

وزارة التعليم العالي والبحث العلمي
جهاز الإشراف والتقويم العلمي
دائرة ضمان الجودة والاعتماد الأكاديمي

استمارة وصف البرنامج الأكاديمي للكليات والمعاهد للعام الدراسي

الجامعة : جامعة شط العرب الاهلية

الكلية /المعهد : التقنية الهندسية

القسم العلمي : هندسة تقنيات الحاسوب

تاريخ ملء الملف : 2024 /9/15



التوقيع :

Kumar

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التاريخ : 15\9\2024

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دقق الملف من قبل

شعبة ضمان الجودة والأداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي

التاريخ : 2024 / 9 / 15

التوقيع

مصادقة السيد العميد

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أ.م.د. مازن عبدالاله علوان

عميد الكلية التقنية الهندسية



Part One: Academic Program Description

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

Academic Program Description Form for Colleges and Institutes

Item	Details
University	Shatt Al-Arab Private University
College / Institute	Engineering Technical College
Department	Department of Computer Engineering Techniques
Date of completion	15/9/2024
Head of Department	Asst. Prof. Qasim Abdul-Jabbar Abdul-Razzaq
Scientific Assistant Dean	Prof. Dr. Kamil Hussein Alwan
File checked by	Quality Assurance and University Performance Unit
Approved by the Dean	Asst. Prof. Dr. Mazin Abdul-Ilah Alwan

Academic Program Description

This academic program description provides a concise summary of the main features of the program and the learning outcomes that students are expected to achieve, demonstrating whether the program has made the best use of the available opportunities. It is accompanied by a description of each course within the program.

No.	Item	Details
1	Educational institution	Engineering Technical College
2	Scientific department / centre	Department of Computer Engineering Techniques
3	Academic or professional program name	Computer Engineering Techniques – Computer Electronics Branch; Computer Engineering Techniques – Computer Communication Networks Branch
4	Final degree awarded	Bachelor of Technical Engineering
5	Study system (annual / courses / other)	Annual + Bologna
6	Accreditation program	ABET
7	Other external influences	Labour market: many seminars and meetings were held with employers to discuss the academic and applied content. Universities and colleges with similar specializations: through joint working mechanisms that enable communication between teaching staff and students, to reach a shared vision and set plans for developing the academic content.
8	Date of preparing the description	15/9/2024

9. Academic Program Objectives

The program aims to graduate students specialized in computer technical engineering and to prepare them to:

1. Work in fields that require connecting computer networks, such as telecommunications companies, technology companies and educational institutions.
2. Develop the infrastructure of e-government and help overcome technical problems that may arise.
3. Work in industrial establishments, especially in fields that require computerized control operations.
4. Modernize the infrastructure of old production plants, converting their former production-control processes into modern processes controlled by computers and remotely.

10. Required Program Outcomes and Teaching, Learning and Assessment Methods

A. Knowledge objectives

- A1: Knowledge and understanding of communication networks and how to connect them.
- A2: Knowledge and understanding of digital signals and their analysis.
- A3: Knowledge and understanding of computer components, how they are assembled, and how to fix their problems.
- A4: Knowledge and understanding of the electronic circuits of various computerized devices and how to design them.
- A5: Knowledge and understanding of different programming languages and how to use and benefit from them.
- A6: Knowledge of the types of digital controllers and how to program them and design their circuits.

B. Program-specific skill objectives

- B1: Writing and implementing programs for communications, controllers and engineering algorithms.
- B2: Designing and implementing wired and wireless computer networks.
- B3: Diagnosing and repairing faults in computerized devices and their peripherals.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide students with the experience needed to develop their practical skills, which is essential for carrying out practical projects correctly, and establish the principles and steps of occupational safety to reduce harm to people and property.
- Curricular training: provides students with direct exposure to the labour market, so they can understand the practical application of the curricula they have studied.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's engagement with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's engagement with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make the effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by teaching staff through observing students' engagement and the application of the department's affective objectives, and recording their observations.
- Practical projects and graduation projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Connecting wired and wireless internal and external networks.
- D2: Designing and fabricating printed circuit boards.
- D3: Installing and interfacing computerized communication systems.
- D4: Maintaining personal and industrial computer systems and their attached peripheral systems.

Teaching and learning methods

- Practical laboratories and workshops: provide students with the experience needed to develop their practical skills, which is essential for carrying out practical projects correctly, and establish the principles and steps of occupational safety to reduce harm to people and property.
- Curricular training: provides students with direct exposure to the labour market, so they can understand the practical application of the curricula they have studied.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Semester exams: the middle stage for assessing the student's engagement with the material during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's engagement with the material during the academic year, in both its academic and practical aspects.

11. Program Structure

First Year – First Semester

No.	Course name	Code	Theory	Practical	ECTS
1	Digital Principles	CET1101	2	2	6
2	Principles of Electrical Engineering	CET1102	2	2	6
3	Mathematics I	CET1103	2	2	5
4	Engineering Drawing	CET1104	–	3	5
5	Engineering Workshops	CET1105	–	4	6
6	English Language 1	MTU1002	1	–	2

First Year – Second Semester

No.	Course name	Code	Theory	Practical	ECTS
1	Digital Systems	CET1201	2	2	6
2	Electrical Circuits	CET1202	2	2	6
3	Programming Fundamentals	CET1203	2	2	6
4	Mathematics II	CET1204	2	–	5
5	Democracy and Human Rights	MTU1006	2	–	2
6	Arabic Language	MTU1001	2	–	2
7	Computer Fundamentals	MTU1004	1	1	3

Second Year – First Semester

No.	Course name	Code	Theory	Practical	ECTS
1	Engineering Mathematics	CET2101	2	–	5
2	Object-Oriented Programming	CET2102	2	2	6
3	Computer Architecture and Applications	CET2103	2	2	5
4	Principles of Electronics	CET2104	2	2	5
5	Fundamentals of Communications	CET2105	2	2	5
6	English Language 2	MTU1003	1	–	2
7	Crimes of the Ba'ath Regime	MTU1007	2	–	2

Second Year – Second Semester

No.	Course name	Code	Theory	Practical	ECTS
1	Advanced Engineering Mathematics	CET2201	2	–	5
2	Programming in Python	CET2202	2	2	5
3	Microprocessors	CET2203	2	2	5
4	Analog Communications	CET2204	2	2	5
5	Electronic Circuits	CET2205	2	2	5
6	Instruments and Measurements	CET2206	2	2	5

Third Year – Computer Electronics Branch

No.	Course name	Theory	Practical	ECTS
1	Electronic Systems Simulators	1	2	

No.	Course name	Theory	Practical	ECTS
2	Engineering Analysis	2	2	6
3	Fundamentals of Control Engineering	2	2	6
4	Power Electronics	2	2	6
5	Real-Time Systems Design	2	2	6
6	Digital Signal Processing	2	2	6
7	Digital Controllers	2	2	6
8	Elective Subject	2	2	6
9	Summer Training	–	–	–

Fourth Year – Computer Electronics Branch

No.	Course name	Theory	Practical	ECTS
1	Intelligent Systems Modelling	2	2	6
2	Advanced Computer Technology	2	2	6
3	Computer Interfacing Circuit Design	2	2	6
4	Advanced Digital Electronics	2	2	6
5	Project Management	2	2	6
6	Computer Networks	2	2	6
7	Elective Subject	2	2	6
8	Graduation Project	–	4	4

Third Year – Computer Communication Networks Branch

No.	Course name	Theory	Practical	ECTS
1	Computer Network Simulators	1	2	4
2	Engineering Analysis	2	2	6
3	Fundamentals of Control Engineering	2	2	6
4	Fundamentals of Computer Networks	2	2	6
5	Real-Time Systems Design	2	2	6
6	Digital Signal Processing	2	2	6
7	Digital Communications	2	2	6
8	Elective Subject	2	2	6
9	Summer Training	–	–	–

Fourth Year – Computer Communication Networks Branch

No.	Course name	Theory	Practical	ECTS
1	Computer Network Protocols	2	2	6
2	Information Theory and Coding	2	2	6
3	Mobile Communication Systems	2	2	6
4	Computer and Network Security	2	2	6
5	Project Management	2	2	6
6	Multimedia Computing	2	2	6

No.	Course name	Theory	Practical	ECTS
7	Elective Subject	2	2	6
8	Graduation Project	–	4	4
9	English Language	1	–	2

12. Personal Development Planning

The approved academic and practical program gives students a basic body of knowledge that enables them to develop themselves continuously. Teaching staff also build students' self-reliance by encouraging them to look for problems within their field and work on solving them, under staff supervision and follow-up, providing the advice and guidance needed to establish sound foundations for personal development.

13. Admission Criteria (regulations for enrolment in the college or institute)

Admission criteria are set annually by specialized committees of the Ministry of Higher Education and Scientific Research. Students are admitted from:

1. Graduates of the scientific stream (applied and biological) with an average of no less than 77%.
2. Graduates of industrial secondary schools, for the top 10% in Iraq, from the following specializations: computer maintenance, communications, computer networks, computer assembly and maintenance, media technology.
3. Graduates of technical institutes.

14. Main Sources of Information about the Program

1. Specialized scientific books.
2. Academic research.
3. The internet.
4. The accumulated scientific expertise of the department's staff.
5. Feedback from the labour market.

Curriculum Skills Map

Please tick the boxes corresponding to the individual program learning outcomes subject to assessment

Year / Level	Course Code	Course Name	Core or Elective	Knowledge objectives				Program-specific skill objectives				Affective and value objectives				General and transferable skills (employability and personal development)			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
First Year	CET1101	Digital Principles		✓		✓			✓	✓		✓	✓	✓		✓			✓
	CET1102	Principles of Electrical Engineering		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
	CET1103	Mathematics I				✓	✓		✓		✓	✓			✓	✓		✓	✓
	CET1104	Engineering Drawing			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
	CET1105	Engineering Workshops		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
	MTU1002	English Language 1		✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓		✓
	CET1201	Digital Systems			✓		✓			✓	✓	✓		✓	✓	✓	✓	✓	
	CET1202	Electrical Circuits		✓		✓	✓	✓	✓			✓		✓			✓		✓
	CET1203	Programming Fundamentals		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
Second Year	CET2101	Engineering Mathematics		✓		✓			✓	✓		✓	✓	✓		✓			✓
	CET2102	Object-Oriented Programming		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
	CET2103	Computer Architecture and Applications				✓	✓		✓		✓	✓			✓	✓		✓	✓
	CET2104	Principles of Electronics			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
	CET2105	Fundamentals of Communications		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
		English Language 2		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
				✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓		✓
					✓		✓			✓	✓	✓		✓	✓	✓	✓	✓	
				✓		✓	✓	✓	✓			✓		✓			✓		✓
Third Year – Computer Electronics Branch		Computer Network Simulators			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
		Engineering Analysis		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
		Engineering Analysis		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
		Fundamentals of Control Engineering		✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓		✓
		Power Electronics			✓		✓			✓	✓	✓		✓	✓	✓	✓	✓	
		Real-Time Systems Design		✓		✓	✓	✓	✓			✓		✓			✓		✓
		Digital Signal Processing		✓		✓			✓	✓		✓	✓	✓		✓			✓
		Digital Controllers		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
		Elective Subject				✓	✓		✓		✓	✓			✓	✓		✓	✓
		Summer Training			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
Fourth Year – Computer Electronics Branch		Intelligent Systems Modelling		✓		✓	✓	✓	✓			✓		✓			✓		✓
		Advanced Computer Technology			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
		Computer Interfacing Circuit Design		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
		Advanced Digital Electronics		✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓		✓
		Project Management			✓		✓			✓	✓	✓		✓	✓	✓	✓	✓	
		Computer Networks		✓		✓	✓	✓	✓			✓		✓			✓		✓

Year / Level	Course Code	Course Name	Core or Elective	Knowledge objectives				Program-specific skill objectives				Affective and value objectives				General and transferable skills (employability and personal development)			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
		Elective Subject		✓		✓			✓	✓		✓	✓	✓		✓			✓
		Graduation Project		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
				✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
Third Year – Computer Communication Networks Branch		Computer Network Simulators				✓	✓		✓		✓	✓			✓	✓		✓	✓
		Engineering Analysis			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
		Fundamentals of Control Engineering		✓		✓			✓	✓		✓	✓	✓		✓			✓
		Fundamentals of Computer Networks		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	
		Real-Time Systems Design				✓	✓		✓		✓	✓			✓	✓		✓	✓
		Digital Signal Processing			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
		Digital Communications		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
		Elective Subject		✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓		✓
		Summer Training			✓		✓			✓	✓	✓		✓	✓	✓	✓	✓	
		English Language		✓	✓	✓		✓	✓	✓									
Fourth Year – Computer Communication Networks Branch		Computer Network Protocols		✓		✓	✓	✓	✓			✓		✓			✓		✓
		Information Theory and Coding			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
		Mobile Communication Systems		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
		Computer and Network Security		✓		✓	✓	✓	✓			✓		✓			✓		✓
		Project Management			✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓
		Multimedia Computing		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
		Elective Subject		✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓		✓
		Graduation Project			✓		✓				✓	✓	✓		✓	✓	✓		
		English Language		✓	✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	

Part Two: Course Descriptions – First and Second Stages

The course descriptions of the first and second stages are written in English in the original file (Module Description Forms). They are included in the following pages exactly as they appear in the original.

نموذج وصف المقرر

وصف المقرر

يوفر وصف المقرر هذا ايجاز مقتضبا لاهم خصائص المقرر ومخرجات التعليم المتوقعه من الطالب تحقيقها مبرهنا عما اذا قد حقق الاستفادة القصوى من فرص التعليم المتاحة ولا بد من الربط بينها وبين وصف البرنامج

المرحلة الاولى

مبادئ الرقمية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Digital Fundamentals		Module Delivery	
Module Type	Core		✓ Theory Lecture ✓ Lab Tutorial Practical Seminar	
Module Code	CET1101			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	1	Semester of Delivery	1	
Administering Department	CET	College	EETC	
Module Leader	Reem Jamal		e-mail	Reem84j@mtu.edu.iq
Module Leader's Acad. Title	lecturer		Module Leader's Qualification	Msc.
Module Tutor	Raya Majid Hameed		e-mail	Rayamajid89@mtu.edu.iq

Peer Reviewer Name	Asst. Prof. Alhamzah Taher Mohammed	e-mail	alhamza_tm@mtu.edu.iq
Scientific Committee Approval Date	29/10/2023	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	1. To be able to deal with the number systems and codes. 2. To understand the functionality of logic gates. 3. To have a skill to use the logic gates in designing logic circuit. 4. To have a skill to simplify the digital circuits. 5. To learn the simplification process, Boolean expression, Demorgans law, and Karnaugh map.. 6. To understand the principles for designing logic circuit. 7. To understand adder, subtractor, decoder, incoder, multiplexer, demultipleaer, and comparator circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize each type of number systems. 2. Identify the process of converting between number systems. 3. Summarize the types of logic gates. 4. Discuss the use of each gate. 5. Describe design of logic circuit by using logic gats. 6. Explain the simplification processes. 7. Explain Boolean expression and Demorgan's law. 8. Explain the Karnaugh map for different numbers of bits. 9. Discuss the design of logic circuit before and after simplification. 10. Explain the combinational logic circuit.

	11. Identify the adder, subtractor, decoder, encoder, multiplexer, demultiplexer, comparator circuits, and code conversion. 12. Identify the basic circuit elements and their applications
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. --Number systems - decimal, binary, octal, and hexadecimal number system, conversion, operation. [8 hrs] -Codes- excess-3, gray code, conversions, operations, complements [8 hrs] --Logic gates-NOT, AND, OR, NOR, NAND, XOR, XNOR. [5 hrs] --Logic simplification-Boolean theorem and Demorgans law. [10 hrs] --Karnaugh map-SOP, POS, and don't care. [10 hrs] --Arithmetic operations Part A- adder, parallel binary adder, subtractor, adder-subtractor . [10 hrs] --Arithmetic operations Part B- multiplexer, demultiplexer, decoder, encoder, comparator, and code conversion. [10 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب موزع على 15 اسبوع			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

رياضيات 1

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Mathematics I			Module Delivery	
Module Type	Suport or related learning activity			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CET1103				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		1	Semester of Delivery		
Administering Department		CET	College	EETC	
Module Leader	Hala A. Hashim		e-mail	hala.solomon@gmail.com	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		M.Sc.
Module Tutor	Haneen Jawad Abood		e-mail	haneenjavadabood1994@gmail.com	
Peer Reviewer Name		Assist prof. Alhamzah Taher	e-mail	alhamza_tm@mtu.edu.iq	
Scientific Committee Approval Date		29/10/2023	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	1. This course deals with differential and integral calculus. 2. To develop problem solving skills and understanding of preliminaries to differential calculus. 3. To understand differentiation, and differentiation methods. 4. To perform applications using the derivative. 5. To get a good grasp of Integrals, and Integration methods. 6. To understand the relationship between differentiation and integration.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize Line and Circle Equation and related evaluating formulas. 2. List the various terms associated with Functions and their Types. 3. Discuss the Limit and Continuity of a Function. 4. Describe the Definition of a derivative as a limit, Differentiation Rules, and various types of Function's Derivatives. 5. Identify when to use different Differentiation Methods. 6. Discuss the Curve Sketching process, and the L'Hospital's Rule. 7. Analyze Taylor and Maclaurin Series. 8. Identify the Indefinite Integrals. 9. Explain the Integration Methods u-substitution, By parts. 10. Explain the Integration Methods Involving Trigonometric Functions, Trigonometric substitution. 11. Explain the Integration Method Rational Functions by Partial Fractions. 12. Explain the Integration Methods Functions Involving Roots, and Functions Involving Quadratics. 13. Recognize the Definite Integral and its Application Area Under a Curve. 14. Discuss the Definite Integral Applications Arc Length, Average Value of a Function. 15. Discuss the Definite Integral Applications Areas Between Two Curves.
Indicative Contents المحتويات الإرشادية	<u>Part A - Preliminaries to differential calculus.</u> This part includes the Line and Circle Equation and related evaluating formulas and parameters. Furthermore, main mathematical Functions characteristics Domain, Range, Odd, Even, and their Types. Finally, The Limit and Continuity of a Function Laws, the behavior At Infinity, followed by important Special Limits, then the Continuity Conditions. [9 hrs] + Revision problem classes in weekly tutorials [3 hrs]

	<u>Part B – Differential calculus.</u> This part will take in details the first key subject of the semester, the Differentiation process from the prospective of Definition as limit, Differentiation Rules, and Function-Derivative Table. Which will be followed by Differentiation Methods namely the Implicit, Logarithmic, and The Chain Rule. Furthermore, four Applications of differentiation will be discussed the Curve Sketching, L'Hospital's Rule, and Taylor and Maclaurin Series. [12 hrs] + Revision problem classes in weekly tutorials [5 hrs] <u>Part C – Integral calculus.</u> This part discusses the second key subject the Integration of functions. Followed by dissecting the main Integration Methods, u-substitution, By parts, Involving Trigonometric Functions, Trigonometric substitution, Rational Functions by Partial Fractions, Functions Involving Roots, and Functions Involving Quadratics. Furthermore, it will consider six definite Integral applications, namely The Area Under a Curve, Arc Length, Average Value of a Function, and Areas Between two Curves. [22 hrs] + Revision problem classes in weekly tutorials [8 hrs]
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module will primarily focus on encouraging students to participate in the activities, as well as refining and developing their critical thinking skills. This will be achieved through lectures, tutorials, discussions, and grading activities.

Student Workload (SWL) الحمل الدراسي للطالب موزع على 15 اسبوع			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5,10	LO #1 - 9
	Assignments	2	20% (10)	5,10	LO # 1 - 4, LO # 6-9
	Projects / Lab.	N/A			
	Report	1	10% (10)		LO # 1 - 14
Summative assessment	Midterm Exam	2 hr	10% (10)	5	LO # 1-11
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Line and Circle Equation. Functions (Domain, Range, Odd, Even, Types.)
Week 2	The Limit and Continuity of a Function (Laws, At Infinity, Special Limits, Continuity Conditions.)
Week 3	Differentiation (Definition as limit, Differentiation Rules, Function-Derivative Table.)
Week 4	Differentiation Methods (Implicit, Logarithmic, The Chain Rule.)
Week 5	Midterm Exam
Week 6	Applications of Differentiation (Curve Sketching, L'Hospital's Rule.), Applications of Differentiation (Taylor and Maclaurin Series.)
Week 7	Introduction to Indefinite Integrals, Integration Methods (u-substitution, By parts.)
Week 8	Integration Methods (Involving Trigonometric Functions, Trigonometric substitution.)
Week 9	Integration Methods (Integration of Rational Functions by Partial Fractions.)
Week 10	Midterm Exam
Week 11	Integration Methods (Functions Involving Roots, Functions Involving Quadratics.)
Week 12	Midterm Exam
Week 13	Definite Integral and Applications (Definite Integral, Area Under a Curve.)
Week 14	Definite Integral and Applications (Arc Length, Average Value of a Function.)
Week 15	Definite Integral and Applications (Areas Between two Curves)
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Tutorial)		
المنهاج الاسبوعي الاضافي		
	Material Covered	
Each week, a question sheet related to the material presented in the theoretical lecture will be solved and debated.		
Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Joel R. Hass, Christopher E. Heil, Maurice D. Weir, "Thomas' Calculus: Early Transcendentals", Pearson Education, 14th Edition, (January 1, 2017), ISBN-13: 978-0134439020.	Yes
Recommended Texts	Anthony Croft, Robert Davison, "Mathematics for Engineers: A Modern Interactive Approach", Prentice Hall, 3rd edition, (January 1, 2008), ISBN-13: 978-0132051569.	No
Websites	https://www.khanacademy.org/math/differential-calculus	

الرسم الهندسي
نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Engineering Drawing		Module Delivery		
Module Type	Suport or related learning activity		☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	CET1104				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		1	Semester of Delivery		1
Administering Department		CET	College	EETC	
Module Leader	Rawaa dawood Salim		e-mail	rawaadawood@mtu.edu.iq	
Module Leader’s Acad. Title		Asst. lecturer	Module Leader’s Qualification		MSC.
Module Tutor	Asst. Prof. Dr. Oras Ahmed Shareef		e-mail	dr.oras@mtu.edu.iq	
Peer Reviewer Name		Dr. Mahmoud Shuker Mahmoud	e-mail	mahmoud.shukur@mtu.edu.iq	
Scientific Committee Approval Date		29/10/2023	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	8. To develop spatial visualization skills: Enhance your ability to visualize and mentally manipulate objects in three-dimensional space based on two-dimensional drawings. Strengthen your spatial awareness and improve your understanding of complex engineering design 9. Learn sketching and taking field dimensions. 10. Take data and transform it into graphic drawings. 11. Learn basic engineering drawing formats. 12. Learn basic AutoCAD skills. 13. Learn how to draw 2D drawings in AutoCAD.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	13. Identify the basic of AutoCAD 14. Explain Drawing settings 15. How to drawing: Point, Line, Multiline, P line, Spline, X line, Rectangle. 16. How to drawing: Donut, Polygon, Circle, Arc, Ellipse 17. List Modify Tools Identify: Erase, Undo, Redo, Explode, Move, Copy, Rotate, Mirror, 18. Identify Array, Align, Scale, Stretch, Lengthen, Trim, Extend, Break, Join, Chamfer, Fillet. 19. Explain Zoom, Pan. 20. How to assign: Dimension - Linear, Aligned, Radius, Diameter, Center Mark, Angle, Arc length, Continuous, Baseline, Tolerance, Dimension Space, Dimension Break, Jogged radius, Ordinate dimensions. 21. Dealing with: Text, Style, M text, Scale text, Spell, 22. Knowing the Hatching Objects. 23. Drawing 3d modeling. 24. Drawing the Exercises .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. -- AutoCAD Software , drawing settings, Drawing Tools, Line, Circle, Arc, Ellipse, Donut, Polygon, Rectangle, Point, Multiline, P line, Spline, X line. [20 hrs.]

	--Modify Tools Erase, Undo, Redo, Explode, Move, Copy, Rotate, Mirror, Array, Align, Scale, Stretch, Lengthen, Trim, Extend, Break, Join, Chamfer, Fillet. [4 hrs.] --Display Control Zoom, Pan, Redraw, Clean Screen. [4 hrs.] --Dimension - Linear, Aligned, Radius, Diameter, Center Mark, Angle, Arc length, Continuous, Baseline, Tolerance, Dimension Space, Dimension Break, Jogged radius, Ordinate dimensions. [4 hrs.] --Hatching Objects [4hrs] --Text, Style, M text, Scale text, Spell, [4 hrs.] --3D MODELLING, Convert 2D to 3D, Solid Editing [20 hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Familiarize with the Software: Before diving into engineering drawing concepts, it's important to become familiar with the AutoCAD software. This includes understanding the user interface, basic tools, and commands. with introductory tutorials or online resources that cover the basics of AutoCAD. 2. Step-by-Step Instructions: Break down complex drawing tasks into smaller, manageable steps. Provide step-by-step instructions and demonstrations using AutoCAD, showing students how to execute each step effectively. This approach helps students understand the workflow and build their confidence. 3. Visual Aids and Examples: Utilize visual aids, such as slides, diagrams, and examples, to reinforce concepts. Show real-world engineering drawings and explain how they were created using AutoCAD. Visual representations can enhance understanding and make abstract concepts more tangible. 4. Group Activities and Collaboration: Promote collaboration among students by assigning group activities or projects. This allows them to work together, share knowledge, and learn from one another. Encourage students to discuss their approaches and problem-solving techniques related to engineering drawing in AutoCAD. 5. Provide Feedback: Regularly provide constructive feedback on students' drawings. Highlight areas for improvement, suggest alternative methods, and point out common mistakes. This feedback loop is crucial for students to refine their skills and develop a deeper understanding of engineering drawing principles.

Student Workload (SWL)			
الحمل الدراسي للطالب موزع على 15 اسبوع			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introducing of Engineering Drawing
Week 2	Drawing settings of AutoCAD
Week 3	Drawing Tools Point, Line ,Multiline, P line, Spline, X line.
Week 4	Rectangle, Donut, Polygon
Week 5	Circle, Arc, Ellipse
Week 6	Modify Tools Erase, Undo, Redo, Explode, Move, Copy, Rotate, Mirror, Array, Align, Scale, Stretch, Lengthen, Trim, Extend, Break, Join, Chamfer, Fillet. Display Control Zoom, Pan, Redraw, Clean Screen.

Week 7	Mid exam
Week 8	Dimension - Linear, Aligned, Radius, Diameter, Center Mark, Angle, Arc length, Continuous, Baseline, Tolerance, Dimension Space, Dimension Break, Jogged radius, Ordinate dimensions
Week 9	Annotation Tools Text, Style, M text, Scale text, Spell
Week 10	Hatching Objects
Week 11,12	3D modeling
Week13	Convert 2D To 3D
Week 14	Solid Editing
Week 15	Exercises drawing
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Introduction to AutoCAD 2010 By Alf Yarwood Copyright 2009	Yes
Recommended Texts	An Introduction to Autodesk Inventor 2010 and AutoCAD 2010 Unbnd Edition by Randy Shih	No
Websites		

الورش الهندسية

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Engineering Workshops		Module Delivery		
Module Type	Suport or related learning activity		☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	CET1105				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1	Semester of Delivery		1	
Administering Department	CET	College	EETC		
Module Leader	Raya Majid Hameed		e-mail	Rayamajid89@mtu.edu.iq	
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	MSc	
Module Tutor	Reem Jamal Abbass		e-mail	Reem84j@mtu.edu.iq	
Peer Reviewer Name	Dr. Mahmoud Shuker Mahmoud		e-mail	mahmoud.shukur@mtu.edu.iq	
Scientific Committee Approval Date	29/10/2023	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	The objective of studying Electrical, Electronic, and Mechanical workshops is to enable students to acquire the necessary skills and knowledge to deal with electrical, electronic, and mechanical systems and devices. This subject aims to teach students how to diagnose faults, repair systems, and perform maintenance on these systems and devices. By studying Electrical, Electronic, and Mechanical workshops, students can understand the principles of electricity, electronics, and mechanics, as well as how to read engineering diagrams and use various tools and equipment to work on them. They also learn how to diagnose faults, repair them, and properly maintain different devices in a safe manner. In general, studying this subject aims to prepare students to become skilled technicians in the field of electrical, electronic, and mechanical engineering. They can work in areas such as industrial maintenance and repair, electrical and electronic installations, automation and robotics, medical devices, and other modern technologies
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The learning outcomes of studying Electrical, Electronic, and Mechanical workshops include: 1. Acquisition of diagnostic and repair skills: Students learn how to analyze problems, identify faults in electrical, electronic, and mechanical systems, and implement appropriate repair procedures. 2. Understanding of electrical, electronic, and mechanical principles: Students gain knowledge of engineering and technical fundamentals related to electricity, electronics, and mechanics, including reading engineering diagrams and practical understanding of circuits, electronic devices, and mechanical components. 3. Development of practical work skills: Students have the opportunity to learn hands-on and practice using various tools and equipment used in electrical, electronic, and mechanical workshops. 4. Ability to perform preventive maintenance: Students learn how to maintain systems and devices and carry out preventive maintenance to ensure proper and sustainable performance. 5. Enhancement of teamwork and communication skills: Studying Electrical, Electronic, and Mechanical workshops promotes collaboration among students and the ability to work as a team in problem-solving and executing practical projects. 6. Knowledge and Understanding: a. Demonstrate a comprehensive understanding of the principles and concepts related to electrical and mechanical workshop operations. b. Identify and explain the safety measures and regulations applicable to electrical and mechanical workshops. 7. Describe the different tools, machines, and materials used in electrical and mechanical workshops. 8. Practical Skills: a. Apply safe working practices and use appropriate personal protective equipment (PPE) in electrical and mechanical workshop

	environments. b. Demonstrate proficiency in using various tools and equipment for turning, filing, drilling, welding, and assembly. 9. Perform practical tasks related to electrical and mechanical workshop operations accurately and efficiently. d. Apply problem-solving techniques to troubleshoot and rectify common issues encountered in electrical and mechanical workshop activities. 10. Critical Thinking and Analysis: a. Analyze and evaluate different turning processes, instrumentation measures, and cutting tools used in the workshop. b. Assess the quality of filing processes and choose appropriate rasps and tools for different filing tasks. 11. Evaluate the drilling processes and select suitable drilling tools based on specific requirements. d. Analyze welding processes, including oxy-acetylene and arc welding, and determine safety precautions and best practices. 12. Communication and Collaboration: a. Effectively communicate and collaborate with peers in group projects and workshop activities. b. Present findings, results, and recommendations related to electrical and mechanical workshop tasks in a clear and concise manner. 13. Professional and Ethical Responsibility: a. Demonstrate ethical behavior and responsibility in adhering to safety regulations, environmental considerations, and industry standards in electrical and mechanical workshop practices 14. Overall, studying this subject prepares students to enter the job market in various technical and engineering fields, such as industrial maintenance, electrical and electronic installations, automation and robotics, medical devices, and other modern technologies.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Electronic workshop</u> In this part, we will learn how to check the elements in the electrical circuits, what is the way each element works, how to check it, and find out what is damaged and replace it. [14 hrs.] We will also talk about conductors and semiconductors [10 hrs.] <u>Part B – Electrical workshop</u> 1. Principles of Industrial Safety in Electrical Workshops [4 hrs.] 2. Tools Used in Electrical Workshops [5 hrs.]. 3. Power Sources and Characteristics [5 hrs.] 4. Multimeter and Wire Size Measurement [5 hrs.] <u>Part C – Mechanical workshop</u> 1. Different Types of Welding Irons and Spot Welding [4 hrs.] 2. Electric Transformers [5 hrs.] 3. Electric Circuits and Transformer Operation [5 hrs.]. 4. Types of Electric Motors [5 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 labs, 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 موزع على 15 اسبوع

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 11	LO #1-4, LO #8-11
	Assignments	1	5% (10)	12	LO # 1-14
	Projects / Lab.	2	20% (10)	Continuous	ALL
	Report	1	5% (10)	13	ALL
Summative assessment	Midterm Exam	4 hr	10% (10)	8	LO # 1-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي للمختبر

Electronic, Electrical , Mechanical Workshops

	Material Covered
Week 1,2	❖ Use different measuring devices in the workshop ❖ 1- Principles of Industrial Safety in Electrical Workshops. 2- Different Types of Welding Irons (with different capacities) and Spot Welding
Week 3,4	❖ How to use irons, types of soldering used, and how to use absorbent soldering irons ❖ 1- Electric Circuits and Transformer Operation. 2- Electrical Installations and Types of Wiring (Surface and Concealed)
Week 5,6,7	❖ Electronic components (resistor , inductors , capacitors) ❖ 1- ONE LAMP CONTROLLED BY ONE SWITCH 2- Parallel Wiring of Two Lamps with a Switch and Socket
Week 8	❖ Midterm Exam
Week 9 ,10	Electronic components(resistor , inductors , capacitors) Drawing a Staircase Lamp (Two-Way Switch) Circuit
Week 11,12	❖ Electronic components (Battery , jumper, fuse, push button, switch, rotary switch) ❖ 1-Introduction to Workshop Safety 2- Turning Process and Instrumentation Measures
Week 13,14	❖ Electronic components (Diode , Transistor, Transformer) ❖ 1- Cutting Tools 2-Practical Exercise - Horizontal Turning
Week 15	❖ using bread board and Vero board, Building a Circuit on Breadboard, Building a Circuit on Vero board ❖ 1- Turning Different Shapes 2- Introduction to Filing Process (practical Exercise)
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the
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		Library?
Required Texts	1-Encyclopedia of Electronic Components Volume 1 (Charles Platt). 2- J. Smith and E. Johnson, "Electrical Engineering Workshop:Theory and Practice	Yes / online
Recommended Texts		No
Websites		

اللغة الانكليزية 1

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	English Language I			Module Delivery	
Module Type	Basic learning activities			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MTU1002				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Delivery		1
Administering Department		CET	College	EETC	
Module Leader	Oras Ahmed shareef		e-mail	dr.oras@mtu.edu.iq	
Module Leader’s Acad. Title		Asst. Professor	Module Leader’s Qualification		PhD
Module Tutor	Rawaa Dawood Salim		e-mail	rawaadawood@mtu.edu.iq	
Peer Reviewer Name		Dr. Osama Abbas Hussein	e-mail	Osama.abbas@mtu.edu.iq	
Scientific Committee Approval Date		29/10/2023	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	1. know students with essential information in the English language in association with reading, writing and speaking skills, and knowing more English vocabulary. 2. To understand pronouns, questions and short answers, tenses (present, past and future), adjective, adverb, prepositions of place, punctuation marks and practicing writing. 3. This module works towards enhancing students' English language competencies along with their technical or professional knowledge. 4. Enhance students' communication skills in English can result in better job opportunities in the future
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will have the ability to: 1. Know the English skills of reading, and writing. 2. Recognize other English language skills such as: grammar, vocabulary. 3. Understand and appreciate the importance of grammar aspects and vocabulary to increase the ability of communicating ideas about the English language. 4. Understand pronouns, questions and short answers. 5. Understand tenses present, past and future. 6. Understand adjectives, adverbs, prepositions of place, and punctuation marks. 7. Practicing reading and writing. 8. Enhance students' communication skills in English.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: Parts of Sentence. Pronoun, question and short answer, adjective, adverb, prepositions of place. [14 hrs] Part B: Tenses Past Tense, Present Tense, and Future Tense. [8 hrs] Part C: Reading and Writing Punctuation marks, and practicing writing [8 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Use didactic questioning through questions to determine student understanding of the material. - Writing an assignment and report that encourages students to clarify and organize their thinking and independently research and present on a topic.
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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment	Quizzes	2	20% (20)	5, 10	LO # 1-3 , 4- 7
	Assignments	2	10% (10)	Cont.	LO # 1- 7
	Projects / Lab.				
	Report	1	10% (10)	14	1-8
Summative assessment	Midterm Exam	2 hours	10% (10)	8	LO # 1-5
	Final Exam	3 hours	50% (50)	16	All
Total assessment		100% (100 Marks)			

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
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	Material Covered
Week 1	Unit 1: Grammar: Types of Pronouns Vocabulary: Everyday objects, Plurals Reading and Writing Skill
Week 2	Unit 2: Grammar: Pronoun, Questions Vocabulary: Countries, Adjective and Nouns Reading and Writing Skill
Week 3	Unit 3: Grammar: Negatives, Questions and short answer Vocabulary: Jobs, Personal Information Reading and Writing Skill
Week 4	Unit 4: Grammar: Possessive adjectives, Possessive 's, common verbs (1): has/have, love, like, work. Vocabulary: The family, The alphabet Reading and Writing Skill
Week 5	Unit 5: Present Simple, Questions Vocabulary: Sport, Food and Drink, Verb phrase, Languages and nationalities, Adjective + noun. Reading and Writing Skill
Week 6	Unit 6: Grammar: Adverbs of frequency (sometimes, always, never), Questions and Negatives. Vocabulary: The Time, Word that go together Reading and Writing Skill
Week 7	Unit 7: Grammar: Question words, Pronouns (subject, object, possessive), that and this. Vocabulary: Adjectives Reading and Writing Skill Grammar: There is/There are, Prepositions of place Vocabulary: Rooms and furniture, Place of town Reading and Writing Skill
Week 8	Mid exam
Week 9	Unit 9: Grammar: Past Simple Tense - regular verbs Vocabulary: years, have, do, go Reading and Writing Skill
Week 10	Unit 10: Grammar: Past Simple Tense - irregular verbs, Questions and Negatives, Time expression, ago. Vocabulary: Weekend activities, Sport and leisure Reading and Writing Skill
Week 11	Unit 11: Grammar: can/can't, Adverbs, Request and offers. Vocabulary: Verb + noun, Adjective + noun, Opposite adjective Reading and Writing Skill
Week 12	Unit 12: Grammar: Would like, some and any, like and would like Vocabulary: Places and town, In cafe Reading and Writing Skill
Week 13	Unit 13: Grammar: Present Continuous Tense Vocabulary: Colors, Clothes, Opposite verbs Reading and Writing Skill
Week 14	Unit 14: Grammar: Future Tense, going to

	Vocabulary: Forms of transport Reading and Writing Skill
Week 15	Grammar: Punctuation Marks, Grammar revision Vocabulary: Vocabulary revision Reading and Writing Skill
Week 16	Preparatory week before the final Exam
Learning and Teaching Resources مصادر التعلم والتدريس	
	Text Available in the Library?
Required Texts	New Headway Plus/ Beginner, John and Liz Soars, Oxford University Press No
Recommended Texts	Understanding and Using English Grammar, 5 th Edition, Betty S. Azar Stacy A. Hagen. No
Websites	

الأنظمة الرقمية نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Digital Systems		Module Delivery		
Module Type	Core		✔ Theory Lecture ✔ Lab Tutorial Practical Seminar		
Module Code	CET1201				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	Semester of Delivery		2
Administering Department		CET	College	EETC	
Module Leader	Reem Jamal		e-mail	Reem84j@mtu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Msc.
Module Tutor	Raya Majid Hameed		e-mail	Rayamajid89@mtu.edu.iq	
Peer Reviewer Name		Assist prof. Alhamzah Taher	e-mail	alhamza_tm@mtu.edu.iq	
Scientific Committee Approval Date		29/10/2023	Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CET1101	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the flip flop operation. 2. To understand the latches operation. 3. This course deals with the designing of logic systems. 4. To understand the principles of counter circuits. 5. To understand the shift registers. 6. To have a skill to design ADC and DAC.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discuss the flip-flops. 2. Recognize the differences between flip-flops and latches. 3. List the applications of flip-flops. 4. Summarize what is meant by the logic systems. 5. Explain the counter circuits and discuss the difference between synchronous and asynchronous counter. 6. Discuss the types of asynchronous counter circuits. 7. Discuss the types of synchronous circuit. 8. Identify the shift registers. 9. Discuss the operations of each types of shift registers. 10. Discuss the shift register counter. 11. Explain the principles of ADC and DAC. 12. Explain the design for each type of ADC and DAC.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. --Flip-Flops – SR latch, T latch, D latch. [10 hrs] --Flip-Flops- JK FF, edge triggered, and conversion from one type to another. [10 hrs] --Counters- Asynchronous, synchronous counters, Decade, up-down counters, and counter decoding. [15 hrs] --Shift-registers - serial in/serial out, serial in/parallel out, parallel in/serial out, parallel in/parallel out, bidirectional , shift register counter (Johnson counter, Ring counter)) [10 hrs] --Multivibrators- definition, astable, bistable, mono-stable, and 555 timer [5 hrs]

	--A/D convertors modeling -flash ADC, tacking ADC, slope ADC ,successive approximation ADC, digital ramp ADC, delta sigma ADC. [5 hrs] --D/A convertors modeling -R/2R DAC, R/2nR DAC. [5 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطلاب موزعة على 15 اسبوع			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Flip-flops and latches(SR latch, D latch)
Week 2	Flip-Flops(T-latch, JK)
Week 3	Flip-Flops(edge triggered, master-slave)
Week 4	Flip-flops (conversion from one type to another, flip flop applications)
Week 5	Asynchronous counter
Week 6	Synchronous counter
Week 7	Decade, up-down counter
Week 8	Cascade counter, Counter decoding
Week 9	Shift-registers (serial in/serial out, serial in/parallel out, parallel in/serial out, parallel in/parallel out)
Week 10	Midterm exam
Week 11	Shift-registers (bidirectional , shift register counter), Johnson counter, Ring counter
Week 12	Multivibrators (definition, astable, bistable)
Week 13	Multivibrators (monostable, 555 timer)
Week 14	A/D convertors (flash ADC, tracking ADC, slope ADC ,successive approximation ADC, digital ramp ADC, delta sigma ADC)
Week 15	D/A convertors (R/2R DAC, R/2 ⁿ R DAC)
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	SR ff, T ff
Week 2	D ff, JK ff
Week 3	Master-slave ff
Week 4	asynchronous counter (2-bit,3-bit)
Week 5	asynchronous counter(4-bit, modulus counter)
Week 6	synchronous counter (2-bit, 3-bit)
Week 7	synchronous counter (decade, up-down counter)
Week 8	Cascade counter, counter decoding

Week 9	Serial in-serial out, parallel in-parallel out shift register
Week 10	Serial in-parallel out, parallel in- serial out SR
Week 11	Johnson counter, ring counter
Week 12	multivibrator
Week 13	Analogue to digital convertor
Week 14	Digital to analogue convertor

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Digital Fundamentals by Floyed	Yes
Recommended Texts	Digital circuit analysis and design with Simulink modeling by Steven T. Karris	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

دوائر كهربائية

Module Information				
معلومات المادة الدراسية				
Module Title	Electrical Circuits		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	CET1202			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level		1		
Administering Department		CET	College	EETC
Module Leader	Omar Ibrahim Mustafa		e-mail	Omar-ibrahim@mtu.edu.iq
Module Leader's Acad. Title		lecturer	Module Leader's Qualification	
Module Tutor		Rawaa Abdulridha Kadhim	e-mail	rawaa84ha@mtu.edu.iq
Peer Reviewer Name		Assist prof. Alhamzah Taher	e-mail	alhamza_tm@yahoo.com
Scientific Committee Approval Date		29/10/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electrical Engineering Fundamentals	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	7. To develop problem solving skills and understanding of circuit theory through the application of techniques Alternating Waveforms (A.C). 8. To understand voltage, current and power from a (A.C) circuit. 9. Deals with the basic concept of electrical (A.C) circuits. 10. This is the basic subject for all electrical and electronic circuits. 11. To understand Kirchhoff's current and voltage Laws problems. 12. To perform Thevenin's Norton's Theorem.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	13. Recognize how electricity works in electrical circuits. 14. List the various terms associated with electrical circuits. 15. Summarize what is meant by a basic electric circuit. 16. Discuss the reaction and involvement of atoms in electric circuits. 17. Describe electrical power, charge, and current. 18. Define Ohm's law. 19. Identify the basic circuit elements and their applications. 20. Discuss the operations of AC circuits in an electric circuit. 21. Discuss the various properties of resistors. 22. Explain the two Kirchhoff's laws used in circuit analysis. 23. Identify the basic circuit elements, Maximum Power Transfer Theorem and Superposition's method 24. Describe Thevenin's theorem and Norton's theorem and how they work IN AC Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Definition: -</u> The Alternating Current Network Types of Alternating Waveforms, Generation of Alternating Current, and Definitions related to Alternating Waveforms The Alternating Current Network. Ohms law, The Mean Values, The Effective Vales, The Vector Diagram (40 hr) <u>Circuit Theory in (A.C)</u> Ac circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Series Ac Circuits (R L C), Reviews for Complex Numbers and their mathematical operations (24 hr) <u>Fundamentals</u> Resistive networks, voltage and current sources, Thevenin and Norton equivalent

	circuits, Conversion Delta To Star Connection, Superposition Method, Maximum Power Transfer Theorem, Superposition's method (24 hr)
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This Course Specification prepares the student to be able to realize basic parameters in electrical engineering and how to link these parameters. It also makes him capable of solving electrical circuits using different theorems in addition to utilizing the dc theorems to solve ac circuits. Moreover, it goes into configuring 3 phase circuits, vectors, phase and total powers and to have the student being capable of linking electricity to magnetism

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.733
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	8	LO #1-4
	Assignments	1	5% (5)	14	LO # 1- 11
	Projects / Lab.	10	20% (10)	Continuous	
	Report	10	10% (10)	12	LO # 1-12
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-9
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Alternating Current Network Types of Alternating Waveforms, Generation of Alternating Current, and Definitions related to Alternating Waveforms
Week 2	The Mean Values of Current and Voltage
Week 3	The Effective Vales of Current and Voltage
Week 4	Circuit Elements in the Phasor Domain
Week 5	The Vector Diagram
Week 6	Reviews for Complex Numbers and there mathematical operations
Week 7	Series Ac Circuits (R L C) ,Parallel Ac Circuits(R L C)
Week 8	Mid exam
Week 9	The Instantaneous Power and Mean Power of AC, Reactive and Apparent Power
Week 10	Using Kirchhoff's law's to solve AC circuits
Week 11	Using Superposition's method to solve AC circuits
Week 12	Using Thevenin's theorem, to solve AC circuits
Week 13	Using Norton's theorem to solve AC circuits
Week 14	3- Phase Current, 3- Phase System, Y- Connection Delta Connection.
Week 15	Transformers , The hysteresis losses , The eddy current losses

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: How to use measuring devices for alternating circuits (A.C) Osliscope, voltmeter and ammeter
Week 2	Lab 2: how to measure Alternating Waveforms
Week 3	Lab 3: Apply Ohm's Law
Week 4	Lab 4: Series Ac Circuits (R C)
Week 5	Lab 5: Series Ac Circuits (R L)
Week 6	Lab 6: Series Ac Circuits (R L C)
Week 7	Lab 7: Apply Kirchhoff's law to measure voltages
Week 8	Lab 8: Apply Kirchhoff's law to measure current

Learning and Teaching Resources			
مصادر التعلم والتدريس			
	Text	Available in the Library?	
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes	
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No	
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering		

Module Information			
معلومات المادة الدراسية			
Module Title	Programming Essentials		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CET1203		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	Semester of Delivery	
Administering Department	CET	College	EETC

Module Leader	Dr. Loay Al-Saffar	e-mail	Loay.alsaffar@mtu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Dr. Hisham Raad Jafer	e-mail	hisham.merzeh@mtu.edu.iq
Peer Reviewer Name	Dr. Osama Abbas Hussein	e-mail	osama.abbas@mtu.edu.iq
Scientific Committee Approval Date	29/10/2023	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	1. To develop problem solving skills and understanding of programming principles. 2. To understand the logic behind programming. 3. This course include using C++ as a programming language. 4. This course include algorithm design. 5. To understand how a programmer should prepare his work and think logically. 6. To perform programming project using control statements, functions, and to deal with the data stored in an array or file.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Use of algorithms (Flowchart specifically). 2. Explain how the program is written using C++ Programming language. 3. Define and use of variables (Data types, Declaration of variables). 4. Use of operators and its precedence (Assignment, Arithmetic operators, Relational and Logical operators, Bitwise Operators, Increment and decrement, Cast operator, and Conditional operator). 5. Making Decisions (use of: if, if-else, and switch statements) and draw of Flowchart of if-else statement. 6. Use of Loops (for, while, do-while), and use of break and continue statements with loops, and draw of Flowchart of loops. 7. Use of Arrays (one and two dimensional). 8. Use of Functions (Built-in function functions (Library functions), and User-Defined functions).

	9. Use of arguments passed by value and by reference, and use of Local and global variables. 10. Use of Character sequences and string handling. 11. Handling and processing text files in C++.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - -Introduction to computers and programming. Types of programs (Applications and Systems). Programming languages (Machine, Assembly, and High-level language). Introduction to Compilers, Interpreters, object file, and executable file. Introduction to C++ with a simple program implementation. Types of programming errors, Program development life cycle, Algorithms - Flowchart - . Header files, Standard Input/output instructions, Comments in C++. [15 hrs] -- Variables, Data Types, Declaration of variables, Constants, Statements. Operators (Assignment, Arithmetic operators, Relational and Logical operators, Bitwise Operators, Increment and decrement, Cast operator, and Conditional operator), Precedence of operators. [5hrs] -- Making Decisions (if, if-else statements), Flowchart of if-else statement. Making Decisions (switch statement), using break statement with switch statement, Flowchart of switch statement. Loops (for, while, do-while), using break and continue statements with loops, Flowchart of loops. [1 0hrs] - -Arrays (One dimensional and Two Dimensional) [5hrs] -- Functions (Built-in function functions (Library functions), and User-Defined functions), Function prototype (Declaration), Function call, Passing arguments to a function, return statement, Value-Returning vs. Void (Non Value Returning) functions, Function with no argument and no return value, Function with no argument but return value, Function with argument but no return value, Function with argument and return value. Arguments passed by value and by reference, Recursion, Local and global variables. [15hrs] -- Character sequences and string handling, ASCII table. [5hrs] - -Handling and processing text files in C++ [5hrs]

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 learning and developing their skills in programming and logic thinking, 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 lab experiments involving assignments and project design activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	6	LO #1- 6
	Assignments	1	10% (10)	Continuous	LO #1-10
	Projects / Lab.	1	10% (10)	Continuous	LO #1-11
	Report	1	5% (10)	Continuous	LO #1, 11
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1 to 7
	Final Exam	4hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Introduction (History of computers). Types of programs (Applications and Systems). Programming languages (Machine, Assembly, and High-level language).
Week 2	Introduction to Compilers, Interpreters, object file, and executable file. Types of programming errors, program development life cycle.
Week 3	Algorithms (Flowchart).
Week 4	Variables, Data Types, Declaration of variables, Constants, Statements, and Operators.
Week 5	Making Decisions (if, if-else statements), flowchart of if-else statement.
Week 6	Making Decisions (switch statement), using break statement with switch statement, flowchart of switch statement.
Week 7	Mid-term Exam
Week 8	Loops (while, do-while), using break and continue statements with loops, flowchart of loops.
Week 9	Arrays (One dimensional)
Week 10	Arrays (Two Dimensional)
Week 11	Functions: Built-in function functions (Library functions), and User-Defined functions), Function prototype (Declaration), function call, Passing arguments to a function, return statement, Local and global variables.
Week 12	Functions (Value-Returning) vs. Void (Non Value Returning) functions, function with no argument and no return value, function with no argument but return value, function with argument but no return value, function with argument and return value. Arguments passed by value and by reference.
Week 13	Character sequences and string handling, ASCII table.
Week 14	Handling and processing text files in C++
Week 15	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الأسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to C++ with a simple program implementation. Header files, Standard Input/output instructions, Comments in C++.

Week 2	Lab 2: Variables and Operators (Assignment, Arithmetic operators, Relational and Logical operators, Bitwise Operators, Increment and decrement, Cast operator, and Conditional operator), Precedence of operators.
Week 3	Lab 3: Making Decisions (if, if-else).
Week 4	Lab 4: Making Decisions (switch statements).
Week 5	Lab 5: Loops (for)
Week 6	Lab 6: Loops (while, and do-while)
Week 7	Lab 7: Arrays (1D)
Week 8	Lab 8: Arrays (2D)
Week 9	Lab 9: Functions
Week 10	Lab 10: Function types according to whether it take arguments and/or return a value or not.
Week 11	Lab 11: Character sequences and string handling.
Week 12	Lab 12: Text files

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	C++ How to Program, 6th Edition 2007 By P. J. Deitel - Deitel & Associates, Inc., H. M. Deitel - Deitel & Associates, Inc.	Yes
Recommended Texts	Starting Out with Programming Logic and Design (What's New in Computer Science), 5th Edition 2018 By Tony Gaddis	No
Websites	https://www.geeksforschools.org/c-plus-plus	

رياضيات 2

Module Information					
معلومات المادة الدراسية					
Module Title	Mathematics II		Module Delivery		
Module Type	Suport or related learning activity		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	CET1204				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		1			Semester of Delivery
Administering Department		CET	College	EETC	
Module Leader	Hala A. Hashim		e-mail	hala.solomon@gmail.com	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		M.Sc.
Module Tutor	Haneen Jawad Abood		e-mail	haneenjawadabood1994@gmail.com	
Peer Reviewer Name		Assist prof. Alhamzah Taher	e-mail	alhamza_tm@yahoo.com	
Scientific Committee Approval Date		29/10/2023	Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CET 1103	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	7. To Understand concepts of vectors and vector operations. 8. To Understand concepts of linear algebra. 9. To get a grasp of various methods to solve systems of linear equations. 10. To Compute linear transformations. 11. To be able to determine Eigenvalues and Eigenvectors.

	12. To perform matrix diagonalization.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	16. Recognize Vectors concepts, notation and Operations. 17. Discuss dot product, cross product, Orthogonal and orthonormal vectors. 18. Discuss the terms Diagonal, Triangular, Symmetric, Square Matrix, Transpose of a Matrix. 19. Describe the matrix operations {addition, subtraction, scalar multiplication, multiplication}. 20. Identify Determinant and Inverse for Nonsingular matrices. 21. Discuss aspects about System of Linear Equations (Linear Equations, Linear Equations Solution, Matrix equations.). 22. Identify Row operations, row-echelon form “triangular”, Rank of a Matrix, reduced row-echelon form, Augmented Matrix. 23. Discuss Gaussian elimination. 24. Explain Gauss–Jordan elimination and Solving Systems with Inverses. 25. Explain Cramer's Rule. 26. Explain Linear Combinations of Vector, span. 27. Explain Linear Dependence and Independence, Basis and Dimension, Rank of a Matrix. 28. Recognize Linear Transformations. 29. Discuss Polynomials of Matrices, Characteristic Polynomial, Cayley–Hamilton Theorem. 30. Discuss Eigenvalues and Eigenvectors, Diagonalizing Matrices.
Indicative Contents المحتويات الإرشادية	<u>Part A - Vectors.</u> This part includes Vectors definition, notation {Ordered set, Matrix, Unit vector}, Magnitude, Unit, Zero, negative, Direction, Operations on vectors {addition, subtraction, scalar multiplication}. In addition to Operations on vectors {dot product, cross product}, Orthogonal, orthonormal vectors. [6 hrs] + Revision problem classes in weekly tutorials [2 hrs] <u>Part B – Matrices.</u> This part will take in details Matrices (Matrix, Diagonal, Triangular, Symmetric, Square Matrix, Transpose of a Matrix.), in addition to operations {addition, subtraction, scalar multiplication, multiplication}. Furthermore, Determinant, Inverse (Nonsingular). [10 hrs] + Revision problem classes in weekly tutorials [3 hrs] <u>Part C – System of Linear Equations.</u> This part discusses System of Linear Equations (Linear Equations, Linear Equations Solution, Matrix equations.), in addition to Row operations, row-echelon form “triangular”, Rank of a Matrix, reduced row-echelon form, Augmented Matrix. Furthermore, Gaussian elimination, Gauss–Jordan elimination, Solving Systems with Inverses, Cramer's Rule is described. [14 hrs] + Revision problem classes in weekly

	tutorials [4 hrs]
	Part D – Vector Spaces and Diagonalization. This part discusses Vector Spaces (Linear Combinations of Vector, span, Linear Dependence and Independence, Basis and Dimension, Rank of a Matrix, Linear Transformations. Furthermore, Diagonalization (Polynomials of Matrices, Characteristic Polynomial, Cayley–Hamilton Theorem, Eigenvalues and Eigenvectors, Diagonalizing Matrices.) [15 hrs] + Revision problem classes in weekly tutorials [5 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module will primarily focus on encouraging students to participate in the activities, as well as refining and developing their critical thinking skills. This will be achieved through lectures, tutorials, discussions, and grading activities.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%	5,10	LO #1 - 4, LO # 6-9
	Assignments	2	15%	5,10	LO # 1 - 14, LO # 6-9
	Projects / Lab.	N/A			
	Report	5	5%	Cont.	LO # 1-15
Summative assessment	Midterm Exam	2 hr	10% (10)	5	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
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المناهج الاسبوعي النظري

	Material Covered
Week 1	Vectors (Definition, notation {Ordered set, Matrix, Unit vector}, Magnitude, Unit, Zero, negative, Direction, Operations on vectors {addition, subtraction, scalar multiplication}.)
Week 2	Vectors (Operations on vectors {dot product, cross product}, Orthogonal, orthonormal vectors.)
Week 3	Matrices (Matrix, Diagonal, Triangular, Symmetric, Square Matrix, Transpose of a Matrix.)
Week 4	Matrices (operations {addition, subtraction, scalar multiplication, multiplication}). Matrices (Determinant, Inverse (Nonsingular))
Week 5	Midterm Exam
Week 6	System of Linear Equations (Linear Equations, Linear Equations Solution, Matrix equations.)
Week 7	System of Linear Equations (Row operations, row-echelon form “triangular”, Rank of a Matrix, reduced row-echelon form, Augmented Matrix.)
Week 8	System of Linear Equations (Gaussian elimination.), System of Linear Equations (Gauss–Jordan elimination, Solving Systems with Inverses.)
Week 9	System of Linear Equations (Cramer's Rule.)
Week 10	Midterm Exam
Week 11	Vector Spaces (Linear Combinations of Vector, span.). Vector Spaces (Linear Transformations.)
Week 12	Midterm Exam
Week 13	Vector Spaces (Linear Dependence and Independence, Basis and Dimension, Rank of a Matrix.)
Week 14	Diagonalization (Polynomials of Matrices, Characteristic Polynomial, Cayley–Hamilton Theorem.)
Week 15	Diagonalization (Eigenvalues and Eigenvectors, Diagonalizing Matrices.)
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Tutorial)	
المنهاج الاسبوعي الاضافي	
	Material Covered
Each week, a question sheet related to the material presented in the theoretical lecture will be solved and debated.	

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	David C. Lay, Judi J. McDonald, Steven R. Lay, "Linear Algebra and Its Applications", Pearson Education, 6th edition (July 10th 2020), ISBN-13: 978- 0136880929.	Yes
Recommended Texts	Gilbert Strang, " Linear Algebra and Its Applications", Cengage Learning, 4th edition, (January 1, 2006), ISBN-13: 978-0030105678.	No
Websites	https://www.udemy.com/course/linear-algebra-with-applications/	

Module Information					
معلومات المادة الدراسية					
Module Title	Computer fundamentals		Module Delivery		
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	MTU1004				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		1			Semester of Delivery
Administering Department		CET	College	EETC	
Module Leader	Aseel Hameed Majeed		e-mail	aseel_Alnakkash@mtu.edu.iq	
Module Leader's Acad. Title		Assis. Professor	Module Leader's Qualification		Ph.D.
Module Tutor	Dalal Abdulmohsin Hammood		e-mail	Dalal.hammood@mtu.edu.iq	
Peer Reviewer Name		Dr. Mahmoud Shuker Mahmoud	e-mail	mahmoud.shukur@mtu.edu.iq	
Scientific Committee Approval Date		29/10/2023	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	The module aims to: 1. To introduce students to the fundamental concepts of computers, including their evolution, advantages, and classification based on purpose, size, and data type. 2. To familiarize students with the physical components of a computer and software entities, highlighting their roles in computer operations. 3. To promote awareness of computer security, ethics, and intellectual property rights, emphasizing the types of violations and measures for protection. 4. To provide an overview of operating systems, their functions, classifications, and examples, with a focus on the Windows 11 operating system and its desktop components. 5. To equip students with practical knowledge of computer usage and maintenance, covering file organization, software installation, common computer settings, and promoting responsible practices. 6. These aims and indicative contents aim to achieve a comprehensive understanding of computer fundamentals, security, operating systems, and proper computer usage and maintenance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, students should be able to: 1. Demonstrate a comprehensive understanding of computer fundamentals, including the concept of a computer, stages of the computer life cycle, and advantages of computers. 2. Classify computers based on their purpose, size, and data type, and identify the physical components and software entities of a computer system. 3. Apply ethical principles in the digital world and understand the importance of computer security, software licenses, and protecting against hacking and cyber intrusions. 4. Recognize the health effects of computer usage and implement ergonomic practices for a safe and healthy computing environment. 5. Understand the role and objectives of operating systems, classify different types of operating systems, and demonstrate proficiency in using the Windows 11 operating system. 6. Utilize common desktop components, navigate file systems, manage programs and settings, and perform basic file organization and maintenance tasks.
Indicative Contents المحتويات الإرشادية	1. Introduction to Computer Fundamentals and Classification [14 hrs.] • Concept of a computer • Stages of the computer life cycle

	• Evolution of computer generations • Advantages of computers and their applications • Classification of computers based on purpose, size, and data type. 2. Computer Components and Software Entities[14 hrs.] • Physical components of a computer • Introduction to software entities 3. Computer Security, Ethics, and Intellectual Property[14 hrs.] • Concept of computer security • Software licenses and intellectual property • Ethics in the digital world • Types of violations and cyber intrusions • Protecting against hacking 4. Health Effects of Computers and Ergonomics [14 hrs.] • Understanding and mitigating health risks associated with computer use. • Importance of ergonomics and safe computing practices 5. Operating Systems and Desktop Operations[14 hrs.] • Introduction to operating systems • Functions and objectives of operating systems • Classification of operating systems • Overview of the Windows 11 operating system • Desktop components and operations • Control Panel categories and functions • File organization and maintenance
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategies for the module on Computer Principles and operating systems can include: 1. Lectures and Presentations: The instructor can deliver lectures and presentations to introduce and explain key concepts, theories, and principles related to computer fundamentals and operating systems. This can help students develop a foundational understanding of the subject matter. 2. Practical Demonstrations: Hands-on practical demonstrations can be conducted to illustrate the usage of different computer components, software applications, and operating system functionalities. This can enhance students' understanding of the practical aspects of computer systems. 3. Group Discussions and Collaborative Learning: Engaging students in group discussions and collaborative learning activities can promote active participation and deeper understanding. Students can discuss and analyze case studies, real-life examples, and scenarios related to computer fundamentals and operating systems. 4. Laboratory Exercises: Practical laboratory exercises can provide students with opportunities to apply their knowledge and skills in a controlled environment. They can work on computer hardware, software installations, operating system configurations, and troubleshooting tasks, allowing them to gain practical experience.

	5. Assignments and Projects: Assignments and projects can be assigned to students to encourage independent learning and critical thinking. They can involve research, analysis, problem-solving, and the application of concepts learned in the module. This can help students develop their skills and deepen their understanding.
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Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	34	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	- Introduction to Computer Fundamentals. - Concept of a Computer.
Week 2	- Stages of the Computer Life Cycle. - Evolution of Computer Generations.
Week 3	- Advantages of Computers and their Applications. - Classification of Computers based on Purpose, Size, and Data Type.
Week 4	- Computer Components: Physical Components of a Computer. - Computer Components: Software Entities.
Week 5	- Personal Computers. - Concept of Computer Security and Software Licenses.
Week 6	Software Licenses: Types and Importance.

	Intellectual Property.
Week 7	Mid Exam+ - Software Licenses: Types and Importance. - Intellectual Property.
Week 8	- Cyber Intrusions and Malicious Software. - Steps for Protecting Against Hacking.
Week 9	- Health Effects of Computers. - Introduction to Operating Systems.
Week 10	- Functions and Objectives of Operating Systems. - Classification of Operating Systems.
Week 11	- Examples of Different Operating Systems. - Windows 11 Operating System.
Week 12	- Desktop Components. - Start Menu and Taskbar.
Week 13	- Folders and Files. - Icons and Operations on Windows.
Week 14	- Desktop Wallpapers. - Control Panel: Categories and Functions. - File Organization and Maintenance.
Week 15	- Installing and Uninstalling Programs. - Common Computer Settings: Printer Management, Time and Date Settings, Primary Disk Maintenance.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Practical examples of browsing, opening, and closing windows and dialog boxes, and the proper way to interact with the keyboard, cursor, and other devices. Computer Fundamentals: Concept of a Computer, Stages of the Computer Life Cycle, Evolution of Computer Generations.
Week 2	Practical examples of customization, working with icons, and changing screen resolution. Computer Advantages and Applications, Classification of Computers based on Purpose, Size, and Data Type.
Week 3	Training the student on creating a new user, maximizing windows, displaying the keyboard, and familiarizing with the physical components of the computer. Computer Components: Physical Components of a Computer, Software Entities.
Week 4	Training the student on dealing with computer software licenses, their types, and handling original software sources. Your Personal Computer: Concept of Computer Security and Software Licenses.
Week 5	Training the students in computer security. Computer Safety & Software Licenses, Computer Safety, and Security.

Week 6	• Training the student in computer privacy. Ethics in the Digital World, Types of Violations, Computer Security, Computer Privacy.
Week 7	• Training the student on electronic hacking and its types, types and characteristics of viruses, how to create a computer backup for protection. Software Licenses: Types and Importance, Intellectual Property, Cyber Intrusions and Malicious Software, Steps for Protecting Against Hacking, Harmful Effects of Computers on Health.
Week 8	• Training the student on operating systems, configuring, and partitioning the internal and external hard disk. Operating Systems: Definition, Functions, Objectives, Classification, Examples of Different Operating Systems.
Week 9	• Training the student in installing Windows 7. Operating Systems: Windows 11.
Week 10	• Training the student on Start Menu commands, the taskbar, creating a file, and saving it with the student's name on the desktop. Interacting with windows, scrollbars, and using the function keys (F1, F2, ..., F12) on the keyboard. Desktop Components: Start Menu, Taskbar.
Week 11	• Creating a folder with a specific name and training on renaming, hiding, recovering, deleting, and viewing its path. Folders and Files, Icons.
Week 12	• Training the student in performing operations on windows, desktop wallpaper. Performing Operations on Windows, Desktop Wallpapers.
Week 13	• Training the student on using the Control Panel. Control Panel: Windows Control Panel, Categories.
Week 14	• Training the student on uninstalling and reinstalling a specific program. From Control Panel: Defragmenting Files Inside the Computer, Installing and Uninstalling Programs.
Week 15	• Training the student on common computer settings, installing the printer, managing time and date, and maintaining primary disks (Partitions C, D, E, F). Common Computer Settings: Printer Management, Time and Date Settings, Primary Disk Maintenance.
Week 16	• Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	R. E. Bryant and D. R. O'Hallaron, "Computer Systems: A Programmer's Perspective," 2019.	Yes
Recommended Texts	G. Brookshear and D. Brylow, "Computer Science: An Overview," 2020.	No
Websites	The Collage E-Library	

Part Three: Course Descriptions – Third and Fourth Stages (translated from Arabic)

Course description: this course description provides a concise summary of the main features of the course and the learning outcomes that the student is expected to achieve, demonstrating whether the student has made the most of the available learning opportunities. It must be linked to the program description.

Course 1: Microprocessor Architecture

No.	Item	Details
1	Educational institution	Department of Computer Engineering Techniques
2	Scientific department / centre	Electrical Engineering Technical College
3	Course name / code	Microprocessor Architecture
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	150
7	Date of preparing this description	2/8/2022

8. Course objectives

1. Becoming familiar with the main components and parts of the computer, its technologies and the types of microprocessors.
2. Knowing the types of memory used in the computer.
3. Knowing the central processing unit, its components and how it works.
4. Acquiring the skill of programming the microprocessor using its instructions.

9. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing the different stages in the development of the electronic computer.
- A2: Knowing the different types of electronic computers and their main parts.
- A3: Knowing the basic structure of memory and its different classifications (main memory and secondary memory).
- A4: Knowing the basic structure of the central processing unit.
- A5: Knowing how data is represented and transferred inside the electronic computer.
- A6: Knowing the types of microprocessors (8085, 8086).

B. Course-specific skill objectives

- B1: The ability to use the instructions of the 8085 microprocessor.
- B2: The ability to use the instructions of the 8086 microprocessor.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Analyzing assembly-language programs and deducing their outputs.
- D2: Analyzing the data used in the electronic computer.
- D3: Acquiring skill in using machine language.

10. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2	10	Identifying the main parts of the computer	General architecture of digital computer, review of 8085 μ P	Lecture, laboratory	Oral questions, daily test
3, 4	10	Identifying memory, its types and its different classifications for the 8085	8085 memory addressing	Lecture, laboratory	Oral questions, daily test
5, 6	10	Knowing how data is represented inside the electronic computer	8085 I/O addressing	Lecture, laboratory	–
7, 8	10	Knowing the operating steps of the central	8085 machine cycle & bus timing	Oral questions,	Oral questions, daily test

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
		processing unit		daily test	
9	5	Identifying the types of interrupts	8085 interrupt types	Lecture, laboratory	Oral questions, daily test
10	5	Knowing the 8085 instructions	8085 μ P instructions	Lecture, laboratory	Oral questions, daily test
11, 12	10	The main components of the 8086 microprocessor	Software architecture, BIU, EU, registers, pipeline	Lecture, laboratory	Oral questions, daily test
13	5	Knowing how memory is segmented	Memory segmentation, generating memory address	Lecture, laboratory	Oral questions, daily test
14	5	Data representation for the 8086 microprocessor	Hardware organization of 8086 memory space, data organization (aligned and misaligned word, double word)	Lecture, laboratory	Oral questions, daily test
15, 16	10	Knowing the operating modes of the 8086 microprocessor	Pin configuration, min & max mode, 8288 bus controller, 8284 system clock	Lecture, laboratory	Oral questions, daily test
17, 18	10	Examples of different programs for the 8086	Addressing modes, machine language coding	Lecture, laboratory	Oral questions, daily test
19–23	25	–	8086 instruction set (data transfer, LOOP instructions)	Lecture, laboratory	Oral questions, test
24	5	Identifying the stack memory instructions	Stack memory, POP & PUSH instructions	Lecture, laboratory	Oral questions, daily test
25	5	Identifying the behaviour of the buses while executing an instruction	Memory read & write bus cycles, idle & wait state	Lecture, laboratory	Oral questions, daily test
26, 27	10	How memory is interfaced with the microprocessor	Memory interface circuits, bus transceivers, bank write and bank read control logic, memory expansion	Lecture, laboratory	Oral questions, daily test
28, 29	10	How input and output units are connected, and their instructions	I/O interface circuits (isolated input/output & memory-mapped input/output), I/O instructions	Lecture, laboratory	Oral questions, daily test
30	5	Identifying the types of interrupts	8086 interrupt types	Lecture, laboratory	Oral questions, daily test

11. Infrastructure

Item	Details
Required textbooks	1- Digital Fundamentals by Floyd; 2- Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085", 5th Edition, Prentice Hall
Main references (sources)	1- Digital Fundamentals by Floyd; 2- Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085", 5th Edition, Prentice Hall
Recommended books and references (scientific journals, reports...)	1- Digital Fundamentals by Floyd; 2- Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085", 5th Edition, Prentice Hall
Electronic references, websites	Jagdishprasad Jhabarmal, "An Introduction to Microprocessor 8085"

12. Course development plan

Introducing the latest developments in the world of microprocessors, memories and computer types.

Course 2: Fundamentals of Computer Networks

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques / Computer Communication Networks
3	Course name / code	Fundamentals of Computer Networks
4	Target group of this program	Third stage, Computer Communication Networks
5	Available forms of attendance	Lecture, laboratory
6	Semester / year	2021 / 2022
7	Total study hours	120 hours
8	Date of preparing this description	2/8/2022

9. Course objectives

Introducing the student to the basic types of networks, how they are connected and how information is transferred over the network, in addition to the protocols used across networks.

1. Knowing the types of computer networks.
2. Knowing the types of computer network devices.
3. Knowing the methods of connecting computer networks.
4. Knowing how information is transferred across networks.
5. Knowing the types of protocols and computer network technologies according to the application required.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Giving the student knowledge and expertise in the field of computer networks.
- A2: Keeping up with developments in the curricula.
- A3: Strengthening the link between the department and the various sectors of society.

B. Course-specific skill objectives

- B1: Preparing technical engineers with high skills in the field of computer networks.
- B2: Strengthening performance standards at work in a way that meets the requirements of the labour market in the field of computer engineering techniques.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.

- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Connecting the types of computer networks.
- D2: The ability to program and connect all computer network devices.
- D3: Maintaining computer networks.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1st, 2nd	8	Knowing the types of networks by size and transmission technology	Introduction, classification of computer networks by application, size and transmission technology	Lecture, laboratory	Oral questions, daily exam
3rd	4	Learning the most important types of protocols in local networks	Local networks: topologies, CSMA/CD and access protocols, and intellectual property issues	Lecture, laboratory	Oral questions, daily exam
4th	4	Understanding the difference between connection-oriented and connectionless services	Connection-oriented versus connectionless services	Lecture, laboratory	Oral questions, daily exam
5th, 6th	8	Understanding the OSI model	The ISO reference model and the TCP/IP reference model	Lecture, laboratory	Oral questions, daily exam
7th	4	Knowing the types of large, small and private networks	Wide area networks, metropolitan networks, private networks and virtual networks	Lecture, laboratory	Oral questions, daily exam

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
8th	4	Knowing file sizes by type	Digital signals (size: text files, audio files, video files)	Lecture, laboratory	Oral questions, daily exam
9th	4	Knowing bandwidth limits and data transfer rates	Band-limited signals, data rate and the maximum channel capacity	Lecture, laboratory	Oral questions, daily exam
10th	4	Knowing the types of transmission media	Guided transmission media and wireless transmission	Lecture, laboratory	Oral questions, daily exam
11th	4	Knowing the types of satellites according to their uses	Communication satellites: geostationary, medium-Earth orbit and low-Earth orbit	Lecture, laboratory	Oral questions, daily exam
12th, 13th	8	Knowing the types of signal modulation	Digital modulation: amplitude, frequency, phase; TDM, and clean-up mechanisms	Lecture, laboratory	Oral questions, daily exam
14th–16th	12	Knowing the types of switches and data distributors	Public telephone network: local loop structure, DSL, multiplexing and switching (circuit and packet switching)	Lecture, laboratory	Oral questions, daily exam
17th	4	Knowing the components of the television cable	Cable television connection	Lecture, laboratory	Oral questions, daily exam
18th–20th	12	Knowing the duties of the data link layer	Data link layer: design issues, error detection and correction	Lecture, laboratory	Oral questions, daily exam
21st, 22nd	8	Knowing the protocols operating in the data link layer	Elementary data link protocols	Lecture, laboratory	Oral questions, daily exam
23rd, 24th	8	Knowing the actual division of data when transferred from the computer to the transmission medium	Sliding window protocols	Lecture, laboratory	Oral questions, daily exam
25th	4	Knowing the duties of the network layer and how data is routed	Network layer (store-and-forward packet switching)	Lecture, laboratory	Oral questions, daily exam
26th	4	Knowing the services implemented without a connection in the network layer	Network layer (implementation of connectionless service)	Lecture, laboratory	Oral questions, daily exam
27th, 28th	8	Knowing the services implemented with a connection in the network layer	Network layer (implementation of connection-oriented service)	Lecture, laboratory	Oral questions, daily exam
29th	4	Knowing the routing algorithms in the network layer	Network layer (routing algorithms)	Lecture, laboratory	Oral questions, daily exam
30th	4	Knowing broadcast routing algorithms in the network layer	Network layer (broadcast routing)	Lecture, laboratory	Oral questions, daily exam

12. Infrastructure

Item	Details
Required textbooks	Data Communications and Networking by Forouzan, McGraw-Hill Networking Series
Main references (sources)	Data Communications and Networking by Forouzan, McGraw-Hill Networking Series
Recommended books and references (scientific journals,	1. Computer Networking by James F. Kurose, University of Massachusetts, Amherst

Item	Details
reports...)	
Electronic references, websites	1. www.pragsoft.com

13. Course development plan

Introducing some applications of optical networks and some practical applications in other fields.

Course 3: Fundamentals of Control Engineering

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Fundamentals of Control Engineering
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give third-stage students knowledge and skills that enable them to:

1. Analyze systems in the time domain using differential equations in the complex domain using the Laplace transform.
2. Analyze systems in the frequency domain in the complex domain.
3. Design the most popular controllers based on control theory, namely the PID controller.
4. Study and analyze the response of different systems to different inputs.
5. Study and analyze the stability of systems.

9. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing and understanding system analysis in the time domain using differential equations in the complex domain using the Laplace transform.
- A2: Knowing and understanding system analysis in the frequency domain in the complex domain.
- A3: Studying and analyzing the response of different systems to different inputs.
- A4: Knowing and understanding the stability of different systems.
- A5: Knowing and understanding the operation of the most popular controllers designed using control theory, namely the PID controller.

B. Course-specific skill objectives

- B1: Designing controllers using PID control theory.
- B2: Writing and implementing algorithms to determine the stability of systems.
- B3: Designing and operating controller circuits using a simulation environment.
- B4: Calculating the stability of different systems.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing PID-type controllers.
- D2: Reaching system stability by modifying system parameters.
- D3: Finding the response of systems to different types of input and their degree of stability.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2	2 T / 2 P	Identifying the different types of systems	Open and closed loop systems	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
3, 4, 5	2 T / 2 P	Understanding and applying the mathematical representation of control systems and deriving the transfer function	Transfer function and mathematical modelling of control systems	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
6, 7	2 T / 2 P	Deriving the transfer function of servo motors	DC servo motor transfer function	Lecture and practical labs	Interactive assessment, periodic written tests, direct

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
					assessment
8	2 T / 2 P	Understanding and applying block representation	Block diagram representation	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
9–12	2 T / 2 P	Time-domain analysis of control systems and study of the steady and transient states of the outputs	Time domain analysis of control systems: steady state analysis, transient response analysis, analysis of 1st and 2nd order systems	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
13, 14	2 T / 2 P	Designing different controllers	P-I-D controllers	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
15, 16	2 T / 2 P	Applications for studying system stability	Routh's criterion and applications of Routh's criterion	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
17–20	2 T / 2 P	Using the root locus plot to analyze system stability	Root locus	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
21–24	2 T / 2 P	Using the Bode plot to analyze system stability	Bode plot	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
25–28	2 T / 2 P	Modifying the system to reach stability	Compensation	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
29, 30	2 T / 2 P	–	Different examples	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	Modern Control Engineering by Ogata
Main references (sources)	Control Systems by Bakshi; Modern Control Systems by Dorf; Control Systems Engineering by Nise
Recommended books and references (scientific journals, reports...)	Control Systems by Bakshi
Electronic references, websites	–

11. Course development plan

- Practical side: bringing in modern laboratory equipment to cover all experiments related to the course.
- Theoretical side: introducing modern scientific applications in the field of control.

Course 4: Digital Communications

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Digital Communications
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to introduce third-stage students to:

- The concepts and terms used in digital communications.
- The advantages and disadvantages of each type of digital communication system.
- The types of digital modulation.
- Sending several digital signals at the same time and how to recover them.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Defining the concepts and terms used in digital communications.
- A2: Defining the advantages and disadvantages of each type of digital communication system.
- A3: Defining the types of digital modulation.
- A4: Comparing the types of digital systems and their features.

B. Course-specific skill objectives

- B1: Designing a digital communication system.
- B2: Modulating signals digitally.
- B3: How to reduce the effect of noise and interference on the digital signal.

Teaching and learning methods

- Presenting the lecture and diagrams.
- Smart board.
- Scientific laboratories.

Assessment methods

- Oral questions and information recall.
- Weekly exams.
- Semester tests.
- Final tests.

C. Affective and value objectives

- C1: Developing the student's ability to analyze difficulties and overcome them.
- C2: Developing students' sense of responsibility.

- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Fostering a spirit of innovation in students.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.

Assessment methods

- Direct assessment.
- Practical projects.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Working with digital systems and finding the most suitable one for designs.
- D2: Analyzing digital signals.
- D3: Sending more than one signal at the same time and how to recover them.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1	2 P / 2 T	Understanding what a digital system is	Introduction to digital communication	Presentation, board + laboratory	Interactive assessment and written tests
2	2 P / 2 T	Understanding the types of signals and the design of a digital system	Signal types, general block diagram of digital communication	Presentation, board + laboratory	Interactive assessment and written tests
3	2 P / 2 T	Identifying the advantages and disadvantages of digital modulation	Advantages and disadvantages of digital modulation, digital coding	Presentation, board + laboratory	Interactive assessment and written tests
4, 5	2 P / 2 T	Understanding PAM and TDM modulation	Sampling theorem, Pulse Amplitude Modulation (PAM), Time Division Multiplexing (TDM)	Presentation, board + laboratory	Interactive assessment and written tests
6	2 P / 2 T	Understanding PWM and PPM modulation	Pulse Width and Pulse Position Modulation (PWM & PPM)	Presentation, board + laboratory	Interactive assessment and written tests
7	2 P / 2 T	Measuring the noise signal	S/N in analog pulse modulation	Presentation, board + laboratory	Interactive assessment and written tests
8, 9	2 P / 2 T	Understanding PCM and DPCM modulation	Pulse Code Modulation (PCM), noise consideration in PCM, limitation and modifications of PCM, Differential PCM (DPCM)	Presentation, board + laboratory	Interactive assessment and written tests
10, 11	2 P / 2 T	Understanding DM modulation	Delta Modulation (DM), Delta-Sigma Modulation	Presentation, board + laboratory	Interactive assessment and written tests
12–14	2 P / 2 T	Finding the possibility of interference between waves and designing filters	Intersymbol Interference (ISI), pulse shaping to reduce ISI, equalizer, adaptive equalizer, matched filter	Presentation, board + laboratory	Interactive assessment and written tests
15–20	2 P / 2 T	Understanding ASK, FSK and PSK modulation	Baseband modulation (digital modulation): Amplitude Shift Keying (ASK) [modulation and demodulation], Frequency Shift Keying (FSK) [modulation and	Presentation, board + laboratory	Interactive assessment and written tests

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
			demodulation], Phase Shift Keying (PSK) [modulation, coherent and noncoherent detection], Differential PSK		
21, 22	2 P / 2 T	Analyzing errors in the binary system	Error performance of binary system	Presentation, board + laboratory	Interactive assessment and written tests
23, 24	2 P / 2 T	Understanding QPSK and OQPSK modulation	Quadrature Phase Shift Keying (QPSK), Offset QPSK, Minimum Shift Keying	Presentation, board + laboratory	Interactive assessment and written tests
25–30	2 P / 2 T	Understanding QAM and MPSK modulation	Quadrature Amplitude Modulation (QAM), multilevel modulation techniques M-ary PSK, M-ary QAM, bandwidth efficiency and power spectra of modulated signal, carrier recovery and clock recovery	Presentation, board + laboratory	Interactive assessment and written tests

(P = practical hours, T = theory hours)

12. Infrastructure

Item	Details
Required textbooks	–
Main references (sources)	Sarkar N., Elements of Digital Communications, first edition, 2003
Recommended books and references (scientific journals, reports...)	Haykin S., Introduction to Analog and Digital Communications, second edition, 2007
Electronic references, websites	–

13. Course development plan

- Studying how to send several signals at the same time for more than one type of modulation, and comparing them.

Course 5: Power Electronics

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Power Electronics
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give third-stage students of the Computer Electronics branch knowledge and preparation that enable them to:

1. Know the concept of industrial electronics and how to control the transfer of power sent from the source to the load.
2. Identify the electronic components used in this field, how to test them, and how to use them in controlling the transfer of power between the source and the load.
3. Identify the means and methods used in power electronics (PE).
4. Study and analyze single-phase and three-phase rectifier circuits of all types for large loads with high power.
5. Study and analyze how power transfer is controlled in alternating current (AC) circuits.
6. Study and analyze how power transfer is controlled in direct current (DC) circuits.
7. Study how to design power supply circuits.
8. Learn how to control the speed of DC and AC motors (DC and AC motor drive).
9. All the items above are applied practically in the laboratory and verified practically.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing methods of controlling the transfer of power from the source to simulated high loads.
- A2: Knowing and understanding how to control the thyristor and how to design firing circuits.
- A3: Studying how to design and implement DC to DC conversion circuits.
- A4: Knowing and implementing circuits for controlling the light intensity of lamps and how to control motor speed.
- A5: Knowing how to design and implement rectifier circuits.

B. Course-specific skill objectives

- B1: Designing controllers using PID control theory.
- B2: Writing and implementing algorithms to determine the stability of systems.
- B3: Designing and operating controller circuits using a simulation environment.
- B4: Calculating the stability of different systems.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.

- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face, verifying that practice matches theory.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing and implementing rectifier circuits and controlling power transfer.
- D2: Operating and controlling DC to AC inverter conversion.
- D3: Designing and implementing thyristor firing circuits.
- D4: Implementing and designing motor speed control circuits.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2	2 T / 2 P	Identifying the types of electronic components and the types of electronic circuits used in PE	Electronic component devices and types of PE systems	Lecture and practical labs	Interactive assessment, periodic written tests, direct

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
					assessment
3–7	2 T / 2 P	Understanding and explaining the basic concepts of PE and single-phase and three-phase rectifier circuits	Single and three phase rectifier to deliver power to high inductive load	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
8, 9	2 T / 2 P	Identifying methods of switching off the thyristor in DC circuits	DC line commutation	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
10–12	2 T / 2 P	Explaining the process of controlling power in AC circuits	AC voltage controller	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
13–15	2 T / 2 P	Identifying thyristor and transistor firing circuits and deriving the average and effective (RMS) value of periodic waveforms	Average and RMS value of a periodic waveform; methods of thyristor triggering	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
16–19	2 T / 2 P	Explaining, designing and implementing DC to DC converter (chopper) circuits	DC to DC converter (chopper): buck, boost, buck-boost	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
20, 21	2 T / 2 P	Designing a power supply using switch-mode power supply technology	Switch-mode power supply	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
22–25	2 T / 2 P	Circuits converting direct current to single-phase and three-phase alternating current	Single-phase and three-phase inverter	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
26–28	2 T / 2 P	An introduction to driving and controlling DC motor speed (DC motor drive)	DC motor drive	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
29, 30	2 T / 2 P	Analyzing some of the waveforms obtained in the syllabus above using the Fourier series method	Fourier series analysis	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	Modern Power Electronics
Main references (sources)	Power Electronics: Systems and Applications by Lander; Power Electronics by Rashid
Recommended books and references (scientific journals,	Same as above

Item	Details
reports...)	
Electronic references, websites	–

11. Course development plan

- Practical side: bringing in modern laboratory equipment to cover all experiments related to the course.
- Theoretical side: introducing modern applications in the field of power.

Course 6: Engineering Analysis

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Department of Computer Engineering Techniques
3	Course name / code	Engineering Analysis
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to make the student able to:

1. Solve differential equations using different methods.
2. Know the applications of transformation from the time domain to the frequency domain and vice versa.
3. Know the applications of the Z-transform between the time and frequency domains.
4. Know discrete functions and how to transform them.
5. Know how to analyze derivatives using different numerical methods.
6. Know matrices and how to solve them.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing transformations from the time domain to the frequency domain and vice versa using the Laplace transform.
- A2: Understanding the theoretical applications of the Laplace transform.
- A3: Knowing and understanding transformations using the Z-transform method and how to use it in the field of communications.
- A4: Knowing and understanding the different statistical methods used to solve mathematical equations.
- A5: Knowing and understanding probability methods to reach the optimal solution.
- A6: Knowing and understanding numerical methods of solving matrices.

B. Course-specific skill objectives

- B1: Calculating different mathematical equations, both complex and simple.
- B2: Solving equations using MATLAB.
- B3: Transforming equations from the time domain to the frequency domain and vice versa, and how to use them in practical applications.
- B4: Transforming functions in the discrete domain and using them in practical communication applications.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Transforming equations from the time domain to the frequency domain and vice versa.
- D2: Analyzing equations and their uses in the field of communications.
- D3: Finding different solutions to complex mathematical equations.
- D4: Analyzing and solving matrices and methods of using them in practice.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1–7	28	Knowing the transformation from the time domain to the frequency domain, and the theorems, properties and methods of applying this transformation	Laplace transform: applications, properties and theorems	Lecture, laboratory	Oral questions, daily exam
8–14	28	Knowing transformation methods using the Z method, with its properties and applications	Z-transform: properties, theorems, applications	Lecture, laboratory	Oral questions, daily exam

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
15–19	20	Solving mathematical equations using probability, and knowing how to count in different ways	Statistics and probability	Lecture, laboratory	Oral questions, daily exam
20–23	16	Knowing the different methods of calculation for equations	Numerical computation	Lecture, laboratory	Oral questions, daily exam
24, 25	8	Knowing methods of solving non-linear equations	Solving non-linear equations	Lecture, laboratory	Oral questions, daily exam
26–28	12	Knowing the different engineering analysis methods for solving derivatives	Numerical solutions of differential equations	Lecture, laboratory	Oral questions, daily exam
29, 30	8	Knowing methods of solving matrices and solving different equations using matrices	Matrices	Lecture, laboratory	Oral questions, daily exam

12. Infrastructure

Item	Details
Required textbooks	Higher Engineering Mathematics by Dr. B.S. Grewal
Main references (sources)	Higher Engineering Mathematics by Dr. B.S. Grewal
Recommended books and references (scientific journals, reports...)	1- Higher Engineering Mathematics by Dr. B.S. Grewal; 2- An Introduction to Numerical Analysis by David F. Mayers
Electronic references, websites	www.ocw.mit.edu ; www.math.uiowa.edu

13. Course development plan

Introducing some practical applications in modern fields.

Course 7: Digital Controllers

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Department of Computer Engineering Techniques
3	Course name / code	Digital Controllers
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to make the student able to:

1. Identify the types of microcontrollers and their uses.
2. Know the difference between microprocessors and microcontrollers.
3. Know the internal parts of the microcontroller and how they work.
4. Program the microcontroller.
5. Connect the microcontroller with different input and output devices.
6. Know the programmable logic controller (PLC) and its types.
7. Identify the internal parts of the PLC and how they work.
8. Program the PLC and connect it with other devices.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Programming the microcontroller using the MikroC Pro language.
- A2: Activating the internal input and output ports according to the program's requirements.
- A3: Connecting various input and output devices such as sensors and displays, and connecting analog-to-digital conversion devices.
- A4: Knowing how to connect the microcontroller with other devices and using serial transmission to transfer data.
- A5: How to use interrupt routines in the main programs to reach optimal programming.
- A6: Using timers and suitable delays in programs to obtain optimal results.

B. Course-specific skill objectives

- B1: Reading data from digital and analog meters.
- B2: Connecting and programming sensors and actuators.
- B3: Implementing various projects linked to sensing, taking direct decisions and storing results in suitable memory after programming, to receive the output.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: The student gains the ability to deal easily with programming.
- D2: Programming various advanced types of digital controllers and connecting supporting circuits to them.
- D3: Designing and implementing sensing systems and using them in control and monitoring projects.
- D4: Designing integrated electronic circuits that include more than one programmed controller and connecting them.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1st	4	An introduction to the microcontroller and the difference between it and microprocessors	Types of digital controllers	Lecture, laboratory	Oral questions, daily exam
2nd–4th	12	Knowing the internal design of the microcontroller and its internal parts	Input and output ports, serial data transfer circuits, timers and memories	Lecture, laboratory	–

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
5th–7th	12	Programming various input and output devices	Programming LCD, GLCD	Lecture, laboratory	Oral questions, daily exam
8th–11th	16	Programming analog-to-digital conversion devices and interrupt routines	Programming ADC, PWM, interrupt	Lecture, laboratory	Oral questions, daily exam
12th–15th	16	Programming audio devices or circuits and temperature sensing systems	Programming projects	Lecture, laboratory	Oral questions, daily exam
16th	4	Identifying the principle of the PLC	Principle of the PLC-type controller	Lecture, laboratory	Oral questions, daily exam
17th, 18th	8	Identifying the input and output circuits of the PLC	Input–output modules of PLC	Lecture, laboratory	Daily exam, oral questions
19th, 20th	8	Identifying the numbers and logic fundamentals of the PLC	Number systems and codes, fundamentals of logic in PLC	Lecture, laboratory	Daily exam, oral questions
21st	4	Programming the PLC	Basics of PLC programming	Lecture, laboratory	Daily exam, oral questions
22nd, 23rd	4	Knowing PLC diagrams, design and programming	PLC wiring diagram, ladder logic program and sensors	Lecture, laboratory	Daily exam, oral questions
24th, 25th	8	Programming timers and counters	Timers programming, counters programming	Lecture, laboratory	Daily exam, oral questions
26th	4	Identifying mathematical operations	Math operations	Lecture, laboratory	Daily exam, oral questions
27th, 28th	4	Identifying applications linked to sensors and actuators connected to the PLC	Sensors and actuators for industrial applications	Lecture, laboratory	Daily exam, oral questions
29th, 30th	8	Implementing projects related to the PLC	PLC projects	Lecture, laboratory	Daily exam, oral questions

12. Infrastructure

Item	Details
Required textbooks	PIC Microcontroller from Absolute Beginner
Main references (sources)	Programmable Controller, Theory and Implementation
Recommended books and references (scientific journals, reports...)	Automating Manufacturing Systems with PLCs
Electronic references, websites	–

13. Course development plan

Introducing some modern applications of digital controllers and some practical applications in other fields.

Course 8: Real-Time Circuit Design

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Department of Computer Engineering Techniques / third stage / Networks and Electronics branches
3	Course name / code	Real-Time Circuit Design
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to make the student able to:

1. Define the concept of real-time systems.
2. Distinguish between real-time systems and other systems.
3. Define the problem of limited inputs and the need for expansion.
4. Identify the design mechanisms of peripheral circuits.
5. Master the mechanisms of input and output expansion.
6. Peripheral interfacing circuits.
7. Interrupt signal circuits.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

1. Introducing the student to the concept of real-time systems.
2. Identifying the components of real-time systems.
3. The problem of limited inputs.
4. The expansion mechanism for limited inputs.
5. Circuits converting continuous voltages to digital and vice versa.
6. Peripheral interfacing circuits.
7. Interrupt signal circuits.

B. Course-specific skill objectives

- B1: Preparing technical engineers with the set of skills needed to work in the field of embedded systems engineering.
- B2: Designing and programming embedded systems, including everything this involves.

Teaching and learning methods

- Academic lectures: since interfacing is a design subject, the principle of active participation is adopted: the problem is presented to students and the solutions they propose are collected. Interactive discussion is then used to discuss the solutions one after another and diagnose their weaknesses, reaching the optimal solution.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Instilling a spirit of creative thinking as a basis for dealing with design topics.
- C2: Developing students' ability to work with each other as a team in facing the problems presented.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.

Teaching and learning methods

- Relying on collecting and discussing the solutions proposed by students, with the instructor acting as an "organizer" of the discussion and guiding the solution through hints about the optimal approach, so that students can reach the optimal design by themselves.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Preparing students to work in the embedded systems programming sector.
- D2: Preparing students to deal with software alongside hardware circuits.

11. Course structure

Week	Hours per week	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1st, 2nd	2 theory / 2 lab	The concept of real-time systems	Definitions, components, comparison with other systems	Lecture, laboratory	Oral questions, daily exam
3rd	2 theory / 2 lab	Signals	Types, classifications, the information they contain	Lecture, laboratory	Oral questions, daily exam
4th	2 theory / 2 lab	Sensors and transducers	The difference between the sensor and the transducer, and the circuits of each	Lecture, laboratory	Oral questions, daily exam
5th–8th	2 theory / 2 lab	Conversion circuits 1	Conversion from a continuous signal to a digital signal: concepts, circuits and design methods	Lecture, laboratory	Oral questions, daily exam
9th–12th	2 theory / 2 lab	Conversion circuits 2	Conversion from a digital signal to a continuous signal: concepts, circuits and design methods	Lecture, laboratory	Oral questions, daily exam
13th–16th	2 theory / 2 lab	Expansion circuits	The tri-state buffer, the output signal buffer, design	Lecture, laboratory	Oral questions, daily exam
17th,	2 theory /	Peripheral controllers	Design philosophy, general	Lecture,	Oral questions,

Week	Hours per week	Required learning outcomes	Unit / topic	Teaching method	Assessment method
18th	2 lab		design	laboratory	daily exam
19th, 20th	2 theory / 2 lab	8155	Internal structure, design, programming	Lecture, laboratory	Oral questions, daily exam
21st–23rd	2 theory / 2 lab	Timers, programmable timers	Design mechanisms, capacity, successive stages	Lecture, laboratory	Oral questions, daily exam
24th, 25th	2 theory / 2 lab	Interrupt signals	Their types, how to deal with them, design	Lecture, laboratory	Oral questions, daily exam
26th, 27th	2 theory / 2 lab	Direct memory access	Design circuits, design methods	Lecture, laboratory	Oral questions, daily exam
28th–30th	2 theory / 2 lab	The serial port	The concept of seriality, the protocol, the design circuit	Lecture, laboratory	Oral questions, daily exam

12. Infrastructure

Item	Details
Required textbooks	–
Main references (sources)	Real-Time Systems, by John A. Stankovic, 2002
Recommended books and references (scientific journals, reports...)	Practical Introduction to RTS for Undergraduate Engineers, by Douglas W. Harder, 2014
Electronic references, websites	https://www.ces.tech/

13. Course development plan

Introducing embedded systems into the syllabus and allocating 5 to 6 weeks to dealing with them.

Course 9: Electronic Systems Simulators

No.	Item	Details
1	Educational institution	Middle Technical University
2	Scientific department / centre	Electrical Engineering Technical College / Department of Computer Engineering Techniques
3	Course name / code	Electronic Systems Simulators
4	Available forms of attendance	Weekly / theory, practical
5	Semester / year	2021 / 2022
6	Total study hours	90
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to make the student able to:

1. Know and understand the design and analysis of digital circuits.
2. Know and understand the uses of digital circuits.
3. Know how to design synchronous sequential circuits using computer programs.
4. Know and understand design using algorithmic functions.
5. Know how to design asynchronous sequential circuits using computer programs.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing and understanding the design and analysis of digital circuits.
- A2: Knowing and understanding the uses of digital circuits.
- A3: Knowing how to design synchronous sequential circuits using computer programs.
- A4: Knowing and understanding design using algorithmic functions.
- A5: Knowing how to design asynchronous sequential circuits using computer programs.

B. Course-specific skill objectives

- B1: Designing digital circuits in the simplest and best form.
- B2: Simulating electronic systems using the computer.
- B3: Analyzing digital circuits and knowing how they work and their uses.
- B4: Designing circuits that contain parts with non-digital output, using digital design methods and entering values as required.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.

- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them, and developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing digital circuits in the simplest and best form.
- D2: Simulating electronic systems using the computer.
- D3: Analyzing digital circuits and knowing how they work and their uses.
- D4: Designing circuits that contain parts with non-digital output, using digital design methods and entering values as required.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1st–4th	21	Designing digital circuits	Logic design with MSI components	Lecture, laboratory	Oral questions, daily test
5th–10th	18	Designing synchronous sequential circuits	Synchronous sequential networks	Lecture, laboratory	Oral questions, daily test
11th–17th	21	Design using algorithmic functions	Algorithm state machine	Lecture, laboratory	Oral questions, daily test
18th–30th	39	Designing asynchronous sequential circuits	Asynchronous sequential networks	Lecture, laboratory	Oral questions, daily test

12. Infrastructure

Item	Details
Required textbooks	Digital Fundamentals by Floyd
Main references (sources)	1- Digital Fundamentals by Floyd; 2- Digital Circuit Analysis and

Item	Details
	Design with Simulink Modeling, 2nd Ed., by Steven T. Karris
Recommended books and references (scientific journals, reports...)	1- Digital Fundamentals by Floyd; 2- Digital Circuit Analysis and Design with Simulink Modeling, 2nd Ed., by Steven T. Karris
Electronic references, websites	www.academia.edu ; www.electronics-tutorials.ws

13. Course development plan

Introducing some introductory principles of the digital designs adopted in modern systems.

Course 10: Network Simulators

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques / Computer Communication Networks
3	Course name / code	Network Simulators
4	Target group of this program	Third stage, Computer Communication Networks
5	Available forms of attendance	Lecture, laboratory
6	Semester / year	2021 / 2022
7	Total study hours	120 hours
8	Date of preparing this description	2/8/2022

9. Course objectives

Introducing the student to the basic types of networks, how they are connected and how information is transferred over the network, in addition to the protocols used across networks.

1. Knowing the types of computer networks.
2. Knowing the types of computer network devices and the types of connecting devices.
3. Knowing the methods of connecting computer networks and their topologies.
4. Knowing how information is transferred across networks and how routers work.
5. Knowing the types of protocols and computer network technologies according to the application required.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Giving the student knowledge and expertise in the field of computer networks.
- A2: Keeping up with developments in the curricula.
- A3: Strengthening the link between the department and the various sectors of society.

B. Course-specific skill objectives

- B1: Preparing technical engineers with high skills in the field of computer networks.
- B2: Strengthening performance standards at work in a way that meets the requirements of the labour market in the field of computer engineering techniques.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.

- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Connecting the types of computer networks.
- D2: The ability to program and connect all computer network devices.
- D3: Maintaining computer networks.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1st, 2nd	8	Knowing the types of networks by size and transmission technology	Introduction, classification of computer networks by application, size and transmission technology	Lecture, laboratory	Oral questions, daily exam
3rd	4	Learning the most important types of protocols in local networks	Topologies, CSMA/CD and access protocols, and intellectual property issues	Lecture, laboratory	Oral questions, daily exam
4th	4	Understanding the difference between connection-oriented and connectionless services	Connection-oriented versus connectionless services; network implementation	Lecture, laboratory	Oral questions, daily exam
5th, 6th	8	The OSI model; subnetting	The ISO reference model and the TCP/IP reference model	Lecture, laboratory	Oral questions, daily exam
7th	4	Knowing the types of large, small and private networks	Wide area networks, metropolitan networks, private networks and virtual networks	Lecture, laboratory	Oral questions, daily exam
8th	4	Knowing file sizes by type,	Digital signals (size: text files,	Lecture,	Oral questions,

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
		and internet and connection speeds	audio files, video files)	laboratory	daily exam
9th	4	Knowing bandwidth limits and data transfer rates	Band-limited signals, data rate and the maximum channel capacity	Lecture, laboratory	Oral questions, daily exam
10th	4	Knowing the types of transmission media	Guided transmission media and wireless transmission	Lecture, laboratory	Oral questions, daily exam
11th	4	Knowing the types of connections and types of connecting	Communication satellites: geostationary, medium-Earth orbit	Lecture, laboratory	Oral questions, daily exam
12th, 13th	8	Knowing the types of signals	Digital modulation: amplitude, frequency, phase; TDM, and clean-up mechanisms	Lecture, laboratory	Oral questions, daily exam
14th–16th	12	Knowing the types of switches and data distributors	Public telephone network: local loop structure, routers and hubs	Lecture, laboratory	Oral questions, daily exam
17th	4	Knowing the components of the television cable	Cable television connection	Lecture, laboratory	Oral questions, daily exam
18th–20th	12	Knowing the duties of the data link layer	Data link layer: design issues, error and flow control	Lecture, laboratory	Oral questions, daily exam
21st, 22nd	8	Knowing the protocols operating in the data link layer	Elementary data link protocols	Lecture, laboratory	Oral questions, daily exam
23rd, 24th	8	Knowing the actual division of data when transferred from the computer to the transmission medium	Sliding window protocols	Lecture, laboratory	Oral questions, daily exam
25th	4	Knowing the duties of the network layer and how data is routed	Network layer (store-and-forward packet switching)	Lecture, laboratory	Oral questions, daily exam
26th	4	Knowing and using Cisco software	Packet Tracer	Lecture, laboratory	Oral questions, daily exam
27th, 28th	8	Applying networks	Packet Tracer	Lecture, laboratory	Oral questions, daily exam
29th	4	Knowing the routing algorithms in the network layer	Network layer (routing algorithms)	Lecture, laboratory	Oral questions, daily exam
30th	4	Knowing broadcast routing algorithms in the network layer	Network layer (broadcast routing)	Lecture, laboratory	Oral questions, daily exam

12. Infrastructure

Item	Details
Required textbooks	Computer Networks – A. Tanenbaum – 5th edition
Main references (sources)	Data Communications and Networking by Forouzan, McGraw-Hill Networking Series
Recommended books and references (scientific journals, reports...)	1. Computer Networking by James F. Kurose, University of Massachusetts, Amherst
Electronic references, websites	1. www.cisco.com

13. Course development plan

Introducing modern applications of wired and optical networks and some practical applications in other fields.

Course 11: Digital Signal Processing

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Digital Signal Processing
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give third-stage students knowledge and preparation that enable them to:

1. Learn the concepts of signals, including the representation of discrete-time signals in the time domain and their frequency content and response.
2. Learn the concepts of discrete-time systems, including their properties, representations and analysis, and the Fourier and Z transforms.

9. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Determining the digital frequency of a sampled sinusoidal signal; converting DT signals between different coding representations.
- A2: Identifying the basic building blocks of a DSP system (A/D, DSP, D/A) and the signal at each.
- A3: Identifying the classes of DT systems: linear or non-linear, time-invariant or time-varying, causal or non-causal, static or dynamic.
- A4: Analyzing DT systems in the time domain or the frequency domain, using Z-transforms or Fourier transforms, and finding the response of an LTI system to an input signal.
- A5: Converting between the following six representations of linear time-invariant discrete-time systems represented by constant-coefficient difference equations: the difference equation, the impulse response, the transfer function, the frequency response, the pole-zero plot and the block diagram.
- A6: Understanding the derivation of the radix-2 FFT algorithm and its computational savings.

B. Course-specific skill objectives

- B1: Determining the sampling period T and the analog frequency components of a sampled signal, where defined.
- B2: Understanding the origins of the Nyquist sampling rate and the reconstruction formula for band-limited signals.
- B3: Designing FIR filters using the window method or the equiripple method.
- B4: Designing IIR filters by bilinear transformation of analog filters.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out

practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing programs that represent digital systems for signal processing.
- D2: Using the MATLAB programming language to increase the student's programming skill in the field of digital signal processing.
- D3: Designing digital filters in digital communication systems.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2, 3	2 T / 2 P	Identifying the concept of digital signal processing	Introduction to digital signal processing: the basic elements of DSP, DSP compared with ASP, DSP applications, continuous-time signals compared with digital-time signals	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
4, 5, 6	2 T / 2 P	Learning how to plot digital	Digital-time signals and their	Lecture and	Interactive

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
		signals	sequences	practical labs	assessment, periodic written tests, direct assessment
7, 8, 9	2 T / 2 P	Identifying the types of standard digital signals	Standard digital-time signals (sequences): unit impulse sequence, unit step sequence, unit ramp sequence, exponential sequence	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
10, 11, 12	2 T / 2 P	Identifying the types of digital systems	Classification of digital-time signals; system properties: static and dynamic systems, time-invariant and time-varying systems, causal and non-causal systems, linear and non-linear systems, stable and unstable systems	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
13, 14	2 T / 2 P	Applying convolution methods using the direct method and the graphical method	Convolution: the direct method, the graphical method	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
15, 16	2 T / 2 P	Identifying cross-correlation	Correlation of digital-time sequences: cross-correlation	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
17, 18	2 T / 2 P	Applying methods of finding the system response as magnitude and phase	Frequency-domain representation: finding the frequency response	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
19, 20, 21	2 T / 2 P	Identifying the types of Fourier transform methods	Discrete Fourier Transform (DFT), linear convolution using the DFT, Inverse Discrete Fourier Transform (IDFT)	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
22, 23, 24	2 T / 2 P	Applying the fast Fourier transform	Fast Fourier Transform (FFT): butterfly computation, Inverse Fast Fourier Transform (IFFT)	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
25, 26, 27	–	Identifying the Z-transform and its applications	Introduction to the Z-transform: definition of the Z-transform and ROC, properties of the Z-transform, the inverse Z-transform and applications of the Z-transform (poles and zeros, causality and stability), and solving the difference equation using the Z-transform	–	Interactive assessment, periodic written tests, direct assessment
28, 29, 30	–	Identifying the types of digital filters	Digital filter realization: basic structures for FIR sources, FIR direct form structure, FIR cascade form, IIR filter structures, IIR direct form structure, IIR cascade form, IIR parallel structure	–	Interactive assessment, periodic written tests, direct assessment

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	1- John G. Proakis, Dimitris K. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Pearson, 4th edition (April 7, 2006)
Main references (sources)	1- Hayes, Monson H., Digital Signal Processing, Tata McGraw-Hill edition, 2009
Recommended books and references (scientific journals, reports...)	–
Electronic references, websites	–

11. Course development plan

- Practical side: designing and implementing programs in C++ in addition to MATLAB, and providing well-equipped computer laboratories with a computer for every student.
- Theoretical side: using modern scientific references.

Course 12: Project Management

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Department of Computer Engineering Techniques
3	Course name / code	Project Management
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to make the student able to:

1. Know the concepts of project management.
2. Know the methods of drawing project network diagrams.
3. Know and understand project scheduling.
4. Know methods of inventory management.
5. Know how to find the break-even point.
6. Know and understand the types of maintenance.
7. Know and understand quality control.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing the methods of drawing project network diagrams.
- A2: Knowing how to find the critical path of the project, the total and free float of the project, and the early and late start and finish times of project activities.
- A3: Knowing and understanding the problems of allocating project resources.
- A4: Knowing and understanding linear programming methods for the project.
- A5: Knowing and understanding project management methods.
- A6: Knowing, understanding and drawing the break-even point of the project.
- A7: Knowing and understanding maintenance methods.
- A8: Knowing and understanding quality control methods.

B. Course-specific skill objectives

- B1: Drawing the project network using the critical path method and PERT.
- B2: Solving equations to shorten the project duration.
- B3: Converting equations into linear programming using the graphical method and the simplex method.
- B4: Solving equations to find the break-even point.
- B5: Solving equations to find the cost of inventory management.
- B6: Calculating maintenance costs.
- B7: Solving equations to calculate the quality control of the project.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.

- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Transforming equations from the time domain to the frequency domain and vice versa.
- D2: Analyzing equations and their uses in the field of communications.
- D3: Finding different solutions to complex mathematical equations.
- D4: Analyzing and solving matrices and methods of using them in practice.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2	8	Knowing the concepts and elements of project management	Project management	Lecture, laboratory	Oral questions, daily exam
3, 4	8	Knowing methods of economic calculation for engineers	Management and economics for engineers	Lecture, laboratory	Oral questions, daily exam

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
5, 6	8	Knowing work charts	Work charts	Lecture, laboratory	Oral questions, daily exam
7	4	Calculating productivity	Productivity	Lecture, laboratory	Oral questions, daily exam
8, 9	8	Knowing how to draw and solve the project network	Networks	Lecture, laboratory	Oral questions, daily exam
10, 11	8	Knowing and drawing the project network	The critical path method	Lecture, laboratory	Oral questions, daily exam
12–15	16	The method of calculating and drawing the time and cost of the project	The PERT method (time and cost)	Lecture, laboratory	Oral questions, daily exam
16	4	Knowing the problems of resource allocation	Resource allocation problems	Lecture, laboratory	Oral questions, daily exam
18, 19	16	Knowing linear programming methods	Linear programming	Lecture, laboratory	Oral questions, daily exam
19, 20, 21	12	Knowing inventory management models	Project management models	Lecture, laboratory	Oral questions, daily exam
22	4	Calculating the break-even point	The break-even point	Lecture, laboratory	Oral questions, daily exam
23, 24	8	Calculating inventory costs	Inventory costs	Lecture, laboratory	Oral questions, daily exam
25, 26, 27	12	Knowing maintenance concepts	Maintenance concepts	Lecture, laboratory	Oral questions, daily exam
28, 29	12	Calculating quality control	Quality control	Lecture, laboratory	Oral questions, daily exam
30	4	Knowing and understanding the management of the employer	Management of the employer	Lecture, laboratory	Oral questions, daily exam

12. Infrastructure

Item	Details
Required textbooks	–
Main references (sources)	J.R. Meredith and S.J. Mantel, “Project Management”, J. Wiley & Sons, 1995
Recommended books and references (scientific journals, reports...)	S. Choudhury, “Project Management”, Tata McGraw-Hill, 2003
Electronic references, websites	http://www.projectmanagement.com/main.htm

13. Course development plan

Introducing some modern practical applications related to project management.

Course 13: Advanced Digital Electronics

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques / Computer Electronics branch
3	Course name / code	Advanced Digital Electronics
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give fourth-stage students of the Computer Electronics branch knowledge and preparation that enable them to:

1. Study and analyze the operation of programmable digital devices.
2. Design various simple and complex digital circuits using a hardware description language.
3. Implement various simple and complex digital circuits using field-programmable gate arrays.
4. Implement digital circuits using finite state machines.
5. Study and analyze simulation results to verify their correctness.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing and understanding the internal design of programmable digital devices.
- A2: Knowing and understanding the operation and programming of programmable digital devices.
- A3: Studying the hardware description language (VHDL).
- A4: Knowing and understanding the operation of field-programmable gate arrays.
- A5: Knowing and understanding finite state machines.

B. Course-specific skill objectives

- B1: Designing digital circuits using the hardware description language (VHDL).
- B2: Writing and implementing finite state machines.
- B3: Designing and operating digital circuits using field-programmable gate arrays.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing digital circuits in the hardware description language.
- D2: Implementing designs on field-programmable gate arrays.
- D3: Finding the shortest paths for finite state machines.
- D4: Obtaining results using the simulator and studying them to verify the correctness of the designs.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1	2 T / 2 P	An introduction to field-programmable gate arrays	Introduction to FPGA	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
2, 3	2 T / 2 P	Understanding the different programming technologies	Programming technologies	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
4, 5, 6	2 T / 2 P	Identifying the types of field-programmable logic	Types of FPLDs	Lecture and	Interactive assessment,

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
		devices		practical labs	periodic written tests, direct assessment
7	2 T / 2 P	Understanding the structure of the field-programmable gate array	FPGA architecture	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
8	2 T / 2 P	Programming the field-programmable gate array	Programming (configuring) an FPGA	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
9	2 T / 2 P	An introduction to the hardware description language and its basic components	Introduction to VHDL; fundamental VHDL units: library, entity, architecture	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
10, 11	2 T / 2 P	Identifying the data types in the hardware description language	Data types: pre-defined data types, user-defined data types	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
12	2 T / 2 P	Identifying data and signal attributes	Operators, data attributes, signal attributes	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
13, 14	2 T / 2 P	Identifying concurrent statements and how to use them	Concurrent code	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
15, 16	2 T / 2 P	Identifying sequential statements and how to use them	Sequential code	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
17, 18	2 T / 2 P	Identifying the finite state machine and programming it	State machine	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
19, 20, 21	2 T / 2 P	Programming components and packages	Packages and components	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
22, 23, 24	2 T / 2 P	Programming functions and procedures	Functions and procedures	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
25–30	2 T / 2 P	Examples of designing various digital circuits	Design examples	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	Circuit Design with VHDL by Pedroni; Digital Design with CPLD Applications and VHDL by Dueck
Main references (sources)	Circuit Design with VHDL by Pedroni; Digital Design with CPLD Applications and VHDL by Dueck
Recommended books and references (scientific journals, reports...)	Circuit Design with VHDL by Pedroni; Digital Design with CPLD Applications and VHDL by Dueck
Electronic references, websites	–

11. Course development plan

- Practical side: bringing in modern laboratory equipment to cover all experiments related to the course.
- Theoretical side: introducing modern applications of digital electronics.

Course 14: Computer and Network Security

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Computer and Network Security
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give fourth-stage students knowledge and preparation that enable them to understand the means and methods that must be followed to protect computers from access by unauthorized persons and from tampering, as well as protecting data and databases from intruders, and protecting computer networks, especially private networks, from intruder attacks by activating and using network protection protocols.

1. Knowing the fundamentals of information security in communications.
2. Explaining the means and methods that must be followed to protect computers from access and tampering by unauthorized persons.
3. Protecting data and databases from intruders.
4. Protecting computer networks, especially private networks, from intruder attacks by activating and using network protection protocols.
5. Studying and analyzing symmetric encryption algorithms: Caesar, substitution, Vigenère, affine, OTP, Hill cipher, Playfair, transposition.
6. Studying the concept of cryptanalysis and giving an example of substitution.
7. Studying and analyzing asymmetric encryption algorithms: RSA.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing the fundamentals of information security in communications.
- A2: Explaining the means and methods that must be followed to protect computers from access and tampering by unauthorized persons.
- A3: Protecting data and databases from intruders.
- A4: Protecting computer networks, especially private networks, from intruder attacks by activating and using network protection protocols.
- A5: Studying and analyzing symmetric encryption algorithms: Caesar, substitution, Vigenère, affine, OTP, Hill cipher, Playfair, transposition.
- A6: Studying the concept of cryptanalysis and giving an example of substitution.
- A7: Studying and analyzing asymmetric encryption algorithms: RSA.

B. Course-specific skill objectives

- B1: Implementing the instructions and functions of encryption algorithms.
- B2: Writing and implementing encryption algorithms in the MATLAB programming language.
- B3: Designing encryption and decryption programs.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing encryption and decryption programs.
- D2: Designing various programs for cryptanalysis.
- D3: Using the MATLAB programming language to increase the student's programming skill in the field of computer network security.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2, 3	2 T / 2 P	Identifying the concept of symmetric encryption,	Symmetric cipher model: plaintext, encryption algorithm,	Lecture and practical labs	Interactive assessment,

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
		encryption algorithms, the encryption key and the concept of cryptanalysis	secret key, ciphertext, decryption algorithm; a model of conventional encryption; cryptography, cryptanalysis, block and stream ciphers		periodic written tests, direct assessment
4	2 T / 2 P	Applying encryption and decryption to the simplest type of encryption	Caesar cipher, the affine cipher	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
5, 6	2 T / 2 P	Identifying another type of encryption: the monoalphabetic type	Monoalphabetic substitution ciphers, shift ciphers	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
7	2 T / 2 P	Understanding and applying the Hill cipher	Hill cipher	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
8	2 T / 2 P	Applying encryption and decryption to a matrix-based type	Playfair cipher	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
9	2 T / 2 P	Encryption and decryption of the polyalphabetic type	Polyalphabetic ciphers, Vigenère cipher	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
10–13	2 T / 2 P	Applying encryption and decryption to another type of encryption	The transposition cipher, affine cipher, OTP	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
14, 15, 16	2 T / 2 P	Breaking the symmetric-key cipher	Cryptanalysis of a symmetric key	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
17	2 T / 2 P	Finding the multiplicative inverse using Euclid's method	Euclid's algorithm	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
18, 19	–	Applying encryption methods using a symmetric key	Symmetric-key algorithms: DES (the Data Encryption Standard), the 16-round Feistel system	–	Interactive assessment, periodic written tests, direct assessment
20, 21, 22	–	Applying encryption methods using an asymmetric key	Public-key algorithms: RSA, other public-key algorithms	–	Interactive assessment, periodic written tests, direct assessment
23–27	–	Applying methods of verifying the sender	Authentication protocols: authentication based on a shared secret key; establishing a shared key: the Diffie-Hellman key exchange; authentication	–	Interactive assessment, periodic written tests, direct assessment

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
			using a key distribution centre; authentication using Kerberos; authentication using public-key cryptography		
28	–	Applying e-mail protection methods	OSI security architecture, a model for network security, e-mail security	–	Interactive assessment, periodic written tests, direct assessment
29, 30	–	Identifying methods of protecting operating systems	Protection services: OS protection service (protected objects and methods of OS protection, security of OS, memory and addressing protection, fence protection); database protection service; network protection service (IP and e-commerce protection, VPN and next-generation networks protection)	–	Periodic written tests

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	1- Cryptography and Network Security: Principles and Practice (3rd edition), William Stallings, 2003
Main references (sources)	1- Computer Security: Art and Science, Matthew Bishop, 2003; 2- Handbook of Cryptography
Recommended books and references (scientific journals, reports...)	1- Computer Security: Art and Science, Matthew Bishop, 2003; 2- Handbook of Cryptography
Electronic references, websites	–

11. Course development plan

- Practical side: designing and implementing programs in C++ in addition to MATLAB, and providing well-equipped computer laboratories with a computer for every student.
- Theoretical side: using modern scientific references.

Course 15: Mobile Communication Systems

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Mobile Communication Systems
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to introduce fourth-stage students to:

- The concepts and terms used in cellular systems.
- The development of generations in the cellular system.
- How cells are designed.
- How to cover all cells with the signal and over all distances.
- The types of signal modulation in cellular communications.
- Wireless systems: building them, designing them and dealing with wave interference.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Defining the concepts and terms used in cellular systems.
- A2: Studying the internal structure of cells.
- A3: Analyzing the signal and how it covers a single cell.
- A4: Comparing all generations and how they developed.

B. Course-specific skill objectives

- B1: Designing a cellular system.
- B2: Modulating signals digitally.
- B3: How to cover all cells with the signal.
- B4: Designing, planning and analyzing signals for transmission and reception.

Teaching and learning methods

- Presenting the lecture and diagrams.
- Smart board.
- Scientific laboratories.

Assessment methods

- Oral questions and information recall.
- Weekly exams.
- Semester tests.
- Final tests.

C. Affective and value objectives

- C1: Developing the student's ability to analyze difficulties and overcome them.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Fostering a spirit of innovation in students.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.

Assessment methods

- Direct assessment.
- Practical projects.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Working in mobile communication companies.
- D2: Designing and preparing plans for sites and frequencies.
- D3: Choosing the suitable frequency band for each area and each distance.
- D4: Choosing the suitable antenna for transmission and reception.
- D5: Working to reduce interference between signals and noise.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2, 3	2 P / 2 T	Understanding the cellular system, how it developed over several generations, and the features of each generation	Introduction to wireless communication systems: evolution of mobile communications, mobile radio systems around the world, types of wireless communication systems, comparison of common wireless systems, trends in cellular radio and personal communication, second generation (2G) systems, evolved second-generation systems (2.5G), third-generation (3G) systems, fourth-generation (4G) systems, fifth-generation (5G) systems	Presentation, board + laboratory	Interactive assessment and written tests
4, 5, 6, 7	2 P / 2 T	Identifying how cells are formed, calculating frequencies, frequency interference and signal handover	The cellular concept – system design fundamentals: cellular system, hexagonal geometry cell and the concept of frequency reuse, channel assignment strategies, distance to frequency reuse ratio, channel and co-channel interference reduction factor, S/I ratio consideration and calculation for minimum co-channel and adjacent interference, handoff strategies, umbrella cell concept	Presentation, board + laboratory	Interactive assessment and written tests
8–11	2 P / 2 T	Securing the service and the network for each cell	Traffic engineering: trunking and grade of service, improving	Presentation, board +	Interactive assessment and

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
		and calculating the capacity	coverage and capacity in cellular systems – cell splitting, cell sectorization	laboratory	written tests
12–15	2 P / 2 T	Calculating signal propagation through the air and its reflections	Large-scale path loss: free-space propagation loss equation, path loss of NLOS and LOS systems, reflection, ray ground reflection model, diffraction, scattering, link budget design	Presentation, board + laboratory	Interactive assessment and written tests
16, 17, 18	2 P / 2 T	Sending multiple signals and calculating the delay	Small-scale multipath propagation: impulse model for multipath channel, delay spread, Feher's delay spread, upper bound small scale, multipath measurement parameters of multipath channels, types of small-scale fading, Rayleigh and Rician distribution	Presentation, board + laboratory	Interactive assessment and written tests
19, 20	2 P / 2 T	Learning the types of modulation used in the cellular system, such as QPSK, MSK and GMSK	Modulation techniques for mobile radio: review of basic digital modulation techniques, QPSK, MSK, GMSK	Presentation, board + laboratory	Interactive assessment and written tests
21, 22	2 P / 2 T	Understanding FDMA and TDMA technologies	Multiple access techniques: Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), spread spectrum multiple access, Space Division Multiple Access (SDMA)	Presentation, board + laboratory	Interactive assessment and written tests
23–28	2 P / 2 T	Identifying CDMA technology and everything related to the system	Wireless systems: GSM system architecture, radio interface, protocols, localization and calling, handover, authentication and security in GSM, GSM speech coding, concept of spread spectrum, architecture of the IS-95 CDMA system, air interface, CDMA forward channels, CDMA reverse channels, power control in CDMA, cellular technology, GPRS system architecture	Presentation, board + laboratory	Interactive assessment and written tests
29, 30	2 P / 2 T	–	Recent trends: Wi-Fi, WiMAX, ZigBee networks, software defined radio, UWB radio, wireless ad-hoc network and mobile portability, security issues and challenges in a wireless network	Presentation, board + laboratory	Interactive assessment and written tests

(P = practical hours, T = theory hours)

12. Infrastructure

Item	Details
Required textbooks	–
Main references (sources)	Mischa Schwartz, Mobile Wireless Communications, Cambridge

Item	Details
	University Press, 2005
Recommended books and references (scientific journals, reports...)	J. G. Proakis, Digital Communications, 4th ed., NY: McGraw Hill, 2000
Electronic references, websites	–

13. Course development plan

- Building a model for designing and planning a cellular system.
- Learning how to program transmission tools and choose suitable frequencies.

Course 16: Network Protocols

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Network Protocols
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give fourth-stage students of the Networks branch information in the field of networks and communications and to prepare them to:

1. Analyze the system in the networking field using network simulation programs.
2. Analyze the system in terms of protocols and network layers.
3. Design a large, wide network and analyze its protocols and settings.
4. Study and analyze the response of the stations connected to the network with its protocols.
5. Study and analyze the stability of the network and its components.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing and understanding system analysis in the networking field, network software and the Cisco system.
- A2: Knowing and understanding system analysis in terms of protocols and the seven OSI layers.
- A3: Studying and analyzing the response of different systems to different inputs.
- A4: Knowing and understanding the stability of different systems.
- A5: Knowing and understanding the operation of the most popular software and basic network components such as the router and the switch.

B. Course-specific skill objectives

- B1: Designing a complete network using Cisco software.
- B2: Writing and implementing algorithms to determine the stability and operation of the network.
- B3: Designing and operating network components using a simulation environment.
- B4: Programming the protocols in the system.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing various networks in different software.
- D2: Controlling systems and verifying the operation of the network and its protocols.
- D3: Finding the response of systems to different types of input and their degree of stability.
- D4: The ability to program routers in networks in general.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2	2 T / 2 P	Identifying the layered network system	OSI open system interconnection	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
3, 4, 5	2 T / 2 P	Understanding and applying the mathematical representation of network systems and their protocols	Network structure and protocols	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
6, 7	2 T / 2 P	Protocols and network layers	Protocol hierarchy with layers	Lecture and practical labs	Interactive assessment, periodic written

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
					tests, direct assessment
8	2 T / 2 P	Understanding and applying block representation	Block diagram representation	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
9–12	2 T / 2 P	Protocols of the first and second layers	Physical layer protocols, data link protocols	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
13, 14	2 T / 2 P	Error detection and correction algorithms	Error detection and checksum, CRC	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
15, 16	2 T / 2 P	The routing protocol	Routing and network layer protocols	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
17–20	2 T / 2 P	The routing algorithm	Routing algorithms	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
21–24	2 T / 2 P	The TCP/IP system	TCP/IP model	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
25–28	2 T / 2 P	The fifth layer, its protocols and how they work	Transport layers and TCP protocols	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
29, 30	2 T / 2 P	The last layer, with programming of the remaining protocols	Application layers and their protocols	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	1- Computer Networking: A Top-Down Approach, 6th Edition
Main references (sources)	2- Computer Networks – A. Tanenbaum – 5th edition
Recommended books and references (scientific journals, reports...)	–
Electronic references, websites	www.cisco.com

11. Course development plan

- Practical side: updating the approved laboratory experiments.
- Theoretical side: adding modern applications to the course material.

Course 17: Interfacing Circuit Design

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Department of Computer Engineering Techniques / Electronics branch, fourth stage
3	Course name / code	Interfacing Circuit Design
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to make the student able to:

1. Define the concept of interfacing.
2. Identify how the interfacing circuits adopted in the computer work.
3. Learn the concepts of employing the computer ports.
4. Design and implement circuits that suit the problem to be solved.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Learning the concept of interfacing.
- A2: The parallel port.
- A3: The serial port.
- A4: The USB port.
- A5: Capacity expansion circuits.
- A6: Programming interfacing applications.
- A7: Methods of reducing costs in design.
- A8: The trade-off between speed and accuracy.

B. Course-specific skill objectives

- B1: Preparing technical engineers with the set of skills needed to work in the field of interfacing, especially Internet of Things applications.
- B2: Writing interfacing programs in Java to meet design requirements.

Teaching and learning methods

- Academic lectures: since interfacing is a design subject, the principle of active participation is adopted: the problem is presented to students and the solutions they propose are collected. Interactive discussion is then used to discuss the solutions one after another and diagnose their weaknesses, reaching the optimal solution.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.

- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Instilling a spirit of creative thinking as a basis for dealing with design topics.
- C2: Developing students' ability to work with each other as a team in facing the problems presented.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.

Teaching and learning methods

- Relying on collecting and discussing the solutions proposed by students, with the instructor acting as an "organizer" of the discussion and guiding the solution through hints about the optimal approach, so that students can reach the optimal design by themselves.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Preparing students to work in the Internet of Things sector.
- D2: Preparing students to deal with software alongside hardware circuits.
- D3: Preparing students to work as hardware engineers.

11. Course structure

Week	Hours per week	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1st, 2nd, 3rd	2 theory / 2 lab	Building the basic block of any design circuit: the power source	Power circuits, conversion circuits, digital generation circuits	Lecture, laboratory	Oral questions, daily exam
4th–8th	2 theory / 2 lab	Building interfacing using the parallel port	The parallel port: internal structure, connection groups, design circuits	Lecture, laboratory	Oral questions, daily exam
9th–13th	2 theory / 2 lab	Building interfacing using the serial port	The serial port: internal structure, the prevailing protocol, connection groups, design circuits	Lecture, laboratory	Oral questions, daily exam
14th–17th	2 theory / 2 lab	Building interfacing using USB circuits	The USB port: conversion circuits from USB to the parallel and serial ports	Lecture, laboratory	Oral questions, daily exam
18th, 19th	2 theory / 2 lab	Designing conversion circuits	Conversion circuits between ports: their types, how to design them	Lecture, laboratory	Oral questions, daily exam
20th–23rd	2 theory / 2 lab	Circuits converting continuous voltages to digital	Their types, how to use them in interfacing	Lecture, laboratory	Oral questions, daily exam

Week	Hours per week	Required learning outcomes	Unit / topic	Teaching method	Assessment method
24th–26th	2 theory / 2 lab	Circuits converting digital voltages to continuous	Their types, how to use them in interfacing	Lecture, laboratory	Oral questions, daily exam
27th–30th	2 theory / 2 lab	Practical applications	Practical applications	Lecture, laboratory	Oral questions, daily exam

12. Infrastructure

Item	Details
Required textbooks	–
Main references (sources)	PC Interfacing, by Pei An, 1998
Recommended books and references (scientific journals, reports...)	https://www.adafruit.com/ ; http://arduino.cc/
Electronic references, websites	https://www.ces.tech/

13. Course development plan

Introducing the Internet of Things by allocating 5 to 6 weeks of the syllabus to it, as an advanced stage of interfacing circuits.

Course 18: Advanced Computer Technology

No.	Item	Details
1	Educational institution	Foundation of Technical Education
2	Scientific department / centre	College of Electrical and Electronic Techniques
3	Course name / code	Advanced Computer Technology
4	Available forms of attendance	Lecture / laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

- The course aims to study the advanced internal architecture of the computer.
- Addressing methods and how memory is accessed.
- Studying cache memory units and their different storage methods.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Understanding how modern microprocessors work.
- A2: Understanding memory addressing methods and how the data stored in memory is accessed.
- A3: Understanding the reasons for the need for cache memory.
- A4: The different methods followed in connecting cache memory.
- A5: Identifying the developments in microprocessors, such as increased frequency and speed.

B. Course-specific skill objectives

- B1: Learning how to calculate memory addresses using different instructions.
- B2: Designing the different methods of cache memory for different sizes.

C. Affective and value objectives

- C1: How to design a microprocessor.
- C2: How to design a cache memory and use the suitable method.

Teaching and learning methods

Lecture / laboratory / curricular training.

Assessment methods

Weekly tests / semester exams / final exams / daily assessment.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Skills in understanding the programs used in microprocessors.
- D2: Skills in designing cache memories.
- D3: Skills in writing programs in machine language.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1–5	20	The structure of the microprocessor	Architecture of the 386 processor	Lecture / laboratory	Daily participation / tests
6–9	16	Calculating the address using the segmentation method	Segmentation method	Lecture / laboratory	Daily participation / tests
10–13	16	Calculating the address using the paging method	Paging method	Lecture / laboratory	Daily participation / tests
14–17	16	The changes introduced in the 386 processor	Features in 386	Lecture / laboratory	Daily participation / tests
18–23	24	Cache memory	Cache memory	Lecture / laboratory	Daily participation / tests
24–30	28	The structure of modern processors and the additions made to them	Pentium processor, Pentium Pro, Core processor	Lecture / laboratory	Daily participation / tests

12. Infrastructure

Item	Details
Required textbooks	The 80386, 80486 and Pentium Processor, by Walter A. Triebel
Main references (sources)	The 80x86 IBM PC and Compatible Computers (Volumes I & II), by Mohammed Ali Mazidi
Recommended books and references (scientific journals, reports...)	Intel Microprocessors, by Barry B. Brey
Electronic references, websites	–

13. Course development plan

Supporting the lectures with developments in the field of microprocessors and their modern uses in data processing.

Course 19: Computer Networks

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Computer Networks
4	Target group of this program	Fourth stage, Computer Electronics
5	Available forms of attendance	Lecture, laboratory
6	Semester / year	2021 / 2022
7	Total study hours	120 hours
8	Date of preparing this description	2/8/2022

9. Course objectives

Introducing the student to the basic types of networks, how they are connected and how information is transferred over the network, in addition to the protocols used across networks.

1. Knowing the types of computer networks.
2. Knowing the types of computer network devices.
3. Knowing the methods of connecting computer networks.
4. Knowing how information is transferred across networks.
5. Knowing the types of protocols and computer network technologies according to the application required.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Giving the student knowledge and expertise in the field of computer networks.
- A2: Keeping up with developments in the curricula.
- A3: Strengthening the link between the department and the various sectors of society.

B. Course-specific skill objectives

- B1: Preparing technical engineers with high skills in the field of computer networks.
- B2: Strengthening performance standards at work in a way that meets the requirements of the labour market in the field of computer engineering techniques.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratory: provides everything the student needs in terms of experience to develop the practical skill side and establish the principles needed to carry out projects correctly.

Assessment methods

- Interactive assessment: by asking questions to students and observing their interaction and participation during the lecture.
- Written tests: show how well the student understands and follows the material and the scientific notes given by the instructor.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.

- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity in students and encouraging them to find innovative solutions to various problems.
- C2: Developing students' ability to work collaboratively in effective teams that achieve outstanding results.
- C3: Developing students' sense of responsibility and their psychological readiness to bear the duties placed on them.
- C4: Developing the values of diligence and perseverance in completing work to reach satisfactory results.

Teaching and learning methods

- Stimulating students' creativity by presenting different scientific problems and asking students to find suitable scientific solutions in different ways.
- Building cooperation among students by forming work teams, and motivating students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing the student's interaction during the lecture and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for various scientific problems.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Connecting the types of computer networks.
- D2: The ability to program and connect all computer network devices.
- D3: Maintaining computer networks.

11. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1st	4	Understanding the types of services provided by computer networks	Uses of computer networks (business, home and mobile applications)	Lecture, laboratory	Oral questions, daily exam
2nd	4	Knowing the types of networks by size and transmission technology	Classification of networks (LAN, MAN, WAN, wireless networks and internetworks)	Lecture, laboratory	Oral questions, daily exam
3rd, 4th	8	Learning the OSI model and the difference between connection-oriented and connectionless services	Reference models: 1. the OSI reference model (layers, connection-oriented and connectionless services, service primitives)	Lecture, laboratory	Oral questions, daily exam
5th	4	Understanding the TCP/IP model	Reference models: 2. the TCP/IP reference model	Lecture, laboratory	Oral questions, daily exam
6th	4	Understanding the types of switching that depend on a connection	Connection-oriented networks: X.25, frame relay and ATM; ATM switching devices and the reference model	Lecture, laboratory	Oral questions, daily exam
7th	4	Knowing the types of local and private networks	LANs: ALOHANET, Ethernet (IEEE 802.3), token bus (802.4), token ring (802.5),	Lecture, laboratory	Oral questions, daily exam

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
			wireless LANs (802.11)		
8th	4	Knowing file sizes by type	Digital signals (size: text files, audio files and video files)	Lecture, laboratory	Oral questions, daily exam
9th	4	Knowing bandwidth limits and data transfer rates	Channel capacity: band-limited signals, data rate and the maximum channel capacity	Lecture, laboratory	Oral questions, daily exam
10th, 11th	8	Knowing the types of transmission media	Guided transmission media and wireless transmission	Lecture, laboratory	Oral questions, daily exam
12th	4	Knowing the types of technologies used in wireless communications	The electromagnetic spectrum and wireless transmission	Lecture, laboratory	Oral questions, daily exam
13th	4	Understanding space communications	Communication satellites	Lecture, laboratory	Oral questions, daily exam
14th	4	Knowing the types of switches and data distributors	The public switched telephone network (structure and local loop)	Lecture, laboratory	Oral questions, daily exam
15th	4	Knowing the components of wired and wireless modems	ADSL modems and wireless local loops	Lecture, laboratory	Oral questions, daily exam
16th	4	Knowing the types of data distribution	Multiplexing: FDM, WDM and TDM	Lecture, laboratory	Oral questions, daily exam
17th	4	Knowing the types of packet, message and circuit switches	Switching (circuit, message and packet switching)	Lecture, laboratory	Oral questions, daily exam
18th	4	Understanding the types of television cables	Cable television and cable modems	Lecture, laboratory	Oral questions, daily exam
19th	4	Knowing the duties of the data link layer and how data is routed	Data link layer: design issues (services provided to the network layer, framing, error control and flow control)	Lecture, laboratory	Oral questions, daily exam
20th	4	Understanding how data transfer is controlled in networks	Flow control	Lecture, laboratory	Oral questions, daily exam
21st	4	The types of errors and how to detect and correct them	Errors (types of errors, error detection and correction)	Lecture, laboratory	Oral questions, daily exam
22nd, 23rd	8	Knowing the types of data transfer algorithms in the data link layer	Data link protocols (unrestricted simplex protocol, stop-and-wait protocol, sliding window protocols: one-bit, go-back-N and selective repeat)	Lecture, laboratory	Oral questions, daily exam
24th	4	Knowing the routing algorithms in the network layer	Network layer (store-and-forward packet switching)	Lecture, laboratory	Oral questions, daily exam
25th	4	Understanding the connectionless services in the network layer	Network layer (implementation of connectionless service)	Lecture, laboratory	Oral questions, daily exam
26th	4	Understanding the connection-oriented services in the network layer	Network layer (implementation of connection-oriented service)	Lecture, laboratory	Oral questions, daily exam
27th, 28th	8	Understanding the most important algorithms that route data in the network layer	Network layer (routing algorithms)	Lecture, laboratory	Oral questions, daily exam
29th,	8	Understanding the types of	Network layer (broadcast	Lecture,	Oral questions,

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
30th		services provided by computer networks	routing)	laboratory	daily exam

12. Infrastructure

Item	Details
Required textbooks	Data Communications and Networking by Forouzan, McGraw-Hill Networking Series
Main references (sources)	Data Communications and Networking by Forouzan, McGraw-Hill Networking Series
Recommended books and references (scientific journals, reports...)	1. Computer Networking by James F. Kurose, University of Massachusetts, Amherst
Electronic references, websites	1. www.pragsoft.com

13. Course development plan

Introducing some communication applications and some practical applications in other fields.

Course 20: Information Theory and Coding

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques
3	Course name / code	Information Theory and Coding
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give fourth-stage students information and preparation that enable them to:

- - a. Study the importance of measuring information, and the theories and limits related to it.
- - b. Analyze multiple types of communication channels and calculate the capacity and specifications of each type.
- - c. Study the types of source coding and the algorithm of each, and calculate the efficiency of each type.
- - d. Analyze the source encoder and its types, and their limits.
- - e. Study the types of channel coding and the algorithm of each, and calculate the efficiency and limits of each type.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: How information is measured, and knowing its weight and units of measurement.
- A2: How is the information rate calculated?
- A3: What is a communication channel and what are its types?
- A4: How is the efficiency of the source encoder calculated?
- A5: What are the limits of channel coding and what are its types?

B. Course-specific skill objectives

- B1: How to encode information.
- B2: Writing and implementing encoding algorithms in the MATLAB programming language.
- B3: Designing encoding and decoding programs.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out

practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing encoding and decoding programs.
- D2: Designing various programs for code analysis.
- D3: Using the MATLAB programming language to increase the student's programming skill in the field of channel and source coding.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2, 3	2 T / 2 P	Calculating probability and its types	Review of probability, joint probability, conditional probability	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
4	2 T / 2 P	Calculating the amount of information and the information rate	Self-information, information rate, source entropy	Lecture and practical labs	Interactive assessment, periodic written

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
					tests, direct assessment
5, 6, 7	2 T / 2 P	Calculating the amount of mutual information and the mutual information rate	Mutual information, mutual information rate, mutual information transferred in a noisy channel	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
8, 9, 10	2 T / 2 P	Understanding the types of communication channels and calculating their capacity using Shannon's law	Communication channels, their types and specifications; capacity of the analog channel; efficiency of analog and non-analog channels	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
11, 12, 13	2 T / 2 P	Applying calculations to binary, ternary and cascaded channels	Efficiency of the binary symmetric channel, ternary and mixed channels, efficiency calculation	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
14–17	2 T / 2 P	The integrated communication system with source coding and channel coding according to Shannon's law	Modelling theory, Nyquist time calculation, reasons for coding, types of source coding, fixed-length coding, variable-length coding, efficiency calculation for fixed and variable coding	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
18–21	2 T / 2 P	Applying encoding and decoding to other types of coding	Shannon coding, Shannon-Fano coding, binary and ternary Huffman coding for each type	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
22, 23, 24	2 T / 2 P	Applying data compression using multiple algorithms	Data compression, lossless compression, the RLE algorithm, calculation of the saving ratio and the data compression ratio	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
25–29	2 T / 2 P	Applying channel coding, observing its effect on error detection and correction, and applying Hamming coding	Redundant information in error detection, channel coding, types of channel coding, parity coding, linear block coding, efficiency calculation, Hamming coding and decoding	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
30	–	Applying convolutional coding	Convolutional coding, Viterbi theory for decoding convolutional codes	–	Interactive assessment, periodic written tests, direct assessment

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	1- Coding and Information Theory by Steven Roman
Main references (sources)	1- Coding and Information Theory (book by Richard Hamming); 2- Information Theory & Coding by J.S. Chitode
Recommended books and references (scientific journals, reports...)	1- MathWorks, version 2018b
Electronic references,	1- Information Theory and Network Coding by Raymond W. Yeung

Item	Details
websites	

11. Course development plan

- Practical side: designing and implementing programs in C++ in addition to MATLAB, and providing well-equipped computer laboratories with a computer for every student.
- Theoretical side: using modern scientific references.

Course 21: Intelligent Systems Modelling

No.	Item	Details
1	Educational institution	Electrical Engineering Technical College
2	Scientific department / centre	Computer Engineering Techniques / Computer Electronics
3	Course name / code	Intelligent Systems Modelling
4	Available forms of attendance	Lecture, laboratory
5	Semester / year	2021 / 2022
6	Total study hours	120 hours
7	Date of preparing this description	2/8/2022

8. Course objectives

The course aims to give fourth-stage students information and preparation that enable them to:

- Know what artificial neural networks are, and be able to choose a network and work with it through the MATLAB programming language.
 - Know the genetic search algorithm, be able to identify its types, and program them in the MATLAB programming language.
1. Knowing artificial neural networks.
 2. The ability to choose an artificial neural network.
 3. Identifying learning algorithms in artificial neural networks.
 4. Identifying the genetic search algorithm.
 5. The ability to identify the types of genetic algorithms.

10. Course outcomes and teaching, learning and assessment methods

A. Knowledge objectives

- A1: Knowing artificial neural networks.
- A2: The ability to choose an artificial neural network.
- A3: Identifying learning algorithms in artificial neural networks.
- A4: Identifying the genetic search algorithm.
- A5: The ability to identify the types of genetic algorithms.

B. Course-specific skill objectives

- B1: Designing and implementing simple neural networks in the MATLAB programming language.
- B2: The ability to program the neural network using MATLAB.
- B3: Programming the methods and types of genetic algorithms and implementing them in the MATLAB programming language.

Teaching and learning methods

- Academic lectures: provide the solid foundation on which students' knowledge is developed.
- Practical laboratories and workshops: provide everything the student needs in terms of experience to develop the practical skill side, establish the principles needed to carry out practical projects correctly, and follow occupational safety steps to reduce harm to people and property.

Assessment methods

- Interactive assessment: carried out directly between the student and the instructor; it is one of the main sources of feedback that teaching staff rely on to evaluate the teaching and learning process.
- Periodic written tests: show the instructor how well students follow the academic content and respond to the information and notes given to them.
- Semester exams: the middle stage for assessing the student's interest in and interaction with the material received during the semester, in both its academic and practical aspects.
- Final exams: the final stage for assessing the student's interest in and interaction with the material received during the academic year, in both its academic and practical aspects.

C. Affective and value objectives

- C1: Fostering a spirit of creativity and innovation in students.
- C2: Developing students' sense of responsibility.
- C3: Developing the values of diligence and perseverance in completing work to reach satisfactory results.
- C4: Developing students' ability to work collaboratively.

Teaching and learning methods

- Presenting scientific problems and asking students to find more than one solution using different scientific methods, to stimulate their creativity.
- Forming work teams whose results are evaluated and whose membership changes periodically, to build a spirit of cooperation and motivate students to make every effort needed to work under different conditions and with different people.

Assessment methods

- Direct assessment: carried out directly by the instructor by observing students' engagement and their application of the affective and value objectives, and recording observations about it.
- Practical projects: assess the student's ability to achieve, innovate and work in teams, and the results and solutions reached for the scientific problems students face.

D. General and transferable skills (other skills related to employability and personal development)

- D1: Designing programs for the simplest types of neural networks, namely logic circuits.
- D2: Designing and implementing neural network algorithm programs.
- D3: Designing and implementing genetic algorithm programs.
- D4: Using the MATLAB programming language to increase the student's programming skill in the field of intelligent systems.

9. Course structure

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
1, 2	2 T / 2 P	Identifying the concept of neural networks and the artificial neural network	Introduction and role of ANNs, fundamentals of biological neural networks, basic principles of ANNs and their early structures	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
3	2 T / 2 P	Identifying the properties of the neural network	Properties of ANN, advantages and disadvantages	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
4–7	2 T / 2 P	Identifying the structure of the neural network and	Network architectures, logic	Lecture and	Interactive assessment,

Week	Hours	Required learning outcomes	Unit / topic	Teaching method	Assessment method
		logic circuits using the artificial neural network	gates	practical labs	periodic written tests, direct assessment
8, 9, 10	2 T / 2 P	Identifying the types of algorithms of the artificial neural network and the concept of training	Types of learning rules, learning algorithms, training styles	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
11–14	2 T / 2 P	Identifying the algorithms	Hebb, Adaline, Madaline, delta rule	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
15, 16	2 T / 2 P	Understanding and applying the perceptron algorithm	Important perceptron function, neuron model, perceptron architecture, learning rules, training	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
17, 18	2 T / 2 P	Understanding and applying the back-propagation algorithm	The back-propagation learning procedure, derivation of the BP algorithm, back-propagation training algorithm	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
19, 20	2 T / 2 P	Identifying the concept of search algorithms and genetic algorithms	Search algorithm, genetic algorithm	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
21–24	2 T / 2 P	Identifying the types of parameters used in genetic algorithms	Types of operators, population, selection, crossover, crossover rate, mutation, mutation rate	Lecture and practical labs	Interactive assessment, periodic written tests, direct assessment
25, 26, 27	–	Identifying the population, random selection, crossover and mutation algorithms	Population, selection, crossover and mutation algorithms	–	Interactive assessment, periodic written tests, direct assessment
28	–	Identifying the applications of genetic algorithms	Applications of genetic algorithms	–	Interactive assessment, periodic written tests, direct assessment
29, 30	–	Identifying the advantages and disadvantages of genetic algorithms	Advantages and disadvantages of genetic algorithms	–	Interactive assessment, periodic written tests, direct assessment

(T = theory hours, P = practical hours)

10. Infrastructure

Item	Details
Required textbooks	1- Fundamentals of Neural Networks: Architectures, Algorithms and Applications, Laurene Fausett; 2- Introduction to Genetic Algorithms, S.N. Sivanandam, S.N. Deepa, Springer, 2008
Main references (sources)	1- Fundamentals of Neural Networks: Architectures, Algorithms and

Item	Details
	Applications, Laurene Fausett; 2- Introduction to Genetic Algorithms, S.N. Sivanandam, S.N. Deepa, Springer, 2008
Recommended books and references (scientific journals, reports...)	–
Electronic references, websites	–

11. Course development plan

- Practical side: introducing modern applications and modern algorithms into the syllabus.