6, 10
	Projects / Lab.	16	10% (10)	Continuous	All
	Report	3	10% (10)	2,4,10	LO#2,4and10
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)

المناهج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to signals and systems: motivation, organization of the course. Examples of signal processing systems. Basic classification of signals - continuous/discrete time, periodic/non-periodic. Transformation of time.
Week 2	Continuous and discrete time periodic signals: sinusoids and complex exponentials. Overview of basic notions in complex numbers. Discrete and continuous time systems. Linear, time invariant systems (LTI). Representation of signals as series of pulses, convolution. Describing systems using differential and difference equations.
Week 3	Continuous time signals periodic Non-periodic signals and Fourier series
Week 4	Continuous time signals: Some examples of Fourier series - Signal energy - Parseval's theorem.
Week 5	Continuous time signals frequency analysis: Fourier transform, spectral function. Spectra of typical signals
Week 6	Continuous-time systems : Laplace transform, transfer function, frequency response, stability. Example of a simple analog circuit.
Week 7	Sampling and reconstruction: ideal sampling, aliasing, sampling theorem. Spectrum of sampled signal, ideal reconstruction. Normalized time and frequency quantization
Week 8	Discrete-time signals and their frequency analysis: Discrete Fourier series, Discrete-time Fourier transform. Circular convolution, fast convolution.
Week 9	Discrete-time signals and their frequency analysis: Fast fourier transform(FFT) .
Week 10	Discrete systems - z-transform: finite and infinite impulse response systems (FIR and IIR), transfer function, frequency response, stability. Example of a digital filter..
Week 11	Discrete systems cont'd: design of simple digital filters, sampling of frequency response, windowing. Links between continuous-time and discrete-time systems.
Week 12	Random signals: random variable, realization, distribution function, probability density function (PDF). Stationarity and ergodicity..
Week 13	Parameters of a random signal: mean, Estimation - ensemble and temporal.:
Week 14	Random signals cont'd: correlation function, power spectral density (PSD). Processing of random signals by LTI systems
Week 15	Review
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Represent basic signals like: Unit Impulse, Ramp, Unit Step, Exponential.
Week 2	Lab 2: Generating and plotting of continuous and discrete-time signals in MATLAB.
Week 3	Lab 3: Illustrate the Nyquist sampling theorem
Week 4	Lab 4: Signals Transformations
Week 5	Lab 5: Perform convolution between two vectors
Week 6	Lab 6: Convolution between signals and sequences.
Week 7	Lab 7: signal correlation (Auto and cross correlation)
Week 8	Lab 8: Fourier Series
Week 9	Lab 9: Fourier transforms and inverse fourier transform
Week 10	Lab 10: Properties of fourier transform.
Week 11	Lab 11: Discrete-time Signals in Frequency Domain.
Week 12	Lab 12: Compute DFT and IDFT of a given sequence .
Week 13	Lab 13: Fast fourier transform (FFT).
Week 14	Lab 14: Laplace Transform
Week 15	Lab 15: Z-Transform and Inverse Z-Transform Analysis
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Signals and Systems 2nd Edition by Alan Oppenheim (Author)	YES
Recommended Texts	Signals, Systems, & Transforms 5th Edition, Kindle Edition by Charles L. Phillips (Author), John Parr (Author), Eve A. Riskin (Author) Format: Kindle Edition	No
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 جداً	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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Wireless Sensor Network and IoT</u>	Module Delivery	
Module Type	<u>Core</u>	✓	Theory
Module Code	<u>CTE309</u>	✓	Lecture
ECTS Credits	<u>5</u>	✓	Lab
SWL (hr/sem)	<u>125</u>	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 3	Semester of Delivery	1
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	<u>Dr. Ahmed Khazal Younis</u>	e-mail	<u>ahmedkhazal@ntu.edu.iq</u>
Module Leader's Acad. Title	<u>Assistant prof.</u>	Module Leader's Qualification	<u>Ph.D</u>
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	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	<ul style="list-style-type: none">wireless sensor networks aim to gather data from the physical environment using a network of wireless sensor nodes. these nodes are equipped with sensors to measure various parameters such as temperature, humidity, pressure, motion, etc.wireless sensor networks focus on collecting and aggregating the sensor data from multiple nodes to provide a comprehensive view of the monitored environment.wireless sensor networks establish wireless communication links between sensor nodes to transmit data to a central node, called a sink or gateway.Environmental Monitoring: WSNs find applications in various domains, including environmental monitoring, habitat monitoring, agriculture, healthcare, industrial automation, and disaster management.IoT aims to connect a wide range of physical objects, devices, and systems to the internet. This enables these objects to exchange data, interact, and be remotely monitored and controlled.Data Analytics and Automation: IoT systems aim to leverage the data generated by

	<p>connected devices to gain insights, perform analytics, and enable automation and intelligent decision-making.</p> <ul style="list-style-type: none"> IoT aims to enhance efficiency, productivity, and resource management in various domains, such as smart cities, transportation, healthcare, manufacturing, energy management, and home automation. IoT enables real-time monitoring and control of connected devices and systems from anywhere, anytime, using web or mobile interfaces. and simulations.
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>The outcomes of Wireless Sensor Networks (WSNs) and the Internet of Things (IoT) have significant implications in various domains. Here are some key outcomes of WSNs and IoT:</p> <ul style="list-style-type: none"> Data-driven Decision Making: WSNs and IoT generate a vast amount of real-time data from sensors and connected devices. This data can be analyzed to gain valuable insights and support data-driven decision making Improved Efficiency and Resource Management: WSNs and IoT enable efficient resource management by providing real-time monitoring and control. In industrial settings, WSNs can be used to monitor equipment conditions, detect faults, and optimize maintenance schedules, leading to reduced downtime and improved productivity. In smart buildings, IoT systems can optimize energy usage by adjusting lighting, heating, and cooling based on occupancy and environmental conditions. Enhanced Safety and Security: WSNs and IoT contribute to enhanced safety and security in various domains. Environmental Monitoring and Conservation: WSNs and IoT play a crucial role in environmental monitoring and conservation efforts. They can be deployed in ecosystems to monitor pollution levels, track wildlife behavior, and detect natural disasters. This data helps researchers and policymakers make informed decisions to protect the environment and wildlife habitats. Smart and Connected Infrastructure: WSNs and IoT contribute to the development of smart and connected infrastructure. Innovation and Economic Growth: WSNs and IoT foster innovation and contribute to economic growth. They create new business opportunities, drive technological advancements, and stimulate entrepreneurship.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <p>Part 1 – Introduction to Wireless Sensor Networks [16 hrs] Hardware Platforms, Topologies of wireless sensor networks, and Types of wireless sensor networks.</p> <p>Part 2 – Routing and Localization [16 hrs] Routing protocols, fundamental of Localization techniques, and Embedded Operating Systems.</p> <p>Part 3 – Introduction to IOT [16 hrs] Elements of IOT, Controllers using in IOT, and IOT Hardware.</p> <p>Part 4 – IOT Protocols and Module [8 hrs] IOT Communication Protocols, and Communication Module.</p> <p>Revision [4 hrs]</p>

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in delivering this module is to encourage student's 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 simple experiments involving interesting sampling activities for the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3, 7, 11, 14	LO #2, 4, 10 and 11
	Assignments	4	10% (10)	3, 7, 9, 14	LO # 3, 5, 6 and 7
	Projects / Lab.	14	10% (10)	Continuous	All
	Report	5	10% (10)	5, 6, 8, 10, 13	LO # 5, 8 and 12
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
Week 1	OVERVIEW OF WIRELESS SENSOR NETWORKS: <ul style="list-style-type: none"> Introduction to Wireless Sensor Network. Network Characteristics. Key Technologies for Wireless Sensor Networks. Applications of Wireless Sensor Networks.
Week 2	Hardware Platforms: <ul style="list-style-type: none"> Hardware parameters. sensor nodes of a WSN: <ul style="list-style-type: none"> sensing unit, computational unit, and communication unit.
Week 3	Topologies of wireless sensor networks: <ul style="list-style-type: none"> Star Topology. Tree Topologies. Mesh Topologies.
Week 4	Types of Wireless Sensor Networks: <ul style="list-style-type: none"> Terrestrial WSNs. Underground WSNs. Underwater WSNs. Multimedia WSNs. Mobile WSNs.
Week 5	Routing protocols: <ul style="list-style-type: none"> Routing Challenges.

	<ul style="list-style-type: none"> • Data-centric. • Geographic Routing. • Broadcast, and Multicast. • MANET protocols. • Resource-aware routing.
Week 6	Localization: <ul style="list-style-type: none"> • Overview of different localization techniques
Week 7	Embedded Operating Systems: <ul style="list-style-type: none"> • Operating Systems for Wireless Sensor Networks • Operating System Design • Examples of Operating Systems: TinyOS , Mate ,MagnetOS , and MANTIS
Week 8	Introduction to IOT: <ul style="list-style-type: none"> • <u>Network Architecture.</u> • <u>Device Architecture.</u> • <u>Embedded system in IOT.</u> • <u>Application of IOT.</u>
Week 9	Controller use in IOT: <ul style="list-style-type: none"> • Arduino, ESP, and Rasberry-Pi boards. • Comparison between Arduino, ESP, and Rasberry-Pi boards • Hardware and Software Description. Programming Software.
Week 10	Hardware in IOT: <ul style="list-style-type: none"> • Basic Electronics Components of IOT: • LED, Resistors, Capacitors, Transistors, Relay, Switch, Diode, Zener
Week 11	IOT Communication Protocols: <ul style="list-style-type: none"> • <u>Wireless Protocols (SPI, I2C, USART, UART, Modbus).</u> • <u>Networking Protocols (OSI Reference Model, TCP/IP, Ethernet).</u>
Week 12	IOT Communication Module: <ul style="list-style-type: none"> • RF Module. • Bluetooth module. • GSM Module. • LAN Module. • Wifi Modul.
Week 13	Cloud Platforms for IOT: <ul style="list-style-type: none"> • Virtualization concepts and Cloud Architecture. • Cloud computing, benefits. • Cloud providers & offerings. • Study of IOT Cloud platforms . • ThingSpeak API and MQTT. • Interfacing IOT with Web services.
Week 14	Applications: <ul style="list-style-type: none"> • Application example of Wireless Sensor Network and IOT.
Week 15	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	<u>Lab 1: Introduction of Embedded platform: Arduino and Raspberry Pi</u>
Week 2	<u>Lab 2: Architecture of Raspberry Pi part1</u>
Week 3	<u>Lab 3: Architecture of Raspberry Pi part2</u>
Week 4	<u>Lab 4: Software for the Raspberry Pi</u>

Week 5	<u>Lab 5: Configuration of the Raspberry Pi part1</u>
Week 6	<u>Lab 6: Configuration of the Raspberry Pi part2</u>
Week 7	<u>Lab 7: Programming Raspberry Pi with Python</u>
Week 8	<u>Lab 8: Basic Led Blinking</u>
Week 9	<u>Lab 9: Controlling of Gas Detecting Sensor.</u>
Week 10	<u>Lab 10: Controlling the Pressure Sensor</u>
Week 11	<u>Lab 11: Controlling the operation of Servo Motor</u>
Week 12	<u>Lab 12: Servo Motor Control with Webpage</u>
Week 13	<u>Lab 13: Temperature and Humidity Monitoring in Cloud Platform</u>
Week 14	<u>Lab 14: Review</u>

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<ul style="list-style-type: none"> FUNDAMENTALS OF WIRELESS SENSOR NETWORKS [2010] WALTENEGUS DARGIE AND CHRISTIAN POELLABAUER INTERNET OF THINGS (IoT): TECHNOLOGIES, APPLICATIONS, CHALLENGES AND SOLUTIONS [2017] BY BK TRIPATHY ,J ANURADHA 	No
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 بتكرار	(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.



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Techniques Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Fundamentals of Digital Communication</u>		Module Delivery
Module Type	<u>Core</u>		✓ Theory
Module Code	<u>CTE310</u>		✓ Lecture
ECTS Credits	<u>5</u>		✓ Lab
SWL (hr/sem)	<u>125</u>		✓ Tutorial
			✓ Practical
			✓ Seminar
Module Level	UGx11 3	Semester of Delivery	2
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Hakam Marwan Zaidan	e-mail	Hakam_m_zaidan@ntu.edu.iq
Module Leader's Acad. Title	<u>Assistant Lecturer</u>	Module Leader's Qualification	<u>MSc.</u>
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	21/06/2023	Version Number	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	<u>BCCTE305-S1</u>	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes, and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<p><u>The primary objectives of the course on Digital Communication Systems are to provide students with a comprehensive understanding of the fundamental principles, techniques, and technologies used in digital communication. The course aims to familiarize students with various modulation schemes, coding techniques, and signal processing algorithms used in modern communication systems. By the end of the course, students should be able to design, analyze, and evaluate digital communication systems, including the selection of appropriate modulation schemes, error control coding, and channel equalization methods. The course also emphasizes hands-on experience through practical labs to enhance students' skills in implementing and simulating digital communication systems using MATLAB or similar tools. Overall, the course aims to equip students with the knowledge and practical skills necessary for the design and optimization of reliable and efficient digital communication systems.</u></p>
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. UNDERSTANDING DIGITAL COMMUNICATION CONCEPTS: GAIN A SOLID UNDERSTANDING OF THE FUNDAMENTAL CONCEPTS AND PRINCIPLES OF DIGITAL COMMUNICATION SYSTEMS, INCLUDING THE REPRESENTATION, TRANSMISSION, AND PROCESSING OF DIGITAL SIGNALS. 2. KNOWLEDGE OF MODULATION TECHNIQUES: ACQUIRE KNOWLEDGE OF VARIOUS MODULATION TECHNIQUES USED IN DIGITAL COMMUNICATION, SUCH AS AMPLITUDE SHIFT KEYING (ASK), FREQUENCY SHIFT KEYING (FSK), AND PHASE SHIFT KEYING (PSK). UNDERSTAND HOW THESE TECHNIQUES ENCODE INFORMATION ONTO CARRIER SIGNALS. 3. CHANNEL CODING AND ERROR CONTROL: LEARN ABOUT ERROR DETECTION AND CORRECTION CODES USED IN DIGITAL COMMUNICATION SYSTEMS, SUCH AS PARITY CHECK, HAMMING CODES, AND CYCLIC REDUNDANCY CHECK (CRC). UNDERSTAND HOW THESE CODES ENHANCE DATA RELIABILITY AND ENABLE ERROR CONTROL. 4. DIGITAL DEMODULATION AND DETECTION: UNDERSTAND THE PRINCIPLES OF DIGITAL DEMODULATION AND DETECTION TECHNIQUES USED TO RECOVER DIGITAL INFORMATION FROM RECEIVED SIGNALS. LEARN ABOUT COHERENT AND NON-COHERENT DETECTION METHODS AND THE IMPACT OF NOISE AND CHANNEL IMPAIRMENTS. 5. MULTIPLE ACCESS TECHNIQUES: GAIN KNOWLEDGE OF MULTIPLE ACCESS TECHNIQUES USED IN DIGITAL COMMUNICATION SYSTEMS, SUCH AS TIME-DIVISION MULTIPLE ACCESS (TDMA), CODE-DIVISION MULTIPLE ACCESS (CDMA), AND FREQUENCY-DIVISION MULTIPLE ACCESS (FDMA). UNDERSTAND THEIR APPLICATIONS AND ADVANTAGES. 6. SYSTEM PERFORMANCE ANALYSIS: DEVELOP SKILLS IN ANALYZING AND EVALUATING THE PERFORMANCE OF DIGITAL COMMUNICATION SYSTEMS, INCLUDING ASSESSING BIT ERROR RATE (BER), SIGNAL-TO-NOISE RATIO (SNR), AND LINK BUDGET. UNDERSTAND THE FACTORS THAT AFFECT SYSTEM PERFORMANCE. 7. UNDERSTANDING CHANNEL MODELS: ACQUIRE KNOWLEDGE OF CHANNEL MODELS AND THEIR CHARACTERISTICS, INCLUDING ADDITIVE WHITE GAUSSIAN NOISE (AWGN), FADING CHANNELS (RAYLEIGH AND RICIAN), AND THE IMPACT OF INTER-SYMBOL INTERFERENCE (ISI) ON SIGNAL QUALITY. 8. SOURCE CODING AND DATA COMPRESSION: LEARN ABOUT SOURCE CODING TECHNIQUES USED TO COMPRESS DIGITAL DATA EFFICIENTLY, SUCH AS HUFFMAN CODING AND ARITHMETIC CODING. UNDERSTAND THE PRINCIPLES OF LOSSLESS AND LOSSY COMPRESSION AND THEIR APPLICATIONS. 9. DIGITAL COMMUNICATION SYSTEM DESIGN: GAIN THE ABILITY TO DESIGN DIGITAL COMMUNICATION SYSTEMS BY SELECTING APPROPRIATE MODULATION SCHEMES, CHANNEL CODING TECHNIQUES, AND ERROR CONTROL STRATEGIES BASED ON SYSTEM REQUIREMENTS AND CONSTRAINTS. 10. APPLICATION OF DIGITAL COMMUNICATION PRINCIPLES: APPLY DIGITAL COMMUNICATION PRINCIPLES TO REAL-WORLD SCENARIOS AND PRACTICAL APPLICATIONS, SUCH AS WIRELESS COMMUNICATION, SATELLITE COMMUNICATION, AND DATA TRANSMISSION OVER NETWORKS. 11. ETHICAL CONSIDERATIONS: DEVELOP AN UNDERSTANDING OF ETHICAL CONSIDERATIONS AND PROFESSIONAL RESPONSIBILITIES RELATED TO DIGITAL COMMUNICATION SYSTEMS, SUCH AS PRIVACY, SECURITY, AND INTELLECTUAL PROPERTY.
<p>Indicative Contents</p>	<p>Indicative content includes the following: Part 1 – General Introduction [16 hrs] Introduction to the digital communication systems.</p>

المحتويات الإرشادية	Part 2 – digital modulation [16 hrs] Part 3 – error detection and correction [16 hrs] Part 4 – coding techniques [8 hrs] Revision [4 hrs]
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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 student's 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 simple experiments involving interesting sampling activities for the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	4	10% (10)	3, 7, 11, 14	LO #2, 4, 10 and 11
	Assignments	4	10% (10)	3, 7, 9, 14	LO # 3, 5, 6 and 7
	Projects / Lab.	14	10% (10)	Continuous	All
	Report	5	10% (10)	5, 6, 8, 10, 13	LO # 5, 8 and 12
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
Week 1	<u>Review of Fundamentals</u> <ul style="list-style-type: none"> • <u>Recap of digital communication fundamentals</u> • <u>Signal representation and manipulation</u> • <u>Fourier analysis and frequency domain representation</u>
Week 2	<u>Baseband Digital Transmission</u> <ul style="list-style-type: none"> • <u>Baseband transmission and its limitations</u> • <u>Pulse shaping and matched filtering</u> • <u>Eye diagrams and intersymbol interference (ISI)</u>
Week 3	<u>Line Coding and Equalization</u> <ul style="list-style-type: none"> • <u>Line coding techniques (Unipolar, Polar, Bipolar)</u> • <u>Nyquist ISI criterion and equalization techniques</u> • <u>Decision feedback equalization (DFE)</u>

Week 4	<u>Bandpass Digital Transmission</u> <ul style="list-style-type: none"> • <u>Introduction to bandpass transmission</u> • <u>Digital modulation schemes (ASK, FSK, PSK)</u> • <u>Coherent and non-coherent detection techniques</u>
Week 5	<u>Error Detection and Correction</u> <ul style="list-style-type: none"> • <u>Introduction to error detection and correction codes</u> • <u>Linear block codes (Hamming, Reed-Solomon)</u> • <u>Convolutional codes and Viterbi decoding</u>
Week 6	<u>Channel Coding and Interleaving</u> <ul style="list-style-type: none"> • <u>Introduction to channel coding techniques</u> • <u>Turbo codes and iterative decoding</u> • <u>Interleaving and de-interleaving techniques</u>
Week 7	<u>Multiple Access Techniques</u> <ul style="list-style-type: none"> • <u>Multiple access schemes (FDMA, TDMA, CDMA)</u> • <u>Random access protocols (ALOHA, slotted ALOHA)</u> • <u>Carrier Sense Multiple Access (CSMA) protocols</u>
Week 8	<u>Spread Spectrum Techniques</u> <ul style="list-style-type: none"> • <u>Direct Sequence Spread Spectrum (DSSS)</u> • <u>Frequency Hopping Spread Spectrum (FHSS)</u> • <u>Code Division Multiple Access (CDMA)</u>
Week 9	<u>Digital Modulation Techniques</u> <ul style="list-style-type: none"> • <u>Quadrature Amplitude Modulation (QAM)</u> • <u>Orthogonal Frequency Division Multiplexing (OFDM)</u> • <u>Bit and symbol error rate analysis</u>
Week 10	<u>Wireless Communication Systems</u> <ul style="list-style-type: none"> • <u>Cellular communication concepts</u> • <u>Multiple access in cellular networks</u> • <u>Wireless network architectures (2G, 3G, 4G, 5G)</u>
Week 11	<u>MIMO Communication Systems</u> <ul style="list-style-type: none"> • <u>Introduction to Multiple-Input Multiple-Output (MIMO)</u> • <u>Spatial multiplexing and diversity techniques</u> • <u>MIMO channel capacity and beamforming</u>
Week 12	<u>Channel Estimation and Equalization</u> <ul style="list-style-type: none"> • <u>Channel estimation techniques for MIMO systems</u> • <u>MIMO equalization algorithms</u> • <u>Performance analysis in MIMO channels</u>
Week 13	<u>Digital Communication System Design</u> <ul style="list-style-type: none"> • <u>System-level design considerations</u> • <u>Link budget analysis and system performance metrics</u> • <u>Design trade-offs and practical implementation challenges</u>
Week 14	<u>Advanced Topics and Emerging Technologies</u> <ul style="list-style-type: none"> • <u>Overview of advanced topics (Cognitive radio, Massive MIMO)</u> • <u>Introduction to emerging technologies (IoT, 5G+, etc.)</u> • <u>Discussion on current research trends and future prospects</u>
Week 15	<u>Final Exam.</u>

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
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Week 1	Lab1: Introduction to MATLAB <ul style="list-style-type: none"> • <u>Getting started with MATLAB environment</u> • <u>Basic operations, variables, and functions</u>
Week 2	Lab 2: Pulse Amplitude Modulation (PAM) <ul style="list-style-type: none"> • <u>Generation and demodulation of PAM signals</u> • <u>Performance analysis and comparison of PAM schemes</u>
Week 3	Lab 3: Pulse Code Modulation (PCM) <ul style="list-style-type: none"> • <u>Implementation of PCM encoding and decoding</u> • <u>Analysis of quantization noise and signal-to-noise ratio (SNR)</u>
Week 4	Lab 4: Line Coding Techniques <ul style="list-style-type: none"> • <u>Implementation and comparison of line coding schemes</u> • <u>Performance evaluation using eye diagrams</u>
Week 5	Lab 5: Digital Modulation Techniques <ul style="list-style-type: none"> • <u>Implementation of ASK, FSK, and PSK modulation schemes</u> • <u>Analysis of modulation performance in AWGN channel</u>
Week 6	Lab 6: Error Detection and Correction <ul style="list-style-type: none"> • <u>Implementation of error detection codes (CRC, Hamming)</u> • <u>Performance analysis using error detection probability</u>
Week 7	Lab 7: Channel Coding with Convolutional Codes <ul style="list-style-type: none"> • <u>Encoder and decoder implementation for convolutional codes</u> • <u>BER performance analysis with Viterbi decoding</u>
Week 8	Lab 8: Spread Spectrum Techniques <ul style="list-style-type: none"> • <u>Simulation of Direct Sequence Spread Spectrum (DSSS)</u> • <u>Performance analysis in the presence of interference</u>
Week 9	Lab 9: Orthogonal Frequency Division Multiplexing (OFDM) <ul style="list-style-type: none"> • <u>OFDM signal generation and demodulation</u> • <u>Analysis of frequency and timing synchronization</u>
Week 10	Lab 10: Multiple Access Techniques <ul style="list-style-type: none"> • <u>Simulation of FDMA, TDMA, and CDMA systems</u> • <u>Performance comparison under varying load conditions</u>
Week 11	Lab 11: MIMO Systems <ul style="list-style-type: none"> • <u>Simulation of MIMO transmission and reception</u> • <u>Analysis of capacity and diversity gains</u>
Week 12	Lab 12: Channel Estimation and Equalization in MIMO <ul style="list-style-type: none"> • <u>Channel estimation techniques in MIMO systems</u> • <u>Equalization algorithms and performance evaluation</u>
Week 13	Lab 13: Wireless Channel Simulation <ul style="list-style-type: none"> • <u>Simulation of fading channels (Rayleigh, Rician)</u> • <u>Impact of channel conditions on system performance</u>
Week 14	Lab 14: Review

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"DIGITAL COMMUNICATIONS" BY JOHN G. PROAKIS AND MASOUD SALEHI.	No
Recommended Texts	"PRINCIPLES OF DIGITAL COMMUNICATION" BY ROBERT G. GALLAGER	No
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.

	<p>Ministry of Higher Education and Scientific Research - Iraq Northern Technical University Engineering Technical College/Mosul Department of Computer Technology Engineering</p>	
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Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	<u>Computer Networks Systems</u>		Module Delivery	
Module Type	<u>Core</u>		✓	Theory
Module Code	<u>CTE311</u>		✓	Lecture
ECTS Credits	<u>5</u>		✓	Lab
SWL (hr/sem)	<u>125</u>		✓	Tutorial
			✓	Practical
			✓	Seminar
Module Level	UGx11 3	Semester of Delivery	2	
Administering Department	<u>Department of Computer Techniques Engineering</u>		College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Dr. Ziyad Khalaf Farej		e-mail	drziyad.farej@ntu.edu.iq
Module Leader's Acad. Title	Asst. Prof.		Module Leader's Qualification	Ph.D.
Module Tutor	None		e-mail	None
Peer Reviewer Name	None		e-mail	None
Review Committee Approval	2/06/2023		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>73. Medium Access Control (MAC): To Enhance MAC protocols and improve channel access efficiency. To Reduce collisions and increase throughput in wireless or shared media environments.</p> <p>74. LAN Performance: To Improve LAN performance by optimizing protocols and reducing latency. To Enhance network switch and router performance to handle increasing data rates. To Enhance LAN security and mitigate potential threats to ensure data confidentiality.</p> <p>75. Data Link Layer: To Develop efficient error detection and correction mechanisms and ensure data integrity. To Implement flow control mechanisms and regulate the rate of data transmission.</p> <p>76. Transport Layer: To Enhance transport layer protocols such as TCP and UDP to improve reliability and efficiency. To Implement congestion control algorithms and prevent network congestion to ensure fair resource allocation.</p> <p>77. Network Layer: To Develop routing protocols and enable efficient packet forwarding and path selection.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>122. Explain the concepts of framing, error detection, and error correction</p> <p>123. Applying flow control mechanisms to regulate data transmission between sender and receiver.</p> <p>124. Applying Network Protocols: understanding how protocols like TCP/IP enable reliable data transmission and how they are used in real-world scenarios.</p> <p>125. Differentiate between connection-oriented and connectionless transport protocols.</p> <p>126. Implement reliable data transfer mechanisms using protocols like TCP.</p> <p>127. Managing Network Infrastructure and optimizing network performance.</p> <p>128. Understanding the basics of wireless technologies and IoT.</p>

Indicative Contents المحتويات الإرشادية	<ul style="list-style-type: none"> • Data Link Layer: [20 h] Media Access Control (MAC) protocols (Ethernet, Wi-Fi) Framing and error detection Flow control and error control mechanisms Local Area Networks (LAN) and Ethernet technologies • Network Layer: [14 h] IP addressing and subnetting Routing protocols (static routing, RIP, OSPF) IP packet forwarding and (IPv4) and (IPv6) • Transport Layer: [12 h] Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) Connection-oriented vs. connectionless protocols Reliable data transfer and congestion control mechanisms • Emerging Network Technologies: [12 h] Wireless networks (Wi-Fi, Bluetooth, cellular networks) Internet of Things (IoT) and sensor networks
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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. When studying Computer Networks Fundamentals, there are several key strategies that can help you grasp the material effectively. These strategies include (Understanding the Fundamentals, Layered Approach, Analyze Network Protocols, Network Simulations: Visualize Networks and Practical Problem Solving. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</p>
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	4	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	5	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 النظري

Week	Material Covered
Week 1	Introduction to Local Area Networks Standards: Medium Access Control, Ethernet (CSMA/CD) and Token MAC protocols
Week 2	LAN performance; Token ring and CSMA/CD performance Evaluation
Week 3	Introduction to Data-Link Layer; High-level Data Link Control (HDLC) and Point-to-Point Protocol (PPP)
Week 4	Data Link Layer Design Issues: Framing, Error Control, and Flow Control
Week 5	Automatic Repeat Request (ARQ), Stop-And-Wait Protocol and Sliding Window Protocols
Week 6	Link Throughput, Utilization and Efficiency
Week 7	Effect of Errors on Throughput Effect of Sliding Window and ARQ on Throughput
Week 8	Introduction, Error Detection and Correction, Types of Errors, Redundancy, Forward Error Correction
Week 9	Block Coding, Error detection, Cyclic Codes, Cyclic Redundancy Check, Hardware Implementation
Week 10	Transport layer; Process-la-Process Delivery UDP, TCP and SCTP, Features and Connection
Week 11	TCP Congestion Control, Timers Open loop and Close loop Congestion Control
Week 12	Network Layer: Delivery, Forwarding, and Routing
Week 13	Unicast Routing Protocols; Intra- and Interdomain Routing Multicast and Broadcast Routing Protocols
Week 14	Wireless LANs; IEEE 802.11 Standards and Bluetooth
Week 15	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمنتخب

Week	Material Covered
Week 1	Lab 1: Introduction to wireless networks
Week 2	Lab 2: Wireless network characteristics
Week 3	Lab 3: IEEE 802.11 standards
Week 4	Lab 4: Wireless Access point
Week 5	Lab 5: Wireless Station
Week 6	Lab 6: Data Routing Algorithm
Week 7	Lab 7: Introduction to Network Management software
Week 8	Lab 8: Mikrotik system
Week 9	Lab 9: Mikrotik hardware devices
Week 10	Lab 10: Winbox software
Week 11	Lab 11: Firewall configuration
Week 12	Lab 12: Hotspot management
Week 13	Lab 13: User manager
Week 14	Lab 14: Network advanced tools

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Behrouz A. Forouzan. Data communication and Networking, fifth edition	Yes
Recommended Texts	Michael Duck and Richard Read” Communications and Computer Networks, 2 nd edition, Pearson Education 2003	No
Websites	Digital Systems: From Logic Gates to Processors: https://www.coursera.org/learn/computes_networks	

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مخطط الدرجات				
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Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Computer Technology Engineering



Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	<u>Computer Networks Systems</u>	Module Delivery	
Module Type	<u>Core</u>	✓	Theory
Module Code	<u>CTE311</u>	✓	Lecture
ECTS Credits	<u>5</u>	✓	Lab
SWL (hr/sem)	<u>125</u>	✓	Tutorial
		✓	Practical
		✓	Seminar
Module Level	UGx11 3	Semester of Delivery	2
Administering Department	<u>Department of Computer Techniques Engineering</u>	College	<u>Northern Technical University Engineering Technical College/Mosul</u>
Module Leader	Dr. Ziyad Khalaf Farej	e-mail	drziyad.farej@ntu.edu.iq
Module Leader's Acad. Title	Asst. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	2/06/2023	Version Number	1.0

Relation with Other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Semester
None	

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	<p>78. Medium Access Control (MAC): To Enhance MAC protocols and improve channel access efficiency. To Reduce collisions and increase throughput in wireless or shared media environments.</p> <p>79. LAN Performance: To Improve LAN performance by optimizing protocols and reducing latency. To Enhance network switch and router performance to handle increasing data rates. To Enhance LAN security and mitigate potential threats to ensure data confidentiality.</p> <p>80. Data Link Layer: To Develop efficient error detection and correction mechanisms and ensure data integrity. To Implement flow control mechanisms and regulate the rate of data transmission.</p> <p>81. Transport Layer: To Enhance transport layer protocols such as TCP and UDP to improve reliability and efficiency. To Implement congestion control algorithms and prevent network congestion to ensure fair resource allocation.</p> <p>82. Network Layer: To Develop routing protocols and enable efficient packet forwarding and path selection.</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<p>129. Explain the concepts of framing, error detection, and error correction</p> <p>130. Applying flow control mechanisms to regulate data transmission between sender and receiver.</p> <p>131. Applying Network Protocols: understanding how protocols like TCP/IP enable reliable data transmission and how they are used in real-world scenarios.</p> <p>132. Differentiate between connection-oriented and connectionless transport protocols.</p> <p>133. Implement reliable data transfer mechanisms using protocols like TCP.</p> <p>134. Managing Network Infrastructure and optimizing network performance.</p> <p>135. Understanding the basics of wireless technologies and IoT.</p>
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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. When studying Computer Networks Fundamentals, there are several key strategies that can help you grasp the material effectively. These strategies include (Understanding the Fundamentals, Layered Approach, Analyze Network Protocols, Network Simulations: Visualize Networks and Practical Problem Solving. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

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Module Evaluation

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As	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
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Total assessment		100% (100 Marks)			

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Material Covered
Week 1	Introduction to Local Area Networks Standards: Medium Access Control, Ethernet (CSMA/CD) and Token MAC protocols
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Week 14	Wireless LANs; IEEE 802.11 Standards and Bluetooth
Week 15	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختب

Week	Material Covered
Week 1	Lab 1: Introduction to wireless networks
Week 2	Lab 2: Wireless network characteristics
Week 3	Lab 3: IEEE 802.11 standards
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Week 14	Lab 14: Network advanced tools

Learning and Teaching Resources

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Module Descriptor Form

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Summer Training 2	Module Delivery	
Module Type	Supplement	Theory	
Module Code	CTE312	Lecture	
ECTS Credits	2	✓ Lab	
SWL (hr/sem)	50	Tutorial	
Module Level	UGx11 2	✓ Practical	
Administering Department	Department of Computer Techniques Engineering	✓ Seminar	
Module Leader	All Academic staf	Semester of Delivery	2
Module Leader's Acad. Title		College	Northern Technical University Engineering Technical College/Mosul
Module Tutor	None	e-mail	
Peer Reviewer Name	None	Module Leader's Qualification	
Review Committee Approval	21/06/2023	e-mail	None
		e-mail	None
		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>9- القدرة على ربط المعرفة المكتسبة من الطالب خلال دراسته الأكاديمية بالمشاكل الحقيقية على أرض الواقع</p> <p>10- اكتشاف بيئة العمل واحتياجاتها وقبورها</p> <p>القدرة على تحديد المتطلبات المطلوبة لإيجاد حلول مناسبة وفعالة للمشاكل الحقيقية على أرض الواقع مع 11- وجود قيود فنية مختلفة</p> <p>القدرة على تكوين رؤية واضحة حول الأهداف والمعوقات والعمل بشكل فعال-12</p> <p>إيجاد الطالب استقلاليته بكتسابه لمهارات جديدة مع إرشاف بسيط من قبل جهة التدريب-13</p> <p>القدرة على إيجاد حلول مناسبة في حال حدوث أي تعري في متطلبات العمل وقبوره-14</p> <p>القدرة على التواصل مع الكثر من الأشخاص المتواجدين في المجال العملي-15</p> <p>16- تعلم المسؤوليات الأخلاقية والأحرفية</p>
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ul style="list-style-type: none">Networking Fundamentals: Gain knowledge of computer networks, protocols, and network architecture. Understand concepts like IP addressing, routing, switching, and network security.Operating Systems: Learn about the basic principles and components of operating systems. Understand process management, memory management

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
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.

Course Description Form

1. Course Name:					
English language 4					
2. Course Code:					
NTU401					
3. Semester / Year:					
1 st Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 Hours/ 2 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Thabat F. Younis Email: thabet.tfy@ntu.edu.iq					
8. Course Objectives					
Course Objectives		<ol style="list-style-type: none"> 1. In-depth understanding of English grammar. 2. Excellent English-speaking skills 3. Excellent English writing skills 			
9. Teaching and Learning Strategies					
Strategy		Theoretical Lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	2	The student will be able to demonstrate a command of English grammar	Simple present	Theoretical	Written and Oral Exams
2nd	2	The student will be able to demonstrate a command of English grammar	Simple past	Theoretical	Written and Oral Exams

3 rd	2	The student will be able to demonstrate a command of English grammar	Present continuo	Theoretical	Written and Oral Exams
4 th	2	The student will be able to demonstrate a command of English grammar	Past perfect	Theoretical	Written and Oral Exams
5 th	2	The student will be able to demonstrate a command of English grammar	Nouns	Theoretical	Written and Oral Exams
6 th	2	The student will be able to demonstrate a command of English grammar	Noun qualifiers	Theoretical	Written and Oral Exams
7 th	2	The student will be able to demonstrate a command of English grammar	Negative sentenc	Theoretical	Written and Oral Exams
8 th	2	The student will be able to speak English	Formal speech	Theoretical	Written and Oral Exams
9 th	2	The student will be able to speak English	Formal speech	Theoretical	Written and Oral Exams
10 th	2	The student will be able to speak English	Formal speech	Theoretical	Written and Oral Exams
11 th	2	The student will be able to speak English	Informal speech	Theoretical	Written and Oral Exams
12 th	2	The student will be able to write English	Formal letters	Theoretical	Written and Oral Exams
13 th	2	The student will be able to write English	Formal letters	Theoretical	Written and Oral Exams
14 th	2	The student will be able to write English	Formal Email	Theoretical	Written and Oral Exams
15 th	2	The student will be able to write English	Scientific paper	Theoretical	Written and Oral Exams

11. Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12. Learning and Teaching Resources

Liz and John Soars “headway” 2nd edition

<https://www.cambridgeenglish.org/learning-english/free-resources/>

Course Description Form

1. Course Name:					
Information Theory					
2. Course Code:					
CCT404					
3. Semester / Year:					
1 st Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Emad A. Mohammed Email: e.a.mohammed@ntu.edu.iq					
8. Course Objectives					
Course Objectives			<ol style="list-style-type: none"> 1. Identifying types of random variables. 2. Handling information. 3. Analyzing communication channels. 		
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to identify the types of random variables	Probability	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to identify the types of random variables	Joint probability	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to identify the types of random variables	Conditional probability	Theoretical and practical	Theoretical and practical Exams
4th	4	The student will be able to identify the types of	Random variable	Theoretical and practical	Theoretical and practical

		random variables			Exams
5th	4	The student will be able to identify the types of random variables	Random variable	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to identify the types of random variables	Gaussian distribution	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to identify the types of random variables	Poisson distribution	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to identify the types of random variables	Uniform distribution	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to identify the types of random variables	Chi-square distribution	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to process information	Types information	T Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to process information	Digital Informati	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to process information	Joint Information	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to process information	Conditional information	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to analyze communication channels	Channels Type	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to analyze communication channels	Channel capacity	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Stremler “Introduction to communication system” 9th edition

Lathi “Digital communication” 7th edition

<https://www.coursera.org/learn/information-theory>

Course Description Form

1. Course Name:					
Digital Communications 2					
2. Course Code:					
CCT405					
3. Semester / Year:					
1 st Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Hakam Marwan Zaidan Email: hakam_m_zaidan@ntu.edu.iq					
8. Course Objectives					
Course Objectives		<ol style="list-style-type: none"> 1. Understanding the nature of digital signals. 2. Understanding how to convert an analog signal to a digital signal. 3. Understanding the importance of digital communication systems and their applications. 			
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to understand the nature of digital signals	Signal and systems	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to understand the nature of digital signals	Deterministic signal	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to	Non-deterministi	Theoretical	Theoretical

		understand the nature of digital signals	signal	and practical	and practical Exams
4th	4	The student will be able to understand the nature of digital signals	Continuous signal	Theoretical and practical	Theoretical and practical Exams
5th	4	The student will be able to understand the nature of digital signals	Signal spectrum	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to understand the nature of digital signals	Discrete signals	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to convert an analog signal to a digital signal	Analog to digital converter	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to convert an analog signal to a digital signal	Digital quantization	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to recognize the significance and applications of digital communication systems	Digital Communication system	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to recognize the significance and applications of digital communication systems	Digital modulation	Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to recognize the significance and applications of digital communication systems	ASK	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to recognize the significance and applications of digital communication systems	PSK	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to recognize the significance and applications of digital communication systems	CDMA	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to recognize the significance and applications of digital communication systems	FHSS	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to recognize the significance and applications of digital communication systems	DSSS	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Gallager - Principles of Digital Communications 2008

Digital Communications/ Bernard Sklar

<https://www.coursera.org>

Course Description Form

1. Course Name:					
Digital Signal Processing					
2. Course Code:					
CCT406					
3. Semester / Year:					
1 st Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
4 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Omar Zyad Tariq Email: omar.zyad@ntu.edu.iq					
8. Course Objectives					
Course Objectives		<ol style="list-style-type: none"> 1- Understanding digital signal analysis. 2- Transforming signals from the time domain to other domains. 3- Understanding signal processing applications. 			
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to understand digital signal analysis	Digital signals	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to understand digital signal analysis	Unit step signal	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to understand digital signal analysis	Ramp signal	Theoretical and practical	Theoretical and practical Exams

4th	4	The student will be able to understand digital signal analysis	Exponential sign	Theoretical and practical	Theoretical and practical Exams
5th	4	The student will be able to transform signals from the time domain to other domains	Time domain to Frequency domain conversion	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to transform signals from the time domain to other domains	DFT	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to transform signals from the time domain to other domains	FFT	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to transform signals from the time domain to other domains	Time domain to Z Domain conversion	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to transform signals from the time domain to other domains	Laplace transform	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to identify the applications of signal processing	Filters	Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to identify the applications of signal processing	Chebyshev filter	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to identify the applications of signal processing	Butterworth filter	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to identify the applications of signal processing	1 st order filters	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to identify the applications of signal processing	2 nd order filters	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to identify the applications of signal processing	3 rd order filters	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Digital Signal Processing John G. Proakis, 2007

<https://www.coursera.org>

Course Description Form

1. Course Name:					
Artificial intelligence 1					
2. Course Code:					
CCT407					
3. Semester / Year:					
1 st Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
5 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Ahmed K. Younis Email: a.k.younis@ntu.edu.iq					
8. Course Objectives					
Course Objectives		1- Understanding different data types. 2- Understanding different types of networks. 3- Learning machine language			
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to identify data types	Data types	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to identify data types	Data types	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to identify data types	Structured data	Theoretical and practical	Theoretical and practical Exams
4th	4	The student will be able to identify data types	Unstructured data	Theoretical and practical	Theoretical and practical Exams

5th	4	The student will be able to identify data types	Images type	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to identify data types	Random data	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to identify types of networks	unsupervised networks	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to identify types of networks	unsupervised networks	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to identify types of networks	supervised networks	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to identify types of networks	supervised networks	Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to identify types of networks	Supervised network	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to be professional machine language	Machine learning	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to be professional machine language	Machine learning	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to be professional machine language	Machine learning	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to be professional machine language	Machine learning	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Artificial Intelligence by Yun Peng, 2022

<https://www.coursera.org>

Course Description Form

1. Course Name:					
Coding					
2. Course Code:					
CCT408					
3. Semester / Year:					
2 nd Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
6 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Emad A. Mohammed Email: e.a.mohammed@ntu.edu.iq					
8. Course Objectives					
Course Objectives		1- To comprehend different encoding schemes. 2- To design error-detection codes. 3- To design error-correction codes.			
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to identify various encoding methods	Coding	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to identify various encoding methods	Line coding	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to identify various encoding methods	Source coding	Theoretical and practical	Theoretical and practical Exams
4th	4	The student will be able to	Data compressio	Theoretical and practical	Theoretical and practical

		identify various encoding methods			Exams
5th	4	The student will be able to identify various encoding methods	Huffman code	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to identify various encoding methods	Shannon code	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to identify various encoding methods	Shannon-Fano code	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to identify various encoding methods	RLE code	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to design error-detection codes	Channel coding	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to design error-detection codes	Error detection code	Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to design error-detection codes	VRC code	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to design error-detection codes	LRC code	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to design error-correcting codes	Error Correction code	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to design error-correcting codes	Hamming code	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to design error-correcting codes	Turbo code	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Information Theory: From Coding to Learning ,Yury Poliansky, 2021

<https://www.coursera.org>

Course Description Form

1. Course Name:					
Computer security					
2. Course Code:					
CCT409					
3. Semester / Year:					
2 nd Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
7 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Farqad H. Abdulraheem Email: frqhamid@ntu.edu.iq					
8. Course Objectives					
Course Objectives		1- Understanding encryption types/methods. 2- Understanding categories of threats. 3- Understanding security measures/defense mechanisms.			
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to classify encryption techniques	cryptography	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to classify encryption techniques	cryptography	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to classify encryption techniques	Symmetric key cipher	Theoretical and practical	Theoretical and practical Exams

4th	4	The student will be able to classify encryption techniques	Cesar cipher	Theoretical and practical	Theoretical and practical Exams
5th	4	The student will be able to classify encryption techniques	Transposition cipher	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to classify encryption techniques	Hell cipher	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to classify encryption techniques	Asymmetric key cipher	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to classify encryption techniques	Public key	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to classify encryption techniques	RSA cipher	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to classify encryption techniques	AES cipher	Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to classify encryption techniques	ADS cipher	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to identify categories of threats	viruses	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to identify categories of threats	Trojan virus	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to identify security measures	One time pad	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to identify security measures	Salt passwords	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Security Engineering, Ross Anderson, 2nd edition

<https://www.coursera.org>

Course Description Form

1. Course Name:					
Microprocessor 2					
2. Course Code:					
CCT410					
3. Semester / Year:					
2 nd Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Ahmad Faleh Mahmood Email: ahmed.faleh@ntu.edu.iq					
8. Course Objectives					
Course Objectives		<ol style="list-style-type: none"> 1. Understanding types of processors. 2. Understanding types of controllers. 3. Understanding peripheral devices. 			
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to identify different processor architectures	Microprocessors	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to identify different processor architectures	Microprocessors	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to identify different processor architectures	8088 processor	Theoretical and practical	Theoretical and practical Exams
4th	4	The student will be able to	386 processor	Theoretical and practical	Theoretical and practical

		identify different processor architectures			Exams
5th	4	The student will be able to identify different processor architectures	Pentium processo	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to identify different processor architectures	Dual core	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to identify different processor architectures	Quad-core	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to identify different processor architectures	Octal-core	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to identify different controller architectures	microcontrollers	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to identify different controller architectures	microcontrollers	T Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to Understanding peripheral devices	counters	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to Understanding peripheral devices	Serial ports	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to Understanding peripheral devices	latch	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to Understanding peripheral devices	buffers	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to Understanding peripheral devices	Parallel ports	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Microprocessors systems, R.J.Mitchell, 2022

<https://www.coursera.org>

Course Description Form

1. Course Name:					
Artificial intelligence 2					
2. Course Code:					
CCT411					
3. Semester / Year:					
2 nd Semester/ Fourth Year					
4. Description Preparation Date:					
10/6/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3 theoretical Hours, 2 practical hours / 3 Units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Ahmed K. Younis Email: a.k.younis@ntu.edu.iq					
8. Course Objectives					
Course Objectives		1- To understand different learning paradigms 2- To achieve proficiency in deep learning techniques. 3- To recognize the applications of artificial intelligence.			
9. Teaching and Learning Strategies					
Strategy		Theoretical and practical lectures			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	4	The student will be able to demonstrate proficiency in deep learning techniques	Machine learning	Theoretical and practical	Theoretical and practical Exams
2nd	4	The student will be able to demonstrate proficiency in deep learning techniques	Deep learning	Theoretical and practical	Theoretical and practical Exams
3rd	4	The student will be able to demonstrate proficiency in deep learning techniques	Deep learning algorithms	Theoretical and practical	Theoretical and practical Exams
4th	4	The student will be able to	Resnet algorithm	Theoretical	Theoretical

		demonstrate proficiency in deep learning techniques		and practical	and practical Exams
5th	4	The student will be able to demonstrate proficiency in deep learning techniques	CNN Algorithm	Theoretical and practical	Theoretical and practical Exams
6th	4	The student will be able to demonstrate proficiency in deep learning techniques	ANN algorithm	Theoretical and practical	Theoretical and practical Exams
7th	4	The student will be able to demonstrate proficiency in deep learning techniques	RNN algorithm	Theoretical and practical	Theoretical and practical Exams
8th	4	The student will be able to demonstrate proficiency in deep learning techniques	Activation functio	Theoretical and practical	Theoretical and practical Exams
9th	4	The student will be able to demonstrate proficiency in deep learning techniques	ReLu function	Theoretical and practical	Theoretical and practical Exams
10th	4	The student will be able to demonstrate proficiency in deep learning techniques	Log sigmoid function	Theoretical and practical	Theoretical and practical Exams
11th	4	The student will be able to demonstrate proficiency in deep learning techniques	Soft max	Theoretical and practical	Theoretical and practical Exams
12th	4	The student will be able to demonstrate proficiency in machine language	Images training	Theoretical and practical	Theoretical and practical Exams
13th	4	The student will be able to demonstrate proficiency in machine language	Video training	Theoretical and practical	Theoretical and practical Exams
14th	4	The student will be able to understand artificial intelligence applications	Classification	Theoretical and practical	Theoretical and practical Exams
15th	4	The student will be able to understand artificial intelligence applications	prediction	Theoretical and practical	Theoretical and practical Exams

11.Course Evaluation

10 marks for the daily quiz, 40 marks for the monthly exam, and 50 marks for the term/semester exam.

12.Learning and Teaching Resources

Artificial Intelligence by Yun Peng, 2022

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