

**Ministry of Higher Education and Scientific Research**

**Scientific Supervision and Scientific Evaluation Apparatus  
Directorate of Quality Assurance and Academic Accreditation  
Accreditation Department**



# **Academic Program and Course Description Guide**

**2024**

## **Introduction:**

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

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

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

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

## **Concepts and terminology:**

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

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

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

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

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

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

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

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

## Academic Program Description Form

**University Name:** University of Baghdad

**Faculty/Institute:** College of Engineering

**Scientific Department:** Department of Computer Engineering

**Academic or Professional Program Name:** Bachelor of science in Computer Engineering

**Final Certificate Name:** B. Sc. in Computer Engineering

**Academic System:** An annual system for the fourth, third, and second grades and a curriculum system for the first grade.

**Description Preparation Date:** 27/2/2024.

**File Completion Date:** 18/3/2024.

Signature:



Head of Department Name: Dr. Firas Al-Salir

Date: 14/4/2-24

Signature:



Scientific Associate Name: Dr. Dhayyan Jasim

Date: 14-4-2024

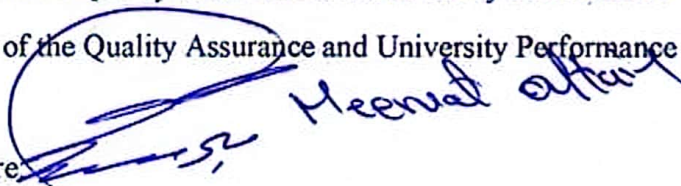
The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:



Meenal Altamir

Approval of the Dean



Ghassan Abdul-Majeed

## **1. Program Vision**

In order to prepare students for a technological community that is compatible with global technological revolutions, to prepare students for community service, and to prepare students for the demands of the labor market, the Department of Computer Engineering seeks to establish a scientific environment compatible with the quality of undergraduate education in computer engineering. The department also aspires to stay in touch with contemporary scientific advancements in the field of computer engineering and follow developments at specific universities, which results in the ongoing development of curricula and the upgrading of teaching staff through the establishment of workshops and training to give them scientific and practical experience as well as the opportunity to provide services to various state institutions and the private sector. The department's basic objectives are to conduct basic and applied research in computer-related engineering sciences and to graduate computer engineers who can work with the growing number of institutions and businesses in this industry. This work has been ongoing since the department's founding and continues today.

## **2. Program Mission**

The department's mission is to stimulate the student's scientific and practical potential through programs, educational curricula, and training workshops in computer engineering to link the theoretical basis with the scientific and applied aspects of the programs, which qualifies them to acquire the necessary skills required for the labor market. The

Department of Computer Engineering aspires to excellence in order to become a solid educational and scientific research institution capable of achieving its mission in serving the community through various specialized applied research that brings prosperity and progress to everyone and graduates a computer engineer who is able to keep pace with modern technology and push the wheel of development.

### **3. Program Objectives**

- I. Creating curricula for numerous disciplines that stay up with technological advancement.
- II. Managing the scientific relationships with the departments of computer engineering at various universities by planning seminars, hosting scientific meetings and workshops, and collaborating with other government colleges and the commercial sector to address issues with institutional research.
- III. Training and preparing engineering employees with a high level of understanding, expertise, and ability to create, examine, and develop computer systems.
- IV. Encouraging and motivating students to comprehend the idea of self-development, as well as to create the drive and enthusiasm to seek out and comprehend the information they will need to be successful in the jobs that will be assigned to them in the future.
- V. Offering computer engineering consulting services that are both applied and scientific to both the public and commercial sectors of society.
- VI. Providing students with the knowledge, skills, and talents they need

to be qualified to pursue higher education after graduation.

Followings are also goals of the department of computer engineering:

- VII. Intellectual goals: The capacity to describe and resolve issues using knowledge of mathematics, physics, and engineering. Ability to build a system, component, or process to satisfy specific needs; ability to plan and carry out experiments; ability to evaluate and understand data.
- VIII. Skills development goals: The capacity for using the contemporary engineering methods, abilities, and equipment required for engineering practice. Students who complete the Computer Engineering program will be able to: Acquire a foundational understanding of the various fields of computer engineering. Graduate will be able to utilize current engineering tools, techniques, and skills, identify, formulate, and resolve computer engineering challenges. Through hands-on practice, perform integrated design of computer systems, components, or processes.
- IX. Emotional and moral objectives: gaining an awareness of the impact a graduate's profession has on society; gaining a grasp of some of the ethical issues that arise in the practice of the profession.
- X. General objectives: (additional skills important for employability and growth personally): Ability to work in multidisciplinary teams; development of written and vocal communication abilities.

#### **4. Program Accreditation**

Does the program have program accreditation? And from which agency?

N/A

### 5. Other external influences

Is there a sponsor for the program?

N/A

### 6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	7	13	7%	basic
College Requirements	2	8	4%	basic
Department Requirements	28	159	89%	basic or optional
Summer Training	1	-	-	basic
Other				

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

### 7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
First Semester			theoretical	practical
			ECTS	
	COE 101	Mathematics and MATLAB	6	
	COE 102	Computer Structure and Organization	5	
	COE 103	Computer Programming	5	
	COE 104	Mathematical Modeling and Electrical Circuits	5	
	COE 105	Boolean Algebra	5	
	UOB 104	Democracy Human Rights	2	



	UOB 102	English (1)	2	
<b>First</b>	COE 106	Engineering Mathematics	6	
<b>Second Semester</b>	COE 107	Logic Circuit Design	5	
	COE 108	Object oriented Programming	6	
	COE 109	Mathematical Modeling and Electrical Systems	5	
	COE 110	Semi-Conductor Physics	6	
	UOB 101	Arabic Language	2	
<b>Second</b>	GS 201	Arabic	2	-
	COE 202	Engineering Mathematics	4	-
	COE 203	Electronic II	3	2
	COE 204	Microprocessor and Microcomputer I	3	2
	COE 205	Digital System Design	3	2
	COE 206	Data Structure and Algorithms	2	2
	COE 207	Communications	3	2
	GS 208	English	2	-
<b>Third</b>	COE 301	Computer Architecture I	3	-
	COE 302	Digital Control Systems	3	2
	COE 303	Microprocessor and Microcomputer II	3	2
	COE 304	Operating Systems	3	-
	COE 305	Computer Network	3	2
	COE 306	Digital Signal Processing	2	-
	COE 307	Data Base Systems	2	2
	GS 308	English	2	-
<b>Fourth</b>	COE 401	Internet Technology	3	2
	COE 402	Computer Architecture II	3	-

	COE 403	Embedded System	3	2
	COE 404	Computer Security	3	-
	COE 405	Robotics and Artificial Intelligence	3	-
	COE 406	Computer Vision and pattern Recognition	3	-
	COE 407	Engineering Project	2	2
	GS 408	English	2	-

## 8. Expected learning outcomes of the program

### Knowledge

Learning Outcomes 1 (A1)	The ability to apply knowledge of mathematics, science and engineering to describe and solve problems.
Learning Outcomes 2 (A2)	The ability to design and conduct experiments, as well as to analyze and interpret data.
Learning Outcomes 3 (A3)	The ability to design a system, component, or process to meet desired needs.

### Skills

Learning Outcomes 4 (B1)	Developing initial competence in computer engineering majors
Learning Outcomes 5 (B2)	Identifying, formulating, and solving computer engineering problems using modern engineering tools, techniques, and skills
Learning Outcomes 6 (B3)	Performing integrated design of computer systems, components, or processes by means of practical experiences.
Learning Outcomes 7 (B4)	Developing written and verbal communication skills
Learning Outcomes 8 (B5)	The ability to work within multi-disciplinary teams

### Ethics

Learning Outcomes 9 (C1)	Obtaining an appreciation of some ethical problems that arise in the practice of the profession.
Learning Outcomes 10 (C2)	Obtaining an understanding of the impact of their profession on society.

## 9. Teaching and Learning Strategies

- 1- Lectures.
- 2- Tutorials.
- 3- Homework and Assignments.

- 4- Tests and Exams.
- 5- In-Class Questions and Discussions.
- 6- Connection between Theory and Application.
- 7- Field Trips.
- 8- Extracurricular Activities.
- 9- Seminars.
- 10- In- and Out-Class oral conversations.
- 11- Reports, Presentations, and Posters

**10. Evaluation methods**

- 1- homework and duties tasks.
- 2- Daily, monthly, and final tests and examinations.
- 3- Questions and discussions within the classroom.
- 4- Oral discussions and exams inside and outside the classroom.
- 5- Reports, presentations, and posters.
- 6- Scientific projects.

**11. Faculty**

**Faculty Members**

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Mohammed Issam Younis	Computer Engineering	The Internet of things			38	4
Omar Waleed Abdulwahhab	Computer Engineering	Control and computers				
Nadia Adnan Shiltagh	Control and systems engineering	Control and networks				
Manal Fadhil	Computer	Computer				

Younus	Sciences	Sciences				
Firas Ali Sabir	Electrical and electronic engineering	Telecom				
Ahlam Hanoon Shanin	Electrical Engineering	Control and computers				
Sadiq Habeeb Abdulhussain	Electrical Engineering	Control and computers				
Wameedh Nazar Flayyih	Computer Engineering	Computer systems				
Alaa Mohammed Abdul-Hadi	Computer Engineering	Information Technology				
Riyad Basil Abdul Jabbar Salman	Electrical Engineering	Control and computers				
Mustafa Ismaiel Salman	Electronic and communications engineering	Communications and networks				
Ammar Adel Hassan Ali	Electrical Engineering	Control and computers				
Maad Issa Jaafar Sharoud	computer Sciences	Systems and networks				
Basheera Mohammed Ridha Mahmmod	Electrical Engineering	Embedded systems and computers				
Ziyad Tariq Allawi	Computer Engineering	Control and systems				
Iman Hussein	Arabic Language	literature				

Mohi Sajjan						
Zainab Hassan Fakhri	Electrical Engineering	Telecom				
Mohammed Sadoon Hathal	Computer Engineering	Software				
Asmaa Taha Saadoun Bashagha	Electrical Engineering	Electronics and communications				
Muhammad Jaafar Ali Abdul Amir Abdul Hussein	Computer Engineering	Computer Engineering				
Anas Wassil Ata'a	Electronic and communications engineering	control				
Saba Qasim Jabbar	Computer Engineering	Communications and information				
Mohammed Abd Al-Sahib Mahdi	Computer Engineering	Computer Engineering				
Ahmed Obaid Salman Jazaa	Electrical Engineering	Computer Engineering				
Dina Abdel Karim Abdel Qader Ahmed	Computer Engineering	Electronics and communications computers				
Hussein Abdel-Saheb Mahdi Jawad	Computer Engineering	Electronics and communications computers				
Taghreed Muhammad Ali	Computer Engineering	Control and computers				

Abdel Wahab						
Marwa Taher Nasser Hassoun	Computer Engineering	Electronics and communications computers				
Labeeb Mohsin Abdullah	Electrical Engineering	Communications and information				
Hayder Saadi Radeaf	Computer Engineering	Computer Engineering				
Marwah Abdulrazzaq Naser	Electronic and communications engineering	Wireless communications				
Hala Jassim Muhammad Ali	Computer Engineering	Electronics and communications computers				
Sally Antoine Guergis Francis	Control and systems engineering	Electronics and communications computers				
Islam Muhammad Ahmed Mustafa	Computer Engineering	Electronics and communications computers				
Hussein Ali Hussein Salman	Electrical Engineering	Electrical and electronic systems				
Al-Harith Muthanna Bashir Ismail	Computer Engineering	Computer Engineering				
Raafat Salih Muhammad	Computer Engineering	Electronics and communications computers				
Zainab Ibrahim Shihab Ahmed	Computer Engineering	Electronics and communications computers				

## **Professional Development**

### **Mentoring new faculty members**

- 1- Teaching the subject based on specialization, meaning that the specialization must be appropriate to the courses that the professor will teach.
- 2- Adherence to teaching dates and hours.
- 3- Developing and making scientific efforts in the specialty (publishing, conferences, seminars, projects, etc.)
- 4- Analyzing the success and failure rates of students in the subjects taught by the professor.
- 5- Developing their level of qualification and training to serve the scientific process.
- 6- Take some important courses such as those at the Center for Continuing Education.
- 7- Take some training courses in the laboratory department before starting with the students.

### **Professional development of faculty members**

An annual plan is developed that includes a set of programs and methods that work to provide the faculty member with more skills, knowledge, and modern techniques related to the exercise of his professional role, namely teaching, scientific research, administrative and leadership tasks, and finally community service, in order to raise the level of his performance so that he can perform his role in an integrated manner. This plan includes arrangements for the academic and professional development of faculty members and includes a number of axes, namely:

- 1- Developing teaching and learning strategies.
- 2- Evaluation of learning outcomes.
- 3- Professional development for faculty members.
- 4- E-learning development.

## **12. Acceptance Criterion**

Admission to the Bachelor's program in the Department of Computer Engineering is based on the following rules:

- 1- The applicant (Students) from the Iraqi high school diploma. must obtain a high average to qualify for admission to colleges of engineering.
- 2- The Ministry of Education and Higher Education put the rules of admission.

3- The distribution of students to the 13 engineering departments of the College of Engineering at the University of Baghdad, including the Department of Computer Engineering is based on their winding of the ability plan and average evaluation of applicants and their aspiration or selection. The capacity plan of the Department of Computer Engineering in the last triennium was 40-50 students.

4- The number of students accepted for admission is available in centers in the names of the state and ministries.

5 - There is a specific time for admission.

6- An applicant who graduated from the secondary school system outside Iraq has completed twelve years of combined elementary and secondary schools and studies from a recognized school. An equivalent certificate from the Iraqi Ministry of Education is also required.

### **13.The most important sources of information about the program**

A- The department page on the college's website.

B- Computer Engineering Department Handbook.

C- College of Engineering Handbook.

D- Some committee meetings of the Ministry for the Computer Engineering Department.

E-Official E-mails of the Department.

### **14.Program Development Plan**

The development and improvement plan are carried out continuously by focusing on learning outcomes, considering the opinions of students and teaching staff and the reality of the department's infrastructure. The development mechanism takes place by establishing mechanisms to ensure improvement of performance standards in line with international universities and achieving labor market requirements. It is necessary to develop a future plan to improve processes that increase the degree of achievement of the department and college objectives by conducting a periodic study and comprehensive analysis of areas of weakness or deficit in order to overcome or overcome them. Part of the program development plan is directly related to the teacher by working to improve the level of the scientific material, advance the academic level of the students, and overcome the obstacles



facing the students or the educational process, according to his specialty in his work site, to ensure quality. We seek to move forward with continuous development and improvement plans to provide our optimal program, and the following specific procedures have been successfully implemented:

- 1- Changes in the curriculum to keep pace with the development taking place in international universities.
- 2- Continuous improvement of faculty members through training programs.
- 3- Study the obstacles related to developing the quality of engineering education and propose quick and correct solutions appropriate to this.
- 4- Purchasing a number of laboratory equipment, measuring tools and modern books.
- 5- Holding conferences, seminars, etc., in cooperation with public and private sector institutions, by taking advantage of the capabilities of those institutions, in order to link the labor market with the academic field and study the possibility of providing job opportunities for graduates.
- 6- Directing the Engineering Department to deal with local and international institutions related to developing the quality of higher education.
- 7- Establishing a network of access facilities provided by the College of Engineering Wireless LAN network with stations now available in the department.
- 8- An increase in extracurricular activities for students, such as sports and scientific activities.
- 9- Reconstruction and rehabilitation of classrooms and rooms in the department, as well as services and infrastructure.
- 10- Measuring the level of academic program outcomes and developing evaluation tools that give correct indicators of their achievement.

### Program Skills Outline

Required program Learning outcomes														
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills					Ethics	
				A1	A2	A3	B1	B2	B3	B4	B5	C1	C2	
<b>First- First Semester</b>	COE101	Mathematics and MATLAB	C	√	√	√								
	COE102	Computer Structure and Organization	C		√		√	√	√	√		√	√	
	COE103	Computer Programming	C	√	√	√	√	√	√		√	√	√	
	COE104	Mathematical Modeling and Electrical Circuits	C	√	√	√	√	√	√		√			

	COE105	Boolean Algebra	C	√	√	√	√	√		√			√
	GE02	Democracy Human Rights								√		√	
	GE01	English (1)	C							√	√		
<b>First- Second semested</b>	<b>COE106</b>	Engineering Mathematics	C	√	√	√							
	<b>COE107</b>	Logic Circuit Design	C	√	√	√	√	√		√			√
	<b>COE108</b>	Object oriented Programming	C	√	√	√	√	√	√		√	√	√
	<b>COE109</b>	Mathematical Modeling and Electrical Systems	C	√	√	√	√	√	√		√		
	<b>COE110</b>	Semi-Conductor Physics	C	√	√	√	√	√	√		√	√	√
	<b>GE03</b>	Arabic Language	C							√	√		
<b>Second</b>	<b>GS 201</b>	Arabic	C							√	√		

	<b>COE 202</b>	Engineering Mathematics	C	√	√								
	<b>COE 203</b>	Electronic II	C	√	√	√	√	√	√		√	√	√
	<b>COE 204</b>	Microprocessor and Microcomputer I	C	√	√	√	√	√	√		√	√	√
	<b>COE 205</b>	Digital System Design	C	√	√	√	√	√	√		√	√	√
	<b>COE 206</b>	Data Structure and Algorithms	C	√	√	√	√	√	√		√	√	√
	<b>COE 207</b>	Communications	C	√	√	√	√	√	√		√	√	√
	<b>GS 208</b>	English	C							√	√		
<b>Third</b>	<b>COE 301</b>	Computer Architecture I	C	√	√	√	√	√	√			√	√
	<b>COE 302</b>	Digital Control Systems	C	√	√	√	√	√	√			√	√
	<b>COE 303</b>	Microprocessor and Microcomputer	C	√	√	√	√	√	√		√	√	√

		II											
	<b>COE 304</b>	Operating Systems	C	√	√	√	√	√	√			√	√
	<b>COE 305</b>	Computer Network	C	√	√	√	√	√	√		√	√	√
	<b>COE 306</b>	Digital Signal Processing	O	√	√	√	√		√		√	√	√
	<b>COE 307</b>	Data Base Systems	O	√	√	√	√	√	√			√	√
	<b>GS 308</b>	English	C							√	√		
<b>Fourth</b>	<b>COE 401</b>	Internet Technology	C	√	√	√	√	√	√		√	√	√
	<b>COE 402</b>	Computer Architecture II	C	√	√	√	√	√	√			√	√
	<b>COE 403</b>	Embedded System	C	√	√	√	√	√	√		√	√	√
	<b>COE 404</b>	Computer Security	C	√	√	√	√	√	√			√	√
	<b>COE 405</b>	Robotics and Artificial	O	√	√	√	√	√	√			√	√

		Intelligence											
	<b>COE 406</b>	Computer Vision and pattern Recognition	O	√	√	√	√	√	√			√	√
	<b>COE 407</b>	Engineering Project	C	√	√	√	√	√	√	√	√	√	√
	<b>GS 408</b>	English	C							√	√		

- Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

# First Year

## (First Course)

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Mathematics and Matlab		Module Delivery	
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	GE 102			
ECTS Credits	6			
SWL (hr/sem)	90			
Module Level	1	Semester of Delivery		1
Administering Department	Computer	College	College of Engineering	
Module Leader	Dr. Saba Qasim Jabbar		e-mail	shura2007515@coeng.uobaghdad.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification		
Module Tutor			e-mail	shura2007515@coeng.uobaghdad.edu.iq
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

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



## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<ul style="list-style-type: none"> <li>Improving the student's level in mathematics in particular and in the educational process in general.</li> <li>Understand some mathematical concepts. Such as: matrices, functions, trigonometric functions, inverse functions, differentiation, integration, solving first degree derivative equations.</li> <li>Understanding some mathematical applications, such as the use of the derivative in drawing functions and applications of integration in calculating area and volume..</li> </ul>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	A student who successfully fulfills the course requirements will have demonstrated: <ol style="list-style-type: none"> <li>Learn to use concepts of mathematics</li> <li>Apply these concepts in their studies to solve the mathematics problems related to the main topics studied in mechanical courses.</li> <li>Learn methods for sketch functions.</li> <li>Learn and recruit Logarithmic and Trigonometric functions in the related mathematics models.</li> <li>Be able to apply differential equations in engineering problems and applications.</li> <li>Work in groups and function on multi-disciplinary teams.</li> <li>Understand professional, social and ethical responsibilities.</li> </ol>
<b>Indicative Contents</b> المحتويات الإرشادية	

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<ol style="list-style-type: none"> <li>Lectures.</li> <li>Tutorials.</li> <li>Homework and Assignments.</li> <li>Tests and Exams.</li> <li>In-Class Questions and Discussions.</li> <li>Connection between Theory and Application.</li> <li>Field Trips.</li> <li>Extracurricular Activities.</li> <li>In- and Out-Class oral conversations.</li> </ol>
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## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	40	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	2.67
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<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	10	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعياً	0.67
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	50		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	3	13%		
	<b>Assignments</b>	2	10%		
	<b>Projects / Lab.</b>	2	15%		
	<b>Report</b>		2%		
<b>Summative assessment</b>	<b>Midterm Exam</b>	1	10%		
	<b>Final Exam</b>	1	50%		
<b>Total assessment</b>			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي النظري	
	<b>Material Covered</b>
<b>Week 1</b>	Complex numbers in Cartesian coordinate and Polar coordinates DeMoivre's Theorem
<b>Week 2</b>	Matrix, properties, Determinates, Operations and inverse matrices
<b>Week 3</b>	Review of functions, Types of functions, Graphs of functions. The principle of mathematical induction.
<b>Week 4</b>	Trigonometric functions and their graphs
<b>Week 5</b>	Inverse trigonometric functions and their graphs
<b>Week 6</b>	Continuous with Inverse trigonometric functions and their graphs
<b>Week 7</b>	Transcendental functions "logarithm function ,Natural logarithms and exponential functions"
<b>Week 8</b>	Limits of Functions. The method of substitution, the Sandwich Theorem. Continuity of a function
<b>Week 9</b>	Differentiation, differentiation rules. Derivatives of trigonometric functions.
<b>Week 10</b>	Derivatives of the inverse trigonometric functions and Transcendental functions
<b>Week 11</b>	Applications of derivatives: Concavity and Curve Sketching Indeterminate forms and L'Hopital's Rule
<b>Week 12</b>	Integration- Indefinite integrals the definite integral. Substitution and Area between curves

<b>Week 13</b>	Techniques of integration, basic integration formulas, integration by parts, integration of rational functions by partial fractions, trigonometric substitutions, integral Tables
<b>Week 14</b>	Applications of definite integrals- Volumes by Slicing and Rotation about Axis.
<b>Week 15</b>	First order differential equations, variable separable, homogeneous, linear, exact first order.
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الاسبوعي للمختبر	
	<b>Material Covered</b>
<b>Week 1</b>	EXP1: Complex numbers in Cartesian coordinate and Polar coordinates DeMoivre's Theorem
<b>Week 2</b>	EXP2: Matrix, properties, Determinates, Operations and inverse matrices
<b>Week 3</b>	EXP3: Review of functions, Types of functions, Graphs of functions. The principle of mathematical induction.
<b>Week 4</b>	EXP4: Trigonometric functions and their graphs
<b>Week 5</b>	EXP5: Inverse trigonometric functions and their graphs
<b>Week 6</b>	EXP6: Continuous with Inverse trigonometric functions and their graphs
<b>Week 7</b>	EXP7: Transcendental functions "logarithm function ,Natural logarithms and exponential functions"
<b>Week 8</b>	EXP8: Limits of Functions. The method of substitution, the Sandwich Theorem. Continuity of a function
<b>Week 9</b>	EXP9: Differentiation, differentiation rules. Derivatives of trigonometric functions.
<b>Week 10</b>	EXP10: Derivatives of the inverse trigonometric functions and Transcendental functions
<b>Week 11</b>	EXP11: Applications of derivatives: Concavity and Curve Sketching Indeterminate forms and L'Hopital's Rule.
<b>Week 12</b>	EXP12: Integration- Indefinite integrals the definite integral. Substitution and Area between curves
<b>Week 13</b>	EXP13: Techniques of integration, basic integration formulas, integration by parts, integration of rational functions by partial fractions, trigonometric substitutions, integral Tables
<b>Week 14</b>	EXP14: Applications of definite integrals- Volumes by Slicing and Rotation about Axis.
<b>Week 15</b>	EXP5: First order differential equations, variable separable, homogeneous, linear, exact first order.
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Weir, M., Hass and Giordano. (2008). Thomas' Calculus. Eleventh Edition, Pearson-Addison-Weesley.	Y
Recommended Texts	Howard, A. et. Al. (2008). Calculus. McGraw-Hill	Y
Websites	<a href="https://www.youtube.com/watch?v=fo_q9mEAFp4">https://www.youtube.com/watch?v=fo_q9mEAFp4</a> <a href="https://www.youtube.com/watch?v=S4n-tQZnU6o">https://www.youtube.com/watch?v=S4n-tQZnU6o</a> <a href="https://www.youtube.com/watch?v=UjTTx2eYrx8&amp;t=1058s">https://www.youtube.com/watch?v=UjTTx2eYrx8&amp;t=1058s</a>	

Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
<p><b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.</p>				



Ministry of Higher Education and  
Scientific Research - Iraq  
  
University of Baghdad  
Computer Engineering Department



## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Computer Structure and Organization		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	COE102		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	1	Semester of Delivery	
Administering Department	Computer	College	College of Engineering
Module Leader	Hala Jassim Mohammed	e-mail	<a href="mailto:hala.jassim@coeng.uobaghdad.edu.iq">hala.jassim@coeng.uobaghdad.edu.iq</a>
Module Leader's Acad. Title	Assist. Lect.	Module Leader's Qualification	M.Sc.
Module Tutor		e-mail	
Peer Reviewer Name	Mohammed Issam Younis	e-mail	<a href="mailto:younismi@coeng.uobaghdad.edu.iq">younismi@coeng.uobaghdad.edu.iq</a>
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<p>-This course is intended for first-class students. These students typically will know how a computer works, how to assemble and disassemble the computer, and how to troubleshoot hardware and software issues.</p> <p>-The students will enhance the capability of using computer skills in Microsoft Word, Excel, and PowerPoint, because of the wide uses of these applications in education, scientific research, and the preparation of research reports.</p>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p>Upon the completion of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1) Understand the history and development of the computer system.</li> <li>2) Identify the purposes and operation of the power supply of the personal computer.</li> <li>3) Identify the CPU's names, purposes, and characteristics and how to Install and troubleshoot the CPU. And learn the internal structure and operation of the microprocessor.</li> <li>4) Identify the names, purposes, and characteristics of motherboard and adapter cards. and how to Install and troubleshoot the motherboard. And learn the development and structure of the motherboard.</li> <li>5) Identifying the BIOS and CMOS settings. And understand the purpose of the operating system and how to Install an operating system and MS applications.</li> <li>6) Identify the names, purposes, characteristics, and types of memory. and how to Install and troubleshoot memory.</li> <li>7) Identify the names, purposes, characteristics, and types of storage devices and how to install and troubleshoot the storage devices.</li> <li>8) Identify serial and parallel ports that have been standard on PCs since the beginning and the universal serial bus and IEEE 1394 or (FireWire) interfaces.</li> <li>9) Identify the purpose and components of laptops and other portable devices. and troubleshoot laptops.</li> </ol>

	<p>10) Identify the names, purposes, and characteristics of input and output devices and their operation.</p> <p>11) Learn the principles of networking, the basic networking concepts, and technologies.</p>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<ul style="list-style-type: none"> <li>- Explain the Basic Structure of the Computer and the interaction with I/O devices this includes Input devices, Output devices, I /O Ports, CPU, Memory, and Storage</li> <li>- Explain the role of the Operating system and software for computer work.</li> <li>- The principle of networking.</li> <li>- Portable Devices.</li> </ul>

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through class discussions and practical experiments in the laboratory.</p>
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### Student Workload (SWL)

#### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<p><b>Structured SWL (h/sem)</b></p> <p>الحمل الدراسي المنتظم للطالب خلال الفصل</p>	64	<p><b>Structured SWL (h/w)</b></p> <p>الحمل الدراسي المنتظم للطالب أسبوعيا</p>	4
<p><b>Unstructured SWL (h/sem)</b></p> <p>الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	36	<p><b>Unstructured SWL (h/w)</b></p> <p>الحمل الدراسي غير المنتظم للطالب أسبوعيا</p>	
<p><b>Total SWL (h/sem)</b></p> <p>الحمل الدراسي الكلي للطالب خلال الفصل</p>	<b>100</b>		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	3	15%	3,11,15	1, (8,9),(10,11)
	<b>Assignments</b>	1	2%		
	<b>Projects / Lab.</b>	3	15%	10,11,12	5
	<b>Report</b>	1	8%	15	1-11
<b>Summative assessment</b>	<b>Midterm Exam</b>	1/ (2 hours)	10%	8	3-7
	<b>Final Exam</b>	1/ (3 hours)	50%	16	All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	The Development of the Personal Computers.
<b>Week 2</b>	Power Supplies of the Personal Computers.
<b>Week 3</b>	Processor Types and Specifications.
<b>Week 4</b>	Motherboards and Buses.
<b>Week 5</b>	BIOS.
<b>Week 6</b>	Memory.
<b>Week 7</b>	Magnetic Storage.
<b>Week 8</b>	Mid Exam
<b>Week 9</b>	Optical, flash, and removable storage.



<b>Week 10</b>	External I/O Interface.
<b>Week 11</b>	Laptop and Portable Devices.
<b>Week 12</b>	Input Device Types and Operation
<b>Week 13</b>	Output Device Types and Operation
<b>Week 14</b>	Network Fundamentals.
<b>Week 15</b>	Introduction to Microprocessor Structure.
<b>Week 16</b>	Final Exam.

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	EXP 1: Identifying Computer Components.
<b>Week 2</b>	EXP 2: Computer Assembling and Disassembling.
<b>Week 3</b>	EXP 3: Installing Windows Operating System.
<b>Week 4</b>	EXP 4: Navigate within an Operating System using GUI and CLI.
<b>Week 5</b>	EXP 5: Identifying BIOS and CMOS settings.
<b>Week 6</b>	EXP 6: Creating a Partition in Windows OS.
<b>Week 7</b>	EXP 7: Explore Administrative Tools.
<b>Week 8</b>	EXP 8: Preventive maintenance procedure for OS.
<b>Week 9</b>	EXP 9: Identify laptop Components and Laptop Assembling and Disassembling.
<b>Week 10</b>	EXP 10: MS Word.
<b>Week 11</b>	EXP 11: MS PowerPoint.
<b>Week 12</b>	EXP 12: MS Excel.
<b>Week 13</b>	EXP 13: Networking UTP-cable configuration and testing.

<b>Week 14</b>	EXP 14: Networking PC to PC interface using UTP cable, sharing folders, and building a small network using a hub, LAN card, and UTP cable.
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<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Scott Mueller, "UPGRADING AND REPAIRING PCs", 20th edition, 2012.	NO (Available free of charge online).
<b>Recommended Texts</b>	The Intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit extensions: architecture, programming, and interfacing / Barry B. Brey—8th ed.	NO (Available free of charge online).
<b>Websites</b>		

<b>Grading Scheme</b> مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
<b>Success Group</b> (50 - 100)	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group</b> (0 - 49)	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work is required but credit is awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required
<b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Computer programing Methodology		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	COE103		
ECTS Credits	5		
SWL (hr/sem)	130		
Module Level	1	Semester of Delivery	
Administering Department	Computer	College	College of Engineering
Module Leader	Mohammed Al-Shammaa	e-mail	m.alshammaa@coeng.uobaghdad.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

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

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<ol style="list-style-type: none"><li>1- This course aims to help students to learn how to use Python programming language to solve real-life and scientific problems. The objective of the course is to provide students with confidence of their ability to write small useful programs.</li><li>2- In addition, the course covers some details of essential programming topics like: program debugging, testing and algorithm development.</li><li>3- Students learn best by experimenting a plenty of programs that that solve useful and interesting problems. The problems tackled cover a wide range of general, and scientific applications although none of them require specialist knowledge.</li></ol>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p>Upon successful completion of the course, students should be able to:</p> <ol style="list-style-type: none"><li>1- Know how to use/ run programs.</li><li>2- Design of algorithms and implementation, testing and verification of programs</li><li>3- Code in Python</li><li>4- Handling multiple data types and type conversions.</li><li>5- Read given source code in Python and understand its behavior.</li><li>6- Extend existing source code for new features.</li><li>7- Write original source code to solve an engineering problem.</li><li>8- Organize source code in a modular form.</li></ol>
<b>Indicative Contents</b> المحتويات الإرشادية	

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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## Student Workload (SWL)

### الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	79	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	5.26
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	51	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	3.4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>150</b>		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	3	30%		
	<b>Assignments</b>	2	10%		
	<b>Projects / Lab.</b>	5	10%		
	<b>Report</b>				
<b>Summative assessment</b>	<b>Midterm Exam</b>		10%		
	<b>Final Exam</b>		50%		
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to programming, problem solving, and Python basic syntax
Week 2	Python data types: variables, assignments, and numerical types
Week 3	Python Print and Input
Week 4	Arithmetic and logical operators, precedence of operators
Week 5	If statement, nested if statement, if-else if ladder else
Week 6	String data type: simple string processing and string manipulation
Week 7	Python lists: traversing a list and list operations
Week 8	Loops: while statement and for statement
Week 9	2D lists and Nested loops
Week 10	Python dictionaries, sets, and tuples
Week 11	Handling multiple data types and type conversions
Week 12	Python text files: reading from and writing to a file
Week 13	Modules in Python: Turtle and Random modules
Week 14	Functions in Python: new function creation, return values and calls
Week 15	Function arbitrary arguments, passing lists to a function, and recursive functions
Week 16	<b>Preparatory week before the final Exam</b>

## Delivery Plan (Weekly Lab. Syllabus)

### المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	EXP 1: VARIABLES, DATA TYPE, AND OPERATIONS
Week 2	EXP 2: IF...ELIF...ELSE STATEMENT
Week 3, 4	EXP 3: LISTS
Week 5,6	EXP 4: LOOPS
Week 7	EXP 5: STRING MANIPULATION
Week 8, 9	EXP 6: TUPLES, SET, AND DICTIONAR
Week 10, 11	EXP 7: FILE HANDLING
Week 12, 13	EXP 8: MODULES
Week 14, 15	EXP 10: FUNCTIONS

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Brian Heinold, A Practical Introduction to Python Programming, 2012	No
<b>Recommended Texts</b>	Ben Stephenson, The Python Workbook: A Brief Introduction with Exercises and Solutions, 2014	No
<b>Websites</b>	<a href="https://www.w3schools.com/python/">https://www.w3schools.com/python/</a>	

## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.



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College of Engineering  
Department of Computer  
Engineering



## MODULE DESCRIPTOR FORM

### نموذج وصف المادة الدراسية

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	<b>MATHEMATICAL MODELING AND ELECTRICAL CIRCUITS</b>		<b>Module Delivery</b>
<b>Module Type</b>	<b>CORE</b>		Class Lecture + Lab.
<b>Module Code</b>	<b>COE104</b>		
<b>ECTS Credits</b>	<b>6</b>		
<b>SWL (hr/sem)</b>	<b>150</b>		
<b>Module Level</b>	<b>1</b>	<b>Semester of Delivery</b>	
<b>Administering Department</b>	computer	<b>College</b>	Engineering
<b>Module Leader</b>	Ahlam Hanoon Shnain	<b>e-mail</b>	<a href="mailto:assis.prf.a.hanoon@coeng.uobaghdad.edu.iq">assis.prf.a.hanoon@coeng.uobaghdad.edu.iq</a>
<b>Module Leader's Acad. Title</b>	Assis.Prof.	<b>Module Leader's Qualification</b>	M.Sc
<b>Module Tutor</b>	None	<b>e-mail</b>	None
<b>Peer Reviewer Name</b>	Labeeb Mohsin Abdullah	<b>e-mail</b>	<a href="mailto:Labeeb.m@coeng.uobaghdad.edu.iq">Labeeb.m@coeng.uobaghdad.edu.iq</a>
<b>Review Committee Approval</b>	25/6/2023	<b>Version Number</b>	1.0



## Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	Mathematics and Mat lab	<b>Semester</b>	1

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p style="text-align: center;"><b>Module Aims</b> أهداف المادة الدراسية</p>	<p>1.To introduce students to the fundamental principles of mathematical modeling and its applications in the field of electrical circuits.</p> <p>2.To develop students' skills in formulating mathematical models for electrical systems and analyzing their behavior using mathematical techniques.</p> <p>3.To enable students to understand the principles of electrical circuits and their components, including resistors, capacitors, and inductors.</p> <p>4.To provide students with hands-on experience in designing and analyzing electrical circuits using appropriate tools and software.</p> <p>5.To enhance students' problem-solving abilities by applying mathematical modeling techniques to real-world electrical engineering problems</p>
<p style="text-align: center;"><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>LO #1.Demonstrate an understanding of the basic principles of mathematical modeling and its relevance to electrical circuits.</p> <p>LO #2.Formulate mathematical models for simple electrical systems and analyze their behavior using mathematical techniques such as differential equations and linear algebra.</p> <p>LO #3.Apply Kirchhoff's laws and other circuit analysis techniques to solve electrical circuit problems involving resistors, capacitors, and inductors.</p> <p>LO #4.Design and analyze electrical circuits using appropriate software tools, considering factors such as power consumption, efficiency, and safety.</p> <p>LO #5.Interpret and evaluate the results obtained from mathematical models and circuit simulations in the context of real-world applications.</p> <p>LO #6.Demonstrate effective problem-solving skills by applying mathematical modeling techniques to solve electrical engineering problems .</p>
<p style="text-align: center;"><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>1. Introduction to mathematical modeling in electrical engineering.</p> <p>2. Mathematical techniques for electrical circuit analysis: differential equations, linear algebra.</p> <p>3. Basic circuit elements: resistors, capacitors, and inductors.</p> <p>4. Kirchhoff's laws and their applications in circuit analysis.</p> <p>5. Circuit analysis techniques: node voltage method, mesh current method, superposition theorem.</p> <p>6. Introduction to software tools for circuit simulation and design.</p> <p>7. Practical applications of mathematical modeling and circuit analysis in electrical engineering.</p>

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>1. Lectures: The module may include traditional lectures where the instructor presents the theoretical concepts, principles, and mathematical techniques related to mathematical modeling and electrical circuits. The lectures can provide a foundation for understanding the subject matter.</p> <p>2. Interactive Discussions: Interactive discussions can be incorporated to encourage student participation and engagement. This can involve questioning and problem-solving activities related to mathematical modeling and electrical circuits. Discussions can help clarify concepts and stimulate critical thinking.</p> <p>3. LAB Experiment. Sessions: Hands-on LAB.sessions can allow students to apply the theoretical knowledge to real-world scenarios. Students may work with electrical circuit components, measurement devices, and software tools for circuit simulation and analysis. LAB Experiment provide valuable experiential learning opportunities.</p> <p>4. Computer-based Learning: Computer-based learning resources, such as online tutorials, interactive simulations, and educational software, can be used to supplement the learning process. These resources can assist students in visualizing electrical circuits, simulating their behavior, and exploring mathematical modeling concepts.</p> <p>6. Group Projects: Collaborative group projects can encourage teamwork and the application of mathematical modeling principles to solve complex electrical circuit problems. Students can work together to design and analyze circuits, formulate mathematical models, and present their findings to the class.</p> <p>7. Assessment Methods: Various assessment methods can be employed, including quizzes, tests, assignments, and project reports. These assessments can evaluate students' understanding of mathematical modeling and electrical circuits, their ability to apply the learned concepts, and their problem-solving skills.</p> <p>8. Self-directed Learning: Encouraging students to engage in self-directed learning by exploring additional resources, conducting research, and practicing problems independently can further enhance their understanding and mastery of the subject matter.</p>
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**Student Workload (SWL)**

الحمل الدراسي للطالب

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	94	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6.266
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.733
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل			150

## Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	4	10% (10)	4,8,11,13	LO #1, 2 and 3
	<b>Assignments</b>	3	5% (5)	3,6 ,14	LO # 1, 2 and3
	<b>Lab.</b>	15	15%(15)	1-15	LO #3,4 ,5 and 6
<b>Summative assessment</b>	<b>Comprehensive Exam</b>	1	5% (5)	12	LO #3,4 ,5 and 6
	<b>Projects</b>	1	5% (5)	15	LO # 1-4
	<b>Final Exam</b>	4 hr	60% (60)	16	All
<b>Total assessment</b>		100% (100 Marks)			

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introduction to mathematical modeling - Importance and applications of mathematical - Modeling in electrical circuits
<b>Week 2</b>	-Overview of electrical circuits and components (resistors, capacitors, inductors)and Ohm's Law
<b>Week 3</b>	Mathematical techniques for electrical analysis
<b>Week 4</b>	-Differential equations for electrical circuits
<b>Week 5</b>	-Linear algebra and matrices in circuit analysis
<b>Week 6</b>	Kirchhoff's law and circuits analysis techniques - Kirchhoff's voltage and current laws
<b>Week 7</b>	Node voltage and mesh current methods
<b>Week 8</b>	circuits analysis techniques – Superposition theorem and its applications Thevenin Theorem , Norton Theorem and Maximum power transfer
<b>Week 9</b>	Introduction to software tools for circuits -simulation and design
<b>Week 10</b>	-Overview of AC electrical circuits

	-Analysis of RL and RC circuit in series and parallel
<b>Week 11</b>	-Analysis of RLC circuit in series and parallel
<b>Week 12</b>	circuits analysis techniques – Superposition theorem and its applications Thevenin Theorem , Norton Theorem and Maximum power transfer and complex power
<b>Week 13</b>	Practical applications of mathematical modeling and circuit analysis in electrical engineering
<b>Week 14</b>	Resonance Series re Resonance
<b>Week 15</b>	Parallel Resonance
<b>Week 16</b>	Review and revision and Final examination preparation

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	EXP 1: Introduction to Basic Electrical Concepts
<b>Week 2</b>	EXP 2: Ohm's Law and Circuit Analysis
<b>Week 3</b>	EXP 3: KVL and Circuit Analysis
<b>Week 4</b>	EXP 4: KCL and Circuit Analysis
<b>Week 5</b>	EXP 5: superposition Circuit Analysis -Simulation Models
<b>Week 7</b>	EXP6: Circuit Theorems (Thevenin)
<b>Week 8</b>	EXP 7: Circuit Theorems (Maximum power transfer )Simulation Models
<b>Week 9</b>	EXP 8: DC Circuits and Voltage Division- Simulation Models
<b>Week 10</b>	EXP 9: Capacitors and Inductors
<b>Week 11</b>	EXP10: Analysis(AC Circuits and Impedance)-Simulation Models
<b>Week 12</b>	EXP11: Power in AC Circuits
<b>Week 13</b>	EXP12: RLC Circuits and Resonance
<b>Week 14</b>	Project Work
<b>Week 15</b>	Final Exam

### Learning and Teaching Resources

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the</b>

		Library ?
<b>Required Texts</b>	<p>1-Fundamentals of Modern Electric Circuit Analysis and Filter Synthesis A Transfer Function Approach Second Edition© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2023</p> <p>2-Fundamentals of Electric Circuits Charles K. Alexander Professor Emeritus of Electrical Engineering and Computer Science Cleveland State University ,Matthew N. O. Sadiku Department of Electrical and Computer Engineering Prairie View A&amp;M University Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright © 2021 by McGraw-Hill Education.</p> <p>3."Engineering Circuit Analysis" by William H. Hayt Jr. and Jack E. Kemmerly: This textbook provides a comprehensive introduction to electrical circuits, covering topics such as circuit analysis techniques, network theorems, and AC circuit analysis.</p> <p>5."Introduction to Electric Circuits" by Richard C. Dorf and James A. Svoboda: This textbook offers a practical approach to understanding electric circuits. It covers topics such as circuit analysis techniques, network theorems, AC circuit analysis, and introduces mathematical modeling principles.</p> <p>4."Mathematical Modeling and Simulation: Introduction for Scientists and Engineers" by Kai Velten: This textbook focuses specifically on mathematical modeling techniques and their application in various scientific and engineering fields. It covers topics such as modeling principles, differential equations, simulation methods, and includes examples relevant to electrical circuits.</p>	Yes Soft copy
<b>Recommended Texts</b>	<p>1."Electric Circuits" by James W. Nilsson and Susan A. Riedel: This textbook offers a clear and concise introduction to electrical circuits and circuit analysis. It covers topics such as Kirchhoff's laws, network theorems, AC circuit analysis, and introduces mathematical modeling techniques.</p> <p>2."Mathematical Modeling and Simulation: Introduction for Scientists and Engineers" by Kai Velten: This textbook focuses specifically on mathematical modeling techniques and their application in various scientific and engineering fields. It covers topics such as modeling principles, differential equations, simulation methods, and includes examples relevant to electrical circuits.</p> <p>3.Basic Engineering Circuit Analysis J. DAVID IRWIN Auburn University R. MARK NELMS Auburn University 2021 12th Edition</p> <p>4-Fundamentals of Modern Electric Circuit Analysis and Filter Synthesis A Transfer Function Approach Second Edition© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2023</p> <p>5-Fundamentals of Electric Circuits Charles K. Alexander Professor Emeritus of Electrical Engineering and Computer Science Cleveland State University ,Matthew N. O. Sadiku Department of Electrical and</p>	Yes pdf

	Computer Engineering Prairie View A&M University Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright © 2021 by McGraw-Hill Education.
<b>Websites</b>	1. MATLAB( <a href="http://www.mathworks.com/products/matlab.html">www.mathworks.com/products/matlab.html</a> ) 2. Simulink ( <a href="http://www.mathworks.com/products/simulink.html">www.mathworks.com/products/simulink.html</a> ) 3. CircuitLab ( <a href="http://www.circuitlab.com">www.circuitlab.com</a> ) 4. Multisim Live ( <a href="http://www.multisim.com/live/">www.multisim.com/live/</a> )

**APPENDIX:**

<b>GRADING SCHEME</b> مخطط الدرجات				
<b>Group</b>	<b>Grade</b>	<b>التقدير</b>	<b>Marks (%)</b>	<b>Definition</b>
<b>Success Group (50 - 100)</b>	<b>A – Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C – Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D – Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E – Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX – Fail</b>	مقبول بقرار	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required
<b>Note:</b>				
<p>NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.</p>				



# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Boolean Algebra		Module Delivery
Module Type	B		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	COE105		
ECTS Credits	5		
SWL (hr/sem)	150		
Module Level	1	Semester of Delivery	
Administering Department	Computer	College	College of Engineering
Module Leader	Mohammed Issam Younis Zainab Hassan	e-mail	younismi@coeng.uobaghdad.edu.iq zainab.hassan@coeng.uobaghdad.edu.iq
Module Leader's Acad. Title	Professor Lecturer	Module Leader's Qualification	Ph.D. Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	29/06/2023	Version Number	2.1

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

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p>This course serves as a building block in many disciplines that utilize data of digital nature like digital system design, digital control, data communication, digital computers, computer programming, AI, dsp, etc. The goal of this course is to;</p> <ol style="list-style-type: none"><li>1. perform arithmetic operations in many number systems.</li><li>2. manipulate Boolean algebraic structures.</li><li>3. simplify the Boolean expressions using Karnaugh Map.</li><li>4. implement the Boolean Functions using many techniques.</li><li>5. analyze and design various combinational logic circuits.</li><li>6. understand the basic functions of flip-flops.</li><li>7. understand the importance of state diagram representation of sequential circuits.</li><li>8. analyze and design clocked sequential circuits.</li></ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>This course makes significant contributions to the following program outcomes:</p> <ol style="list-style-type: none"><li>A. an ability to apply knowledge of mathematics, science, and engineering,</li><li>B. an ability to design and conduct experiments, as well as to analyze and interpret data,</li><li>C. an ability to design a system, component, or process to meet desired needs within realistic constraints</li><li>D. an ability to identify, formulate, and solve engineering problems,</li><li>E. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.</li><li>F. an ability to work with group,</li></ol>



<b>Indicative Contents</b> المحتويات الإرشادية	Boolean Algebra and Combinational Logic Discrete Mathematic Boolean Feedback and Sequential Logic Binary, Octal, Decimal, Hexa, and Base N-Systems Mathematic Permutation and Partitioning in Boolean Design K-Map Sum of Product, Product of Sum Connection of Disjunction of Literals and AI Counters Serial and Parallel Conversion Flip-Flops Memory

<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	<ul style="list-style-type: none"> <li>• Lectures.</li> <li>• Tests and Exams.</li> <li>• In-Class Questions and Discussions.</li> <li>• Connection between Theory and Application.</li> <li>• Projects.</li> <li>• In- and Out-Class oral conservations.</li> </ul>

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	79	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	5
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	51	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>130</b>		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 13	A-E
	Assignments				
	Projects / Lab.	1-15	30%(30)	1-15	A-F
	Report				
Summative assessment	Midterm Exam	1	10%	8	A-E
	Final Exam	1	50%		A-E
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introduction to Boolean algebra, Combinational Logic, Sequential Logic, Boolean Function and Expression, Truth Table, Number System.
<b>Week 2</b>	Boolean Rules for Simplification, Demorgan's Theorems, Converting from/to expression to/from Truth Table
<b>Week 3</b>	Karnaugh Mapping and Simplification
<b>Week 4</b>	Quiz + Combinational Logic: Analysis procedure, design procedure examples
<b>Week 5</b>	Decoder , Encoder, Mux, Demux , 7-seg
<b>Week 6</b>	Flip-Flops ( SR-Latch, Gated SR-Latch, D, JK, T), Edge-triggered Flip-Flops, Asynchronous Flip-Flops-Inputs
<b>Week 7</b>	Analysis of clocked sequential circuits, state reduction and assignment, flip -flop excitation tables, design procedure
<b>Week 8</b>	Midterm exam
<b>Week 9</b>	Binary Count Sequence, Asynchronous Counters
<b>Week 10</b>	Synchronous Counters, Counter Modulus, Finite State Machine
<b>Week 11</b>	Shift Register, Shift Counters, Ring Counters, Serial-in Serial out
<b>Week 12</b>	Shift Registers: PISO, SIPO, Universal Shift Registers ( Parallel-in, Parallel-out)
<b>Week 13</b>	Quiz
<b>Week 14</b>	Other Coding and Applications
<b>Week 15</b>	Introduction to Cryptography
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

## Delivery Plan (Weekly Lab. Syllabus)

### المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Introduction to HDL, Software Simulator, Logic Kit Lab, Logic Gates
<b>Week 2</b>	Logic Kit Lab : Logic Gates And Boolean Algebra
<b>Week 3</b>	HDL Lab: P1

<b>Week 4</b>	Logic Kit Lab /Simulator Lab: Half-Adder/subtractor, Full-Adder/Subtractor, BCD-Adder/Subtractor, EX-3 Adder/Subtractor
<b>Week 5</b>	Logic Kit Lab / Simulator Lab: Combinational Boolean Functions
<b>Week 6</b>	Logic Kit Lab /Simulator Lab: Bistable Multivibrators (Flip – Flops) Part-1
<b>Week 7</b>	Logic Kit Lab /Simulator Lab: Bistable Multivibrators (Flip – Flops) Part-2
<b>Week 8</b>	HDL Lab: P2
<b>Week 9</b>	Logic Kit Lab /Simulator Lab: Asynchronous counters
<b>Week 10</b>	Logic Kit Lab /Simulator Lab: Synchronous counters
<b>Week 11</b>	Logic Kit Lab /Simulator Lab: Shift counters
<b>Week 12</b>	HDL Lab: P3
<b>Week 13</b>	Logic Kit Lab /Simulator Lab: Parity generator and checker, and Gray Code converters, Gray-code Counters
<b>Week 14</b>	Group Project: Secure Digital Transmitter/Receiver
<b>Week 15</b>	Group Project: Secure Digital Transmitter/Receiver
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

### Learning and Teaching Resources

#### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	The elements of computing systems: building a modern computer from first principles. Noam Nisan and Shimon Schocken, MIT Press, 2005  M. M. Mano, M. D. Ciletti, Digital Design ( Fourth Edition), Prentice-Hall 2007.	Y
<b>Recommended Texts</b>	ELECTRIC CIRCUITS IV -DIGITAL CIRCUITRY, ELECTRIC CIRCUITS IV -DIGITAL CIRCUITRY, Tony R. Kuphaldt, Open Education Resource, 2023  M. Morris. Mano, "Computer System Architecture" 3rd Edition  Boolean Functions for Cryptography and Coding Theory, Claude Carlet, Cambridge University Press, 2021	Y

<b>Websites</b>	<a href="https://www.nand2tetris.org/">https://www.nand2tetris.org/</a>	

<b>Grading Scheme</b> مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required
<p><b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.</p>				

# First Year

## (Second Course)

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Engineering Mathematics		Module Delivery	
Module Type	Basic		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	COE106			
ECTS Credits	5			
SWL (hr/sem)	135			
Module Level	1	Semester of Delivery		2
Administering Department	Computer	College	College of Engineering	
Module Leader	Ahlam Hanoon Shnain		e-mail	<a href="mailto:assis.pr.f.a.hanoon@coeng.uobaghdad.edu.iq">assis.pr.f.a.hanoon@coeng.uobaghdad.edu.iq</a>
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc	
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	27/02/2024	Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics and Mat lab	Semester	1
Co-requisites module	None	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p><b>1-Apply mathematical principles to analyze and solve engineering problems.</b>  <b>2-Develop critical thinking and analytical skills through mathematical reasoning.</b>  <b>3-Communicate mathematical concepts effectively in written and oral formats.</b>  <b>4-Utilize computational tools to enhance problem-solving capabilities.</b></p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p><b>1-Apply Mathematical Concepts:</b> Students should be able to apply fundamental mathematical concepts such as calculus, linear algebra, and differential equations to solve engineering problems across various disciplines.  <b>2-Analyze Engineering Systems:</b> Students should demonstrate the ability to analyze and model engineering systems using mathematical techniques, including formulating mathematical descriptions of physical phenomena.  <b>3-Solve Mathematical Problems:</b> Students should be proficient in solving mathematical problems related to engineering, including differential equations, optimization, and numerical methods, using appropriate mathematical tools and techniques.  <b>4-Interpret Mathematical Solutions:</b> Students should be able to interpret mathematical solutions in the context of engineering applications, understanding the physical meaning and significance of the results obtained.  <b>5-Utilize Computational Tools:</b> Students should be able to use computational tools and software packages effectively to solve mathematical problems and analyze engineering systems, including proficiency in programming languages commonly used in engineering applications.  <b>6-Communicate Mathematical Concepts:</b> Students should demonstrate the ability to communicate mathematical concepts and solutions clearly and effectively, both orally and in writing, to technical and non-technical audiences.  <b>7-Apply Mathematical Modeling:</b> Students should be capable of developing mathematical models for engineering systems, considering factors such as assumptions, boundary conditions, and simplifications, and evaluating the validity and accuracy of the models.</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	



## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p><b>1-Hands-on Problem-Solving:</b> Encourage active learning through hands-on problem-solving sessions where students work on engineering problems that require the application of mathematical concepts. Provide opportunities for group work and collaborative problem-solving activities.</p> <p><b>2-Real-World Examples:</b> Use real-world examples and engineering applications to illustrate the relevance of mathematical concepts. Show how mathematics is used in various engineering disciplines, such as mechanical, electrical, civil, and chemical engineering.</p> <p><b>3-Interactive Lectures:</b> Make lectures interactive by engaging students through questions, discussions, and demonstrations. Use multimedia tools, visual aids, and interactive simulations to enhance understanding and retention of mathematical concepts.</p> <p><b>4-Formative Assessment:</b> Use formative assessment methods such as quizzes, homework assignments, and in-class exercises to provide regular feedback on students' understanding and progress. Adjust teaching strategies based on students' strengths and areas for improvement.</p> <p><b>5-Integration of Technology:</b> Utilize technology tools such as mathematical software (e.g., MATLAB, Mathematica), simulation tools, and online resources to enhance learning and facilitate visualization of mathematical concepts. Integrate technology into lectures, assignments, and assessments.</p> <p><b>Application-Based Learning:</b> Emphasize application-based learning by assigning projects or case studies where students apply mathematical concepts to solve engineering problems or analyze real-world data. This promotes critical thinking and problem-solving skills.</p> <p><b>6-Office Hours and Support:</b> Offer regular office hours and additional support sessions to provide individualized assistance and address students' questions or concerns related to mathematical concepts or problem-solving techniques.</p>
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## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	79	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	5
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
<b>Total SWL (h/sem)</b>	<b>135</b>		

## Module Evaluation

## تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	8	25%	3,6,9,11,13,15	1,2,3,4
	Assignments	5	8%	4,7,8,12,14	4,5,6
	Projects / Lab.			1-15	1,2,3,4,5
	Report		7%	12	1,2,3,4,5,6
Summative assessment	Midterm Exam	1	10%	15	4,5,6,7
	Final Exam	3hr	50%	16	all
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

## المنهاج الاسبوعي النظري

	Material Covered
Week 1	Vector in the plane, Cartesian coordinates and vectors in space
Week 2	Dot product, cross product
Week 3	Lines and planes in space, Cylinders and quadric surfaces
Week 4	Vector valued functions and space curves
Week 5	Partial derivatives
Week 6	Directional derivatives and gradient
Week 7	Lagrange multipliers
Week 8	Multiple integrals
Week 9	Multiple integrals
Week 10	Sequences
Week 11	Infinite series
Week 12	The integral test for series of non-negative terms
Week 13	Alternating series, power series
Week 14	Taylor and Maclaurin series

Week 15	Differential Equations, second order differential equations	
Week 16	Preparatory week before the final Exam	
<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Weir, M., Hass and Giordano. (2008). Thomas' Calculus. Eleventh Edition, Pearson-Addison-Weesley.	Y
<b>Recommended Texts</b>	Fifth Edition Engineering Mathematics A Foundation for Electronic, Electrical, Communications and Systems Engineers2017 K.A. STROUD ENGINEERING MATHEMATICS 2020 K.A. STROUD ADVANCED ENGINEERING MATHEMATICS2020	Y
<b>Websites</b>	<b>Khan Academy - Engineering Mathematics:</b> <b>MathWorks - MATLAB Tutorials:</b> <b>MIT OpenCourseWare - Mathematics for Engineers I and II:</b>	

<b>Grading Scheme</b> مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

## Logic Circuit Design

<b>1. Course Name:</b>	
Logic Circuit Design	
<b>2. Course Code:</b>	
COE207	
<b>3. Semester / Year:</b>	
2 <sup>nd</sup> / 2024	
<b>4. Description Preparation Date:</b>	
24-2-2024	
<b>5. Available Attendance Forms:</b>	
Class Attendance	
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>	
6 ECTS/75 h	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
<b>Name:</b> Prof. Dr. Mohammed Issam Younis <b>Email:</b> younismi@coeng.uobaghdad.edu.iq	
<b>8. Course Objectives</b>	
<b>Course Objectives</b>	The course provides the basic knowledge necessary to understand the hardware operation of digital computers and covers some of the subjects associated with computer hardware and its relation to software. In addition, this module is based on integrating STEM with the basic of Computer Units (structure) to derive the behavior of these units.
<b>9. Teaching and Learning Strategies</b>	
<b>Strategy</b>	A- Cognitive goals:  A1. Write RTL for hardware jobs.  A2. Define and explain the principles of computer architecture and the interfacing between its hardware and software components  A3. Understand the data path inside a processor  A4. Understand the micro programmed control organization  A5. Know the organization and architecture of the CPU with an emphasis on the user's view of the computer.  A6. Time Management  A7. Note-Taking

	<p>A8. Annotation</p> <p>A9. Exam Preparation</p> <p>A10. Test-Taking and Debugging</p> <p>A11. Working with Instructors &amp; TAs</p> <p>A12. Design Decisions</p> <p>A13. Oral Communication</p> <p>B. The skills goals special to the course</p> <p>B1- Mathematical concepts and basic algorithms for describing and solving engineering problems.</p> <p>B2 - Initial developments in Computer Architecture majors.</p> <p>B3 - developing the ability to conduct experiments and analyze data.</p> <p>B5- Identifying, formulating and solving Computer Architecture problems using modern engineering tools, techniques, and skills,</p> <p>B6 - cooperation in group projects,</p> <p>B7 - Developing written and verbal communication skills through presentations from the project results,</p> <p>B8 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.</p> <p>B9. Logic design and abstraction for Computer Units.</p>
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<b>10. Course Structure</b>					
<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>
1 2 3,4	5 5 10	A1-13, B1-B9	Register Transfer Language and Logic Circuit design  Unit Testing for Logic Design	<ul style="list-style-type: none"> <li>• Lectures.</li> <li>• Tests and Exams.</li> <li>• In-Class Questions and</li> </ul>	<p>Quizzes</p> <p>Projects</p> <p>Seminars</p> <p>Midterm exam</p>

4-15	55		Design Basic Integer ALU Unit  Design Computer System based on abstraction	Discussions. <ul style="list-style-type: none"> <li>• Connection between Theory and Application</li> <li>• Projects.</li> <li>• In- and Out-Class oral conservatio ns.</li> </ul>	Final Exam
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### 11.Course Evaluation

Quizzes  
 Projects  
 Seminars  
 Midterm exam  
 Final Exam

### 12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	M. Morris. Mano, "Computer System Architecture" 3rd Edition
Main references (sources)	The elements of computing systems: building a modern computer from first principles. Noam Nisan and Shimon Schocken, MIT Press, 2005
Recommended books and references (scientific journals, reports...)	Digital Design and Computer Architecture 2nd Edition, David Harris, Sarah Harris
Electronic References, Websites	<a href="https://www.nand2tetris.org/">https://www.nand2tetris.org/</a>

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Object Oriented Programming		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	COE108		
ECTS Credits	5		
SWL (hr/sem)	120		
Module Level	1	Semester of Delivery	
Administering Department	Computer	College	College of Engineering
Module Leader	Mohammed Al-Shammaa	e-mail	m.alshammaa@coeng.uobaghdad.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Programming (COE103)	Semester	1
Co-requisites module	None	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	1. This course aims to help students to learn how to use Python programming language to solve real-life and scientific problems. The objective of the course is to provide students with confidence of their ability to write Python OOP programs. 2. Students learn best by experimenting a plenty of programs that that solve useful and interesting problems. The problems tackled cover a wide range of general, and scientific applications although none of them require specialist knowledge.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, students should be able to: 1. Know how to apply Python OOP concepts. 2. Design of algorithms and implementation, testing and verification of OOP programs 3. Read given OOP source code in Python and understand its behavior. 4. Write original OOP source code to solve engineering problems. 5. Organize source code in a data-encapsulated form.
<b>Indicative Contents</b> المحتويات الإرشادية	

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	64	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>120</b>		

## Module Evaluation

### تقييم المادة الدراسية



		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	30%		
	Assignments	2	10%		
	Projects / Lab.	5	10%		
	Report				
Summative assessment	Midterm Exam		10%		
	Final Exam		50%		
Total assessment			100% (100 Marks)		

### Delivery Plan (Weekly Syllabus)

#### المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to OOP concepts
Week 2	Functions in Python
Week 3	Python classes and OOP: classes, objects, attributes, and methods.
Week 4	Python classes and OOP: inheritance
Week 5	Python classes and OOP: polymorphism and encapsulation.
Week 6	Python iterators
Week 7	Python module classes: Matplotlib
Week 8	Python module classes: JSON
Week 9	Python module classes: BeautifulSoup
Week 10	Python module classes: selenium
Week 11	Python module classes: pandas
Week 12	Python module classes: os
Week 13	Applications of Python classes and OOP: Excel manipulation
Week 14	Applications of Python classes and OOP: using API's
Week 15	Applications of Python classes and OOP: web scraping
Week 16	Preparatory week before the final Exam

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	EXP 1: Functions in Python
Week 2, 3	EXP 2: Python classes and OOP
Week 4	EXP 3: Python iterators
Week 5, 6, 7	EXP 4: Python module classes: pandas and matplotlib
Week 8, 9, 10	EXP 5: Python module classes: JSON, BeautifulSoup, and selenium
Week 11	EXP 6: Python module classes: os
Week 12, 13, 14, 15	EXP 5: Applications of Python classes and OOP

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Brian Heinold, A Practical Introduction to Python Programming, 2012	No
Recommended Texts	Ben Stephenson, The Python Workbook: A Brief Introduction with Exercises and Solutions, 2014	No
Websites	<a href="https://www.w3schools.com/python/">https://www.w3schools.com/python/</a>	

Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
<p><b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.</p>				



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College of Engineering  
Department of Computer  
Engineering



## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematical Modeling and Electrical Systems		Module Delivery
Module Type	Core		Class Lecture + Lab
Module Code	COE109		
ECTS Credits	5		
SWL (hr/sem)	120		
Module Level	UGx11 1	Semester of Delivery	2
Administering Department	Computer Engineering	College	College of Engineering
Module Leader	Ziyad T. Allawi	e-mail	ziyad.allawi@coeng.uobaghdad.edu.iq
Module Leader's Acad. Title	Assist. Prof.	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	25/06/2023	Version Number	1.0

## Relation with other Modules

### العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mathematics and MATLAB	Semester	
Co-requisites module	Electrical Circuits	Semester	

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p>1- Understand the nature and characteristics of different types of signals, including their properties, classifications, and elementary operations</p> <p>2- Classify systems based on their key attributes, such as continuity, linearity, time-invariance, causality, and stability</p> <p>3- Analyze and describe systems using mathematical models, such as differential and difference equations and understanding of different ways to combine and analyze multiple systems in order to achieve specific control objectives</p> <p>4- Apply Fourier series, Fourier transforms, DFT and DTFT to analyze signals and systems in both continuous-time and discrete-time domains</p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>LO#1 Understand and differentiate between different types of signals, such as step, ramp, pulse, impulse, real and complex exponentials</p> <p>LO#2 Classify signals based on various criteria, including continuous and discrete time, periodic and aperiodic, deterministic and random, deterministic energy and power signals, impulse, and step functions</p> <p>LO#3 Apply elementary operations on signals, including scaling, time shifting, time reversal, time scaling, addition, subtraction, and multiplication</p> <p>LO#4 Analyze the properties of signals, such as energy, spectrum and correlation</p> <p>LO#5 Classify systems based on their characteristics, including continuous/discrete, linear/nonlinear, time-invariant/time-varying, causal/acausal, and stable/unstable</p> <p>LO#6 Understand and apply differential and difference equations</p> <p>LO#7 to describe continuous-time and discrete-time systems and their interconnection</p> <p>LO#8 Analyze periodic functions using Fourier series and apply them to electric circuits</p> <p>LO #9 Use the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT) to analyze discrete systems</p> <p>LO #10 Perform Fourier analysis on discrete systems to determine their frequency content</p>

**Indicative Contents**  
المحتويات الإرشادية

**Standard Signals:**

1. Understand the characteristics and properties of standard signals such as step, ramp, pulse, impulse, real and complex exponentials.
2. Identify the time-domain and frequency-domain representations of these signals.
3. Analyze the behavior of these signals under different operations such as scaling, time shifting, time reversal, time scaling, addition, subtraction, and multiplication.

**Classification of Signals:**

1. Classify signals as continuous-time or discrete-time based on their domain.
2. Differentiate between periodic and aperiodic signals.
3. Distinguish between deterministic and random signals.
4. Recognize the distinction between energy signals and power signals.
5. Understand the properties and behavior of impulse and step functions.

**System Description:**

1. Describe systems using mathematical equations, block diagrams, and signal flow graphs.
2. Represent systems in terms of input-output relationships.
3. Identify the characteristics of continuous-time and discrete-time systems.
4. Differentiate between linear and nonlinear systems.
5. Classify systems as time-invariant or time-varying.

**Properties of Signals:**

1. Analyze the frequency content of signals using Fourier analysis and the spectrum.
2. Understand the concept of correlation and its applications in signal processing.
3. Apply Power Spectral Density (PSD) and Parseval's theorem for power signals.

	<p>Continuous-Time and Discrete-Time Systems:</p> <ol style="list-style-type: none"> <li>1. Describe continuous-time systems using differential equations and their solutions.</li> <li>2. Describe discrete-time systems using difference equations and their solutions.</li> </ol> <p>Fourier Analysis:</p> <ol style="list-style-type: none"> <li>1. Compute the Fourier series representation of periodic signals using complex exponential and discrete forms.</li> <li>2. Analyze the amplitude and phase spectra of signals.</li> <li>3. Understand the concept of Power Spectral Density (PSD) and its applications.</li> <li>4. Apply the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT) algorithms for efficient spectral analysis.</li> </ol>
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	<ol style="list-style-type: none"> <li>1) Lectures.</li> <li>2) Homework and Assignments.</li> <li>3) Tests and Exams.</li> <li>4) In-Class Questions and Discussions.</li> <li>5) Extracurricular Activities.</li> </ol>

<b>Student Workload (SWL)</b> الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	96	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	24	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	120		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10%(10)	2,4,6,9,11	All
	Assignments	5	5%(5)	3,5,7,10,12	All
	Projects / Lab.	-	20%(20)		
	Report	1	5%(5)	14	All
Summative	Final Exam	1	60%(60)	16	All
Total assessment			<b>100% (100 Marks)</b>		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Continuous Time Signals
Week 2	Operations and Properties of Continuous Time Signals
Week 3	Discrete Time Signals
Week 4	Operations and Properties of Discrete Time Signals
Week 5	Continuous Time Systems and Properties
Week 6	Discrete Time Systems and Properties
Week 7	Continuous Time Impulse Response and Continuous Convolution
Week 8	Continuous Time System TF and Frequency Response
Week 9	Discrete Time Impulse Response and Discrete Convolution
Week 10	Discrete Time System TF and Frequency Response
Week 11	FS Definition and Pairs
Week 12	FS Properties

Week 13	FT Definition and Pairs
Week 14	FT Properties
Week 15	DTFT, DFT and FFT
Week 16	Final Exam

<b>Delivery Plan (Weekly Lab. Syllabus)</b> المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2	Exp1: Generating Continuous Time and Discrete Time Signals
Week 3	Exp2: Performing Operations on Continuous and Discrete Time Signals
Week 4,5	Exp3: Continuous Time Systems and Operations
Week 6	Exp4: Discrete Time Systems and Operations
Week 7	Exp5: Time Analysis on Continuous Time Systems
Week 8, 9	Exp6: Time Analysis on Discrete Time Systems
Week 10	Exp7: Continuous Fourier Series
Week 11	Exp8: Discrete Fourier Series
Week 12,13	Exp9: Continuous Fourier Transform
Week 14,15	Exp10: Discrete Fourier Transform

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Michael J. Roberts: Signals and Systems Analysis using transform methods and MATLAB, (2018)	Y
Recommended Texts	Chaparro and Akan : Signals and Systems Using MATLAB, (2019)	Y
Websites	None	



## Grading Scheme

### مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> – Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX</b> – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – Fail	راسب	(0-44)	Considerable amount of work required

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.



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## MODULE DESCRIPTOR FORM

### نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	SEMI-CONDUCTOR PHYSICS		Module Delivery
Module Type	BASIC		Class Lecture + Lab
Module Code	COE110		
ECTS Credits	5		
SWL (hr/sem)	135		
Module Level	1	Semester of Delivery	
Administering Department	Computer Engineering	College	Engineering
Module Leader	Firas Ali Sabir	e-mail	<a href="mailto:firas.a.saber@coeng.uobaghdad.edu.iq">firas.a.saber@coeng.uobaghdad.edu.iq</a>
Module Leader's Acad. Title	Assist. Professor	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None
Peer Reviewer Name	Asma Taha Saadoon	e-mail	<a href="mailto:@coeng.uobaghdad.edu.iqasmatahaeeng">@coeng.uobaghdad.edu.iqasmatahaeeng</a>
Review Committee Approval	25/6/2023	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

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<p>This module's goal is to equip the students with an understanding of the fundamental principles of Electronic engineering and provide an overview of evolution of electronics, and introduce the working principle and examples of fundamental electronic devices and circuits. It also aims to assist students in developing knowledge and skills related to fundamental of electronic devices and circuits through an enjoyable, hands-on learning experience that is reinforced by lecture-based inputs as necessary. Electrical, Electronic and technological background is not presupposed in this module. Although the learning on the module will be aided by lab-based exercises, it is a clear goal of this course that students will be able to engage in self-directed learning outside of the lecture hall and the lab with the aid of a chosen collection of useful tools and components. The principles required for more advanced electronic engineering courses will be covered in this module, which will prepare students for them. Through lectures and seminars, it will also give students an introduction to some of the theory supporting the practical portion of the module. The following will be covered in more detail: (i) an introduction and theory of semi-conductor devices; (ii) detailed analysis of diode circuits and application; (iii) the fundamental of BJT transistor and (iv) a DC biasing of BJT.</p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>Upon completion of this module the student should:</p> <ul style="list-style-type: none"><li>- LO#1: Understand the electrical conduction processes in semiconductors.</li><li>- LO#2: Have familiarity with ideal and non-ideal characteristics of semiconductor diodes.</li><li>- LO#3: Be able to analyze and design diode circuits and applications.</li><li>- LO#4: Understand conduction process in transistor.</li><li>- LO#5: Have familiarity with different biasing processes in transistor circuits.</li><li>- LO#6: Be able to analyse and design simple circuits using bipolar transistor.</li></ul>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<ul style="list-style-type: none"><li>- Semiconductor Physics and Devices , Donald A. Neamen, 3rd edition, 2003</li><li>- Electronics a Systems Approach, Neil Storey, Pearson.</li><li>- The Art of Electronics, Paul Horowitz and Winfield Hill, Cambridge University Press</li></ul>

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	<ul style="list-style-type: none"> <li>- Lectures.</li> <li>- Homework and Assignments.</li> <li>- Tests and Exams.</li> <li>- In-Class Questions and Discussions.</li> <li>- Extracurricular Activities.</li> <li>- Individual / Group Projects</li> <li>- In- and Out-Class oral conversations.</li> </ul>
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<b>Student Workload (SWL)</b> الحمل الدراسي للطالب			
<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	78	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعياً	5.2
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعياً	3.8
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	135		

<b>Module Evaluation</b> تقييم المادة الدراسية					
		Time/N umber	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	5	10% (10)	2, 4, 6, 11, 13	LO #1-4
	<b>Assignments</b>	2	5% (5)	3, 9	LO # 1,2,3
	<b>Lab.</b>	15	15% (15)	1 -15	LO # 1-6
<b>Summative assessment</b>	<b>Comprehensive Exam</b>	1	5% (5)	12	LO #1-4
	<b>Projects</b>	1	5% (5)	15	LO # 3,4,5
	<b>Final Exam</b>	3 hr	60% (60)	16	LO # 1-6
<b>Total assessment</b>			100% (100 Marks)		

<b>Delivery Plan (Weekly Syllabus)</b> المنهاج الأسبوعي النظري	
	<b>Material Covered</b>

<b>Week 1</b>	Physics of Semiconductors: Atomic Structure, Electronic State
<b>Week 2</b>	PN Junction: Formation of Depletion layer, Junction Potential, Forward Biased PN junction
<b>Week 3</b>	PN Junction: Forward Biased VI Characteristics, Reverse biased PN junction, Reverse biased VI Characteristics
<b>Week 4</b>	Semiconductor Diodes: Diode Operating Conditions, Actual Diode Characteristics, Zener Region
<b>Week 5</b>	Semiconductor Diodes: Forward Bias Voltage, Temperature Effects, Diode Specification and Max Ratings
<b>Week 6</b>	Diode Applications: Load-Line Analysis, Series Diode Configurations, Parallel Configurations
<b>Week 7</b>	Diode Applications:, Half-Wave Rectification, Full-Wave Rectification, Peak reverse voltage
<b>Week 8</b>	Diode Applications: Diode Clippers, Biased Clippers, Parallel Clippers
<b>Week 9</b>	Diode Applications: Clampers, Biased Clamper Circuits
<b>Week 10</b>	Diode Applications: Zener Diodes
<b>Week 11</b>	Bipolar Junction Transistor (BJT) Construction and Operation
<b>Week 12</b>	Bipolar Junction Transistor (BJT) Construction and Operation
<b>Week 13</b>	DC Biasing of BJTs: Biasing and the Three States of Operation
<b>Week 14</b>	DC Biasing of BJTs: Transistor Saturation Level, Load Line Analysis
<b>Week 15</b>	The BJT as a Switch and Amplifier
<b>Week 16</b>	<b>Final Exam</b>

<b>Delivery Plan (Weekly Lab. Syllabus)</b> المنهاج الاسبوعي للمختبر	
	<b>Material Covered</b>
<b>Week 1, 2, 3</b>	EXP 1: Diode Rectifier and Smoothing Filters
<b>Week 4, 5</b>	EXP 2: Non-linear Wave Shaping: Clipper circuits
<b>Week 6, 7</b>	EXP 3: Non-linear Wave Shaping: Clamper circuits
<b>Week 8, 9</b>	EXP 4: Zener Diode
<b>Week 10,11 ,12</b>	EXP 5: BJT characteristics and parameters
<b>Week 13, 14</b>	EXP 6: Transistor as a Switch
<b>Week 15</b>	EXP 7: Transistor as an Amplifier

**APPENDIX:**

<b>GRADING SCHEME</b> مخطط الدرجات
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## Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Electronic Devices and Circuit Theory, Robert Boylestad, Louis Nashelsky, 10th Edition, 2009.	Yes
<b>Recommended Texts</b>	Microelectronic Circuits, Sedra, Smith, Fourth edition or Fifth edition, Oxford University Press, 1998-2003.	Yes
<b>Websites</b>	Multisim Live ( <a href="http://www.multisim.com/live/">www.multisim.com/live/</a> )	

Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> – Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> – Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> – Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX</b> – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	<b>F</b> – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.



# Second Year

## Course Description Form of Engineering Mathematics

<b>1. Course Name:</b>	
Engineering Mathematics	
<b>2. Course Code:</b>	
COE 202	
<b>3. Semester / Year:</b>	
2023-2024	
<b>4. Description Preparation Date:</b>	
October 2023	
<b>5. Available Attendance Forms:</b>	
Annual System: There is only one mode of delivery, which is a “D Program”. The students are full-time students and on campus. They attend full-day program in face-to-face mode. The academic year is composed 30-week regular subjects.	
<b>6. Number of Credit Hours (Total) / Number of Units (Total):</b>	
120 hrs. / 4 hrs. per week.	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: Asst. Prof. Ziyad T. Allawi, Ph.D.  Email: ziyad.allawi@coeng.uobaghdad.edu.iq	
<b>8. Course Objectives</b>	
<b>Course Objective</b>	<ul style="list-style-type: none"> <li>• As a brief description for the Goals and objectives, by the completion of the course the goals are:</li> <li>• How to relate the skills and concepts learned from Mathematics to understand Engineering Mathematics</li> <li>• How to use the learned skills to understand, derive, and solve the equations in various objects (e.g., Electronics II, DSP, Communications, Digital Control etc.)</li> <li>• Representation of an Introduction to advanced calculus.</li> </ul>
<b>9. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<ol style="list-style-type: none"> <li>1. Lectures.</li> <li>2. Tutorials.</li> <li>3. Homework and Assignments.</li> </ol>



	4. Tests and Exams. 5. In-Class Questions and Discussions. 6. The connection between Theory and Application. 7. Seminars. 8. In-and Out-Class oral conversations. 9. Reports, Presentations, and Posters.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 the. tut.	Item 1,2 section 10	<b>Complex Numbers, Operations, Polar and exponential form</b>	From 1 to of section 1	From 1 to 4 section 12
2	3 the. tut.	From 1 to section 10	<b>Phasors and De Moivre Theorem. Quiz</b>	From 1 to of section 1	From 1 to 4 section 12
3	3 the. tut.	From 1 to section 10	<b>Orthogonal Functions and Integrals, Integrations of continuous functions</b>	From 1 to of section 1	From 1 to 4 section 12
4	3 the. tut.	From 1 to section 10	<b>Numerical Integration. Quiz</b>	From 1 to of section 1	From 1 to 4 section 12
5	3 the. tut.	From 1 to section 10	<b>Taylor Polynomials and Linearization</b>	From 1 to of section 1	From 1 to 4 section 12

6	3 the. tut.	From 1 to section 10	<b>Taylor 2nd and n-order polynomials, Remainder Term</b>	From 1 to of section 1	From 1 to 4 section 12
7	3 the. tut.	Item 4,5 section 10	<b>Taylor and Maclaurin series, Quiz</b>	From 1 to of section 1	From 1 to 4 section 12
8	3 the. tut.	Item 7 of section 10	<b>First-order ODE</b>	From 1 to of section 1	From 1 to 4 section 12
9	3 the. tut.	Item 7 of section 10	<b>Second-order ODE</b>	From 1 to of section 1	From 1 to 4 section 12
10	3 the. tut.	Item 7 of section 10	<b>State-Space</b>	From 1 to of section 1	From 1 to 4 section 12
11	3 the. tut.	Item 1 to 5& 7 section 10	<b>Numerical Methods, Euler and Runge-Kutta</b>	From 1 to of section 1	From 1 to 4 section 12
12	3 the. tut.	Item 7 of section 10	<b>Term Quiz</b>	From 1 to of section 1	From 1 to 4 section 12
13	3 the. tut.	Item 7 of section 10	<b>Laplace Transform Introduction and properties</b>	From 1 to of section 1	From 1 to 4 section 12
14	3 the. tut.	Item 6,7 section 10	<b>Inverse Laplace Transform</b>	From 1 to of section 1	From 1 to 4 section 12
15	3 the. tut.	Item 5 of section 10	<b>Partial Fraction, Solving ODE using LT</b>	From 1 to of section 1	From 1 to 4 section 12
16	3 the. tut.	Item 5,6,8 section 10	<b>Transfer Functions, Poles and</b>	From 1 to of section 1	From 1 to 4 section 12

			<b>Zeros, Quiz</b>		
17	3 the. tut.	Item 9 of secti 10	<b>Term Quiz</b>	From 1 to of section 1	From 1 to 4 section 12
18	3 the. tut.	Item 5,6,8 section 10	<b>Difference Equations and Z-Transform</b>	From 1 to of section 1	From 1 to 4 section 12
19	3 the. tut.	Item 5,6,8 section 10	<b>Design a digital controller, Numerical solution of DE</b>	From 1 to of section 1	From 1 to 4 section 12
20	3 the. tut.	Item 5,6,8 section 10	<b>Partial Fraction, Solving ODE using LT</b>	From 1 to of section 1	From 1 to 4 section 12
21	3 the. tut.	Item 5,6,8 section 10	<b>Transfer Functions, Poles and Zeros, Quiz</b>	From 1 to of section 1	From 1 to 4 section 12
22	3 the. tut.	Item 5,6,8 section 10	<b>Z-Transform Introduction, properties</b>	From 1 to of section 1	From 1 to 4 section 12
23	3 the. tut.	Item 5,6 & 8 section 10	<b>Sampling continuous signal, relation of ZT with LT</b>	From 1 to of section 1	From 1 to 4 section 12
24	3 the. tut.	Item 6,8 section 10	<b>Inverse Z- Transform</b>	From 1 to of section 1	From 1 to 4 section 12
25	3 the. tut.	Item 6,8 section 10	<b>Partial Fraction, Solving DE using ZT</b>	From 1 to of section 1	From 1 to 4 section 12
26	3 the.	Item 9 of secti	<b>Term Quiz</b>	From 1 to	From 1 to 4

	tut.	10		of section 1	section 12
27	3 the. tut.	Item 9 of secti 10	<b>Fourier Series, trigonometric and complex forms</b>	From 1 to of section 1	From 1 to 4 section 12
28	3 the. tut.	Item 6 of secti 10	<b>Fourier Transform</b>	From 1 to of section 1	From 1 to 4 section 12
29	3 the. tut.	Item 9 of secti 10	<b>Discrete Fourier Transform</b>	From 1 to of section 1	From 1 to 4 section 12
30	3 the. tut.	Item 9 of secti 10	<b>Term Quiz</b>	From 1 to of section 1	From 1 to 4 section 12

### 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

### 12. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	1- Stroud, K.A. and Booth, D.J., Engineering Mathematics, 8th Ed., Rinehart-Wiley, New York, Globe Press (2020).  2- Stroud, K.A. and Booth, D.J., Advanced Engineering Mathematics, 6th Ed., Rinehart-Wiley, New York, Globe Press (2020).
Main references (sources)	1- Croft et al., Engineering Mathematics A Foundation for Electronic, Electrical, Communications and Systems Engineering, 5th Ed., Pearson (2017).
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

## Course Description Form of Electronics II

<b>1. Course Name:</b>	
Electronics II	
<b>2. Course Code:</b>	
Electronics II / COE 203	
<b>3. Semester / Year:</b>	
1st& 2nd / Academic Year 2023–2024	
<b>4. Description Preparation Date:</b>	
01/02/2024	
<b>5. Available Attendance Forms:</b>	
Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full program in face-to-face mode. The academic year is composed of 30-week regular subjects.	
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>	
150 hrs. (Totally) 3 hrs. per week in class 2 hrs. per week in lab	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: Dr. Ahmad Obaid Salman Email: ahmad.obaid@uobaghdad.edu.iq	
<b>8. Course Objectives</b>	
<b>Course Objectives:</b> <b>To understand the following:</b>	<ul style="list-style-type: none"> <li>• Small signal Amplifier analysis and Design using BJTs.</li> <li>• FET structure, Biasing, and small signal Amplifier analysis and Design using FET.</li> <li>• Ideal operational amplifier applications (linear and non-linear).</li> </ul>



4- Responses Obtained from Student Questionnaire about Curriculum and Faculty Member ( Instructor )

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 the. 1 tut.	Item A1	<b>The re model of transistors model of BJTs) common emi fixed configuration analysis</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
2	2 the. 1 tut.	Item A1	<b>AC analysis different configurations</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
3	2 the. 1 tut.	Item A1	<b>Effect of load source resistance the ac gain</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
4	2 the. 1 tut.	Item A1	<b>Cascade configuration design of amplifiers.</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
5	2 the. 1 tut.	Item A2	<b>Field Transistors construction operation</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
6	2 the. 1 tut.	Item A2	<b>Transfer characteristics different amplifiers</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)

7	2 the. 1 tut.	Item A2	<b>FET Biasing different configurations</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
8	2 the. 1 tut.	Item A2	<b>FET Biasing different configurations (continued)</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
9	2 the. 1 tut.	Item A3	<b>FET amplifiers analysis</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
10	2 the. 1 tut.	Item A3	<b>FET amplifiers analysis(continued)</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
11	2 the. 1 tut.	Item A4	<b>Operational amplifiers applications (lin applications)</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
12	2 the. 1 tut.	Item A4	<b>Operational amplifiers applications (n linear application</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
13	2 the. 1 tut.	Item A5	<b>Negative feedback</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
14	2 the. 1 tut.	Item A6	<b>Basic principles oscillators</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
15	2 the. 1 tut.	Item A6	<b>Different types oscillators</b>	From 1 to of Methods)	From 1 to 4 of (A-methods
16	2 the.	Item A7	<b>Timing circuits</b>	From 1 to	From 1 to



	1 tut.		<b>timer applications of 555 timer as a monostable multivibrator</b>	of Methods)	4 of (A-methods)
17	2 the. 1 tut.	Item A7	<b>555 timer as a monostable multivibrator and a bistable multivibrator</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
18	2 the. 1 tut.	Item A8	<b>Logic Families (DTL)</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
19	2 the. 1 tut.	Item A8	<b>TTL</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
20	2 the. 1 tut.	Item A8	<b>ECL</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
21	2 the. 1 tut.	Item A8	<b>CMOS</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
22	2 the. 1 tut.	Item A9	<b>DAC</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
23	2 the. 1 tut.	Item A9	<b>DAC</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
24	2 the. 1 tut.	Item A9	<b>ADC</b>	From 1 to 4 of Methods)	From 1 to 4 of (A-methods)
25	2 the.	Item A9	<b>ADC</b>	From 1 to 4 of	From 1 to 4 of

	1 tut.			Methods)	(A-methods)
26	2 the. 1 tut.	Item A10	<b>ROM</b>	From 1 to of Methods)	From 1 to 4 of (A-methods)
27	2 the. 1 tut.	Item A10	<b>EPROM</b>	From 1 to of Methods)	From 1 to 4 of (A-methods)
28	2 the. 1 tut.	Item A10	<b>E2PROM</b>	From 1 to of Methods)	From 1 to 4 of (A-methods)
29	2 the. 1 tut.	Item A10	<b>Static RAM</b>	From 1 to of Methods)	From 1 to 4 of (A-methods)
30	2 the. 1 tut.	Item A10	<b>Dynamic RAM</b>	From 1 to of Methods)	From 1 to 4 of (A-methods)

### 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

### 12. Learning and Teaching Resources

Required textbooks (curricular books if any)

**1-**"Electronic Devices and Circuit Theory" Robert Boylestad, Louis Nashelsky, 8th Edition, 2006.

**2-**Pa McAndrew, Colin C., Alexander Lorenzo-Cassagnes, and Olin L. Hartin. "Transistor self-heat correction and thermal conductivity extraction using only DC data" Microelectronic Test Structures (ICMTS) 2016 International

Main references (sources)	3-Socratous, Josephine, et al. "Electro Structure of Low-Temperature Soluti Processed Amorphous Metal Ox Semiconductors for Thin-Film Transis Applications." Advanced function materials 25.12 (2015): 1873-1885.
Recommended books and References (scientific journals, reports...)	Laboratory experiments in the ( Electron & Communications Lab ) of department.
Electronic References, Websites	<a href="https://www.allaboutcircuits.co">https://www.allaboutcircuits.co</a>

## Course Description Form of Microprocessor & Microcomputer I

<b>1. Course Name:</b>	
Microprocessor & Microcomputer I	
<b>2. Course Code:</b>	
COE 204	
<b>3. Semester / Year:</b>	
1st & 2nd / Academic Year 2023- 2024	
<b>4. Description Preparation Date:</b>	
February-2024	
<b>5. Available Attendance Forms:</b>	
They attend full day program in face-to-face mode. The academic year composed of 30-week regular subjects	
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>	
90 hrs. / 3 hrs. per week Theory. 60 hrs. / 2 hrs. per week Lab\ unit 6	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: Marwa Taher Nasser Email: marwa_taher84@coeng.uobaghdad.edu.iq	
<b>8. Course Objectives</b>	
<b>Course Objectives</b>	<p>1What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)?</p> <p>2Knowledge of the software architecture of the 8088/8086 and how to write and run programs using assembly language.</p> <p>3 Checking architecture of 80x86 microprocessor</p> <p>4Studying types of memories and communication principle between memory and the microprocessor...</p> <p>5Studying of peripheral devices and communication principle</p>

between peripheral devices and the microprocessor....

6 Studying Interrupts Interface.

7 Studying DMA Interface....

## 9. Teaching and Learning Strategies

### Strategy

A- Cognitive goals:

A1- Describe the software architecture of the 8088/8086 microprocessor.

A2- Know about the microprocessor's registers which includes general purpose registers, special purpose registers, and segment registers.

A3- Explain how a byte or a word of data is stored at a memory address space and the meaning of aligned and misaligned word.

A4- Describe the meaning of a logical address, a physical address and how to use the segment register and the instruction pointer to generate the physical memory address.

A5- Describe the meaning of addressing modes which include the register operand addressing mode, the immediate operand addressing mode and the memory operand addressing mode.

A6- Write a program in an assembly language using the 8086-emulator software (compiling, debugging, and running the program) .

A7- Convert a program that is written in assembly language

to machine codes.

A8- Use the instruction set of the 8088/8086 microprocessor that includes data transfer instructions, Arithmetic instructions, Logic instructions and Shift/Rotate instructions in writing a program.

A9- Change the state of the flag status bits by using the flag instructions.

A10- Describe the concept of a stack, when to use the stack and how a value inputs to the stack and return from it using the push and pop instruction.

A11- Write a procedure (function), call a procedure, and return to the main program.

A12- Describe the meaning of a string and how to handle the string using the string instructions.

A13- Write a macro (opcode) and describe the difference between a macro and a procedure.

A14- Describe the hardware architecture of the 8088/8086 microprocessor (pin layout).

A15- Explain how to configure the 8088/8086 microprocessor to work in minimum mode or maximum mode.

A16- Explain the bus system and identify the types of the bus system which includes the address bus, the data bus, the control bus and how they work.

B. The skills goals special to the course

B1- Explain all the control signals that are needed in implementing the minimum mode interface between the 8088/8086 microprocessor and memory or input/output devices.

B2- Explain all the control signals that are needed in implementing the maximum mode interface between the 8088/8086 microprocessor and memory or input/output devices.

B3- Explain the 8284-clock generator and how it generates the system clock to the 8088/8086 microprocessor.

B4- Define the bus cycle and explain the meaning of memory read, memory write bus cycle and input/output read, input /output write bus cycle.

B5- Draw the read bus cycle and the write bus cycle for memory and input/output devices in both modes.

B6- Define the meaning of the wait state, the idle state and when or where the processor inserts it in the bus cycle system.

B7- Explain the interface between the 8088/8086 microprocessor and the 8288-bus controller to generate the control signals in maximum mode.

B8- Describe the hardware organization of the memory address space and explain the difference between the 8086/8088 microprocessor from this point.

B9- Describe the devices that are needed in implementing the memory interface with the 8088/8086 microprocessor.

B10- Explain why the needs for memory address decoding circuit.

B11- Define the memory types and how they interface with the 8088/8086 microprocessor.

B12- Define the input /output types and how they interface with the 8088/8086 microprocessor.

B13- Use the input/output instructions in transferring data between the microprocessor and the input/output devices.

B14- Explain the interrupt types and how to use the interrupt instruction in software program.

B15- Explain how to interface multiple interrupts using 74f148 encoder.

B16- Understand the concept of direct memory address (DMA) and how the DMA controller works and interfaces

with microcomputer system.

#### Teaching and Learning Methods.

1. Lectures.
2. Tutorials.
3. Homework and Assignments.
4. Tests and Exams.
5. In-Class Questions and Discussions.
6. Connection between Theory and Application.
7. Seminars.
8. In- and Out-Class oral conversations.

Reports, Presentations, and Posters.

#### Assessment Methods

1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor)

#### C. Affective and value goals

C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.

C2- Conducting a survey for each year to determine the extent to which students achieve the desired results

C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.

#### Teaching and Learning Methods

- 1-Tests, quizzes.
- 2- Activities.
- 3- Participate during lectures



### Assessment methods

- 1- Study the conditions of former graduates.
- 2- Relevant committees in management such as scientific, QA.
- 3- The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.

### D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1. Ability to carry out independent study to take notes, to carry out background reading.

D2. Problem Solving based on understanding.

D3. Ability to learn and remember key facts

D4. Self-discipline and self-motivation

## 10. Course Structure

<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>
1	2 the. 2 exp.	Item 1 section 10	Introduction microprocessors microcomputers	From 1 to	From 1 to 4 section 12
2	2 the. 2 exp.	Item 2 section 10	16-bit Microprocessor Software Architecture (8088/8086 $\mu$ BIU & EU.	From 1 to	From 1 to 4 section 12
3	2 the. 2 exp.	Item 3,4 section 10	16-bit Microprocessor Software	From 1 to of section 11	From 1 to 4 section 12

			Architecture (8088/8086 $\mu$ memory organization, physical address generation & organization.		
4	2 the. 2 exp.	Item 5,6 section 10	Introduction Assembly Language Programming & Addressing Mode I of the 808 8086.	From 1 to 4 of section 11	From 1 to 4 of section 12
5	2 the. 2 exp.	Item 5,6 section 10	Introduction Assembly Language Programming & Addressing Mode II of the 808 8086.	From 1 to 4 of section 11	From 1 to 4 of section 12
6	2 the. 2 exp.	Item A3	Converting Assembly Language Instructions Machine Code.	From 1 to 4 of T-methods	From 1 to 4 of A-methods
7	2 the. 2 exp.	Item A3	Data Transfer instructions [MOV, XCHG, LSHL, LES, LEA].	From 1 to 4 of T-methods	From 1 to 4 of A-methods
8	2 the. 2 exp.	Item A3	Arithmetic Instructions: Addition-[ADD, ADC, INC, AAS, DAA] Subtraction-[SUB,	From 1 to 4 of T-methods	From 1 to 4 of A-methods

			SBB, DEC, NI AAS, DAS].		
9	2 the. 2 exp.	Item A3	Arithmetic Instructions: Multiplication- [MUL, IMUL, AA Division-[DIV, IDIV, AAD, CB CWD].	From 1 to of T-method	From 1 to 4 of A-methods
10	2 the. 2 exp.	Item A3	Logic Instructio [AND, OR XC NOT, TEST]. Compare In [CMP].	From 1 to of T-method	From 1 to 4 of A-methods
11	2 the. 2 exp.	Item A3	Shift & Rot Instructions [S SAL, SHR, SA ROL, RCL, RC RCR].	From 1 to of T-method	From 1 to 4 of A-methods
12	2 the. 2 exp.	Item A3	Flag Cont Instructions [LAHF, SAHF, C STC, CMC, CLI, S CLD, STD].	From 1 to of T-method	From 1 to 4 of A-methods
13	2 the. 2 exp.	Item A3	Control Trans Insts. Unconditional jump [JMP]. Conditional Jun Insts.	From 1 to of T-method	From 1 to 4 of A-methods
14	2 the.	Item A3	LOOP&LOOP- Handling	From 1 to	From 1 to 4 of

	2 exp.		Instructions[LOOP, LOOPE/LOOPNE/LOOPNE/LOOPNE].	of T-method	A-methods
15	2 the. 2 exp.	Item A2, A3	The Stack Subroutines [PUSH, PUSH, POP, POPF, CALL, RET].	From 1 to of T-method	From 1 to 4 of A-methods
16	2 the. 2 exp.	Item A3	String and String Handling Instructions:	From 1 to of T-method	From 1 to 4 of A-methods
17	2 the. 2 exp.	Item A6	The 8088 and 8086 $\mu$ ps: [Pin layout, Minimum & Max-Memory Interfaces].	From 1 to of T-method	From 1 to 4 of A-methods
18	2 the. 2 exp.	Item B7	System Clock, Bus Cycle & Timing States.8088/8086 Fully Buffered.	From 1 to of T-method	From 1 to 4 of A-methods
19	2 the. 2 exp.	Item B8	The Memory System:[Memory bus-cycles read/write, memory interfacing 8088/8086 (I)].	From 1 to of T-method	From 1 to 4 of A-methods
20	2 the. 2 exp.	Item B8	The Memory System:[Memory types, memory chip requirements].	From 1 to of T-method	From 1 to 4 of A-methods
21	2 the. 2 exp.	Item B8	The Memory System:[Memory interfacing 8088/8086 (II)]	From 1 to of T-method	From 1 to 4 of A-methods

22	2 the. 2 exp.	Item B9	Input /Output Interface Circu and Periphe Devices [Isolate Memory-mapped I/O, Input/Output Bus cycles].	From 1 to of T-method	From 1 to 4 of A-methods
23	2 the. 2 exp.	Item B9	Input /Output Interface Circu and Periphe Devices-[LED, Switches, segment].	From 1 to of T-method	From 1 to 4 of A-methods
24	2 the. 2 exp.	Item B9	Input /Output Interface Circu and Periphe Devices-[Keyboard Parallel Prin Interface].	From 1 to of T-method	From 1 to 4 of A-methods
25	2 the. 2 exp.	Item B5	Introduction 8279 Keyboa &Display controller and interface 8088/8086.	From 1 to of T-method	From 1 to 4 of A-methods
26	2 the. 2 exp.	Item B5	Interrupt-[interrupt typ hardware, software, intern vector table].	From 1 to of T-method	From 1 to 4 of A-methods
27	2 the. 2 exp.	Item B5	Interrupt-[external hardware interrupt interfa using INTR &NM	From 1 to of T-method	From 1 to 4 of A-methods

28	2 the. 2 exp.	Item B5	Interrupt- [Multiple Interrupt Interfa using 74F1 encoder].	From 1 12 of T-method	From 1 to 4 of A-methods
29	2 the. 2 exp.	Item B10	Introduction Direct Memc Accessing DMA 8237 DM controller I.	From 1 12 of T-method	From 1 to 4 of A-methods
30	2 the. 2 exp.	Item B10	Introduction DMA & 8237 DM controller II.	From 1 12 of T-method	From 1 to 4 of A-methods

### 11. Course Evaluation

The student's grade is calculated based on the semester system, out of 100, and is divided as follows:

a- Annual quest of 40%.

The annual pursuit grade depends on the following types of evaluations:

1- Monthly exams (20%)

2- lab exam ,Daily exams, Homework, Seminars and reports, Attendance, oral exams,

Student activity in the classroom (20%).

b- The end year exam is 60%

### 12. Learning and Teaching Resources

Required textbo (curricular books, if an	The 8088 and 8086 Microprocessors: Programming Interfacing, Software, Hardware, and Applications by <a href="#">Walter A. Triebel</a> , <a href="#">Avtar Singh</a>
Main referenc (sources)	Introduction to 80x86 Assembly Language and Computer Architecture by <a href="#">Richard Detmer</a> .

	Paper
Recommended books and references (scientific journals, reports...)	. Firasta et al., " Intel ® AVX: New frontiers in performance improvements and energy efficiency ", Intel Corporation Tech. Rep., May 2008.
Electronic Websites	Referenc Available websites related to the subject.

## Course Description Form of Digital System Design (DSD)

<b>1. Course Name:</b>	
Digital System Design (DSD)	
<b>2. Course Code:</b>	
COE 205	
<b>3. Semester / Year:</b>	
2023-2024	
<b>4. Description Preparation Date:</b>	
February- 2024	
<b>5. Available Attendance Forms:</b>	
Annual System: There is only one mode of delivery, which is a “D Program”. The students are full-time students and on campus. They attend full-day program in face-to-face mode. The academic year is composed 30-week regular subjects.	
<b>6. Number of Credit Hours (Total) / Number of Units (Total):</b>	
Three hours per week - theoretical/90 hours total	
Two hours per week - practical / 60 hours total	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: Asst. Prof. Ammar Adel Hasan, Ph.D.	
Email: mr.ammaradel@coeng.uobaghdad.edu.iq	
<b>8. Course Objectives</b>	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• How to connect skills and concepts learned from basic digital design to understanding advanced digital design.</li> <li>• How to use the acquired skills to understand, extract and solve numerical and logical equations for digital circuits and systems in various objects (e.g., Microprocessors I &amp; II, Computer Architecture I &amp; II, Digital Electronics, Digital Communications, I/O Devices etc. ).</li> <li>• Representation, basic concepts of advanced digital design and implementation through understanding practical digital devices.</li> </ul>



## 9. Teaching and Learning Strategies

<b>Strategy</b>	<ol style="list-style-type: none"> <li>1. Lectures.</li> <li>2. Tutorials.</li> <li>3. Homework and Assignments.</li> <li>4. Tests and Exams.</li> <li>5. In-Class Questions and Discussions.</li> <li>6. The connection between Theory and Application.</li> <li>7. Seminars.</li> <li>8. In-and Out-Class oral conservations.</li> <li>9. Reports, Presentations, and Posters.</li> </ol>
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## 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 the. 2 exp.	Item 1 section 10	Sequence generator & detector, PN generator	From 1 to 4 of section 11(Teaching and Learning Methods)	From 1 to 4 of section 12
2	3 the. 2 exp.	Item 2 & 4 section 10	Tutorials for PN generator, linear and non-linear PN generators. Quiz	From 1 to 4 of section 11(Teaching and Learning Methods)	From 1 to 4 of section 12
3	3 the. 2 exp.	Item 5 section 10	sequential logic circuits: Finite State Machine (FSM), Introduction of Synchronous	From 1 to 4 of section 11(Teaching and Learning Methods)	From 1 to 4 of section 12

			logic circuit: State diagram & table		
<b>4</b>	3 the. 2 exp.	Item 1 to 4 section 10	Tutorials for State diagram and state diagram & Quiz	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
<b>5</b>	3 the. 2 exp.	Item 5 section 10	State reduction table & Tutorials	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
<b>6</b>	3 the. 2 exp.	From 1 to 4 section 10	binary assignment table & Tutorials  Feedback shift registers, sequential circuits using a register and a combination circuit	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
<b>7</b>	3 the. 2 exp.	Item 4 section 10	Synchronous sequential logic circuit realization	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
<b>8</b>	3 the. 2 exp.	Item 8 section 10	Analysis of Synchronous sequential	From 1 to 4 of section 11(Teaching and Learn	From 1 to 4 section 12

			logic  Introduce basic VHDL concepts and constructs, Signal and constant	Methods)	
<b>9</b>	3 the. 2 exp.	Item 8 section 10	Introduction of Asynchronous logic circuit:  State diagram & table  VHDL description of combinational circuits, VHDL models& operators	From 1 to 4 of section 11(Teaching and Learning Methods)	From 1 to 4 section 12
<b>10</b>	3 the. 2 exp.	Item 8 section 10	Determination of flow table for problem reduction of the primitive flow table  Packages and libraries, IEEE standard logic & Modeling Flip-Flops using VHDL processes	From 1 to 4 of section 11(Teaching and Learning Methods)	From 1 to 4 section 12

<b>11</b>	3 the. 2 exp.	Item 8 section 10	Tutorials & Quiz  Modeling registers and counters using VHDL processes & Quiz	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
<b>12</b>	3 the. 2 exp.	Item 8 section 10	Conversion of primitive flow table to transition table and logic diagram  Modeling combinational logic using VHDL processes	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
<b>13</b>	3 the. 2 exp.	Item 8 section 10	VHDL Modeling of a sequential machine, More about processes and sequential statements	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
<b>14</b>	3 the. 2 exp.	Item 7 section 10	Introduction of Asynchronous sequential logic	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12

15	3 the. 2 exp.	Item 7 section 10	Non- critical race, stability consideration, Hazard (Static, Dynamic & Essential)	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
16	3 the. 2 exp.	Item 7 section 10	Determination of flow table for problem reduction of the primitive flow table	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
17	3 the. 2 exp.	From 1 to 8 section 10	Tutorial & Quiz	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
18	3 the. 2 exp.	Item 7 section 10	Conversion of primitive flow table to transition table and logic diagram	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
19	3 the. 2 exp.	Item 7 section 10	State assignment, merging rows of the flow table, race free assignment, hazard,	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12
20	3 the. 2 exp.	Item 7 section 10	implementatio n of sequential circuit with SR latches, Quiz	From 1 to 4 of section 11(Teaching and Learn Methods)	From 1 to 4 section 12

21	3 the. 2 exp.	Item 6 section 10	Logic circuits and programmable logic devices, PLA, PAL, ROM, FPGA	From 1 to 4 of section 11 (Teaching and Learn Methods)	From 1 to 4 section 12
22	3 the. 2 exp.	Item 5 section 10	Introduction of Algorithmic state machines (ASM), ASM Chart & Table	From 1 to 4 of section 11 (Teaching and Learn Methods)	From 1 to 4 section 12
23	3 the. 2 exp.	Item 5 section 10	Practical problems using ASM chart	From 1 to 4 of section 11 (Teaching and Learn Methods)	From 1 to 4 section 12
24	3 the. 2 exp.	Item 5 section 10	Practical problems using ASM chart	From 1 to 4 of section 11 (Teaching and Learn Methods)	From 1 to 4 section 12
25	3 the. 2 exp.	From 5 to 6 section 10	Realization ASM Chart using PLA & ROM devices	From 1 to 4 of section 11 (Teaching and Learn Methods)	From 1 to 4 section 12
26	3 the. 2 exp.	Item 8 section 10	Design of simple processor in VHDL	From 1 to 4 of section 11 (Teaching and Learn Methods)	From 1 to 4 section 12
27	3 the. 2 exp.	Item 8 section 10	Design of simple processor in VHDL	From 1 to 4 of section 11 (Teaching and Learn	From 1 to 4 section 12

				Methods)	
28	3 the. 2 exp.	Item 8 section 10	Design of simple processor in VHDL	From 1 to of secti 11(Teaching and Learn Methods)	From 1 to 4 section 12
29	3 the. 2 exp.	Item 8 section 10	Design of simple processor in VHDL	From 1 to of secti 11(Teaching and Learn Methods)	From 1 to 4 section 12
30	3 the. 2 exp.	Item 1 to 8 section 10	Tutorial & Quiz	From 1 to of secti 11(Teaching and Learn Methods)	From 1 to 4 section 12

#### 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

#### 12. Learning and Teaching Resources

1. Books Required reading:	"Fundamentals of Logic Design Charles H. Roth & Larry L. Kinn all edition until 6th edition in 2014. 2014.
2. Main references (sources)	"Fundamentals of Logic Design Charles H. Roth & Larry L. Kinn all edition until 6th edition in 2014. 2014.
A- Recommended books and references (scientific journals, reports...).	Deshmane, P. D., Lad, M., Mhetre, P., & Kumar, S. (2014). 8 Bit Microprocessor Using VHDL. International Journal of Latest Technology in

Engineering, Management & Applied Science, 241-246.

Kamaljeet, Kaur, G., & Yadav, L. (2015). STUDY OF Programmable Logic Devices. International Journal of Innovative Research in Technology, 313-317.

Hasan, M., Podder, Thakur, J. M., Haque, Sayeed, M., & Islam, (2014). VH Implementation of Mod and Mealy State Machine. International Journal of Electrical and Electronic Research, 174-181.



## Course Description Form of Data Structures and Computer Algorithms

1. Course Name:	
Data Structures and Computer Algorithms	
2. Course Code:	
COE 206	
3. Semester / Year:	
1st & 2nd / Academic Year 2023–2024	
4. Description Preparation Date:	
February- 2024	
5. Available Attendance Forms:	
Face-to-face education	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hrs. / 2 hrs. per week theory	
60 hrs. / 2 hrs. per week Lab.	
7. Course administrator's name (mention all, if more than one name)	
Name: Hussein Abdull Sahib Nasrullah	
Email: h.nassrullah@coeng.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	<ul style="list-style-type: none"> <li>• Learning how to write programs in Object Oriented Programming (OOP) style using JAVA.</li> <li>• The ability to define at a sufficiently high level of abstraction to data structures and algorithms that are needed.</li> <li>• The ability to devise alternative implementations of data structure.</li> <li>• The ability to write a correct algorithm and for all programs tried our best to structure them</li> </ul>

	<p>appropriately.</p> <ul style="list-style-type: none"> <li>To be able to describe the accessing functions of all the fundamentals of data structures (linear list, linked list, stack, queue, tree, binary search tree, table, and the hash techniques) and its operations with the help of object-oriented design.</li> </ul>
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### 9. Teaching and Learning Strategies

<b>Strategy</b>	<ol style="list-style-type: none"> <li>Lectures.</li> <li>Tutorials.</li> <li>Homework and Assignments.</li> <li>Tests and Exams.</li> <li>In-Class Questions and Discussions.</li> <li>Connection between Theory and Application.</li> </ol>
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### 10. Course Structure

<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>
1	2 Theory 2 Exp.	Learning the Basics of OOP in Java	Basics of OOP	From 1 to 6 of section 9	From 1 to 3 of section 11
2	2 Theory 2 Exp.	Learning the Types of member functions in Java	Types of member functions	From 1 to 6 of section 9	From 1 to 3 of section 11
3	2 Theory 2 Exp.	Learning the Initializing functions/data broker functions in Java	Initializing functions/data broker functions	From 1 to 6 of section 9	From 1 to 3 of section 11
4	2	Learning the	Implementation	From 1	From 1 to 3 of

	Theory 2 Exp.	Implementation functions/access functions/ auxiliary functions and constant functions in Java	functions/access functions/ auxiliary functions and constant functions	to 6 of section 9	section 11
5	Theory 2 Exp.	Learning the Class instantiation in Java	Class instantiation	From 1 to 6 of section 9	From 1 to 3 of section 11
6	Theory 2 Exp.	Learning the Array of class objects/ objects as function arguments in Java	Array of class objects/ objects as function arguments	From 1 to 6 of section 9	From 1 to 3 of section 11
7	Theory 2 Exp.	Learning the Constructors(initializing object/default constructor) in Java	Constructors(initializing object/default constructor)	From 1 to 6 of section 9	From 1 to 3 of section 11
8	Theory 2 Exp.	Learning the Copy constructor/ using custom constructor in Java	Copy constructor/ using custom constructor	From 1 to 6 of section 9	From 1 to 3 of section 11
9	Theory 2 Exp.	Learning the Destructors in Java	Destructors	From 1 to 6 of section 9	From 1 to 3 of section 11
10		Learning the Class	Class types, class	From 1	From 1 to 3 of

	Theory 2 Exp.	types, class scope, empty class, empty nested class, nested class in Java	scope, empty class, nested class	to 6 of section 9	section 11
11	2 Theory 2 Exp.	Learning the Data members, static members in Java	Data members, static members	From 1 to 6 of section 9	From 1 to 3 of section 11
12	2 Theory 2 Exp.	Learning the Overloading (non-member/ member functions) conversion function and friend functions in Java	Overloading (non-member/ member functions) conversion function and friend functions	From 1 to 6 of section 9	From 1 to 3 of section 11
13	2 Theory 2 Exp.	Learning the Overloaded constructor, overloaded operator, and operator as a function call in Java	Overloaded constructor, overloaded operator, and operator as a function call	From 1 to 6 of section 9	From 1 to 3 of section 11
14	2 Theory 2 Exp.	Learning the Templates in Java	Templates	From 1 to 6 of section 9	From 1 to 3 of section 11
15	2 Theory 2	Learning the The "this" pointer in Java	The "this" pointer	From 1 to 6 of section 9	From 1 to 3 of section 11

	Exp.				
16	2 Theo ry 2 Exp.	Learning the Simple arrays in Java	Simple arrays	From 1 to 6 of section 9	From 1 to 3 of section 11
17	2 Theo ry 2 Exp.	Learning the Multidimensional arrays in Java	Multidimensional arrays	From 1 to 6 of section 9	From 1 to 3 of section 11
18	2 Theo ry 2 Exp.	Learning the Lists in Java	Lists	From 1 to 6 of section 9	From 1 to 3 of section 11
19	2 Theo ry 2 Exp.	Learning the implantation via arrays, dynamic memory, and via linked in Java	implantation via arrays, dynamic memory, and via linked	From 1 to 6 of section 9	From 1 to 3 of section 11
20	2 Theo ry 2 Exp.	Learning the Order list in Java	Order list	From 1 to 6 of section 9	From 1 to 3 of section 11
21	2 Theo ry 2 Exp.	Learning the Stacks, stack implementations in Java	Stacks, stack implementations	From 1 to 6 of section 9	From 1 to 3 of section 11
22	2 Theo	Learning the Queues, Queue	Queues, Queue	From 1 to 6 of	From 1 to 3 of

	ry 2 Exp.	implementations in Java	implementations	section 9	section 11
23	2 Theo ry 2 Exp.	Learning the Circular queue in Java	Circular queue	From 1 to 6 of section 9	From 1 to 3 of section 11
24	2 Theo ry 2 Exp.	Learning the Tables in Java	Tables	From 1 to 6 of section 9	From 1 to 3 of section 11
25	2 Theo ry 2 Exp.	Learning the Hash technique in Java	Hash technique	From 1 to 6 of section 9	From 1 to 3 of section 11
26	2 Theo ry 2 Exp.	Learning the Methods for handling collisions in Java	Methods for handling collisions	From 1 to 6 of section 9	From 1 to 3 of section 11
27	2 Theo ry 2 Exp.	Learning the Trees in Java	Trees	From 1 to 6 of section 9	From 1 to 3 of section 11
28	2 Theo ry 2 Exp.	Learning the building binary tree in Java	building binary tree	From 1 to 6 of section 9	From 1 to 3 of section 11

29	2 Theo ry 2 Exp.	Learning the Tree traversal/ preorder, in order, and post order in Java	Tree traversal/ preorder, in order, and post order	From 1 to 6 of section 9	From 1 to 3 of section 11
30	2 Theo ry 2 Exp.	Learning the Binary search tree in Java	Binary search tree	From 1 to 6 of section 9	From 1 to 3 of section 11

### 11. Course Evaluation

1. Tests, quizzes.
2. Activities.
3. Participate during lectures

### 12. Learning and Teaching Resources

Required textbooks (curricular books, if a	Data Structures and Algorithms in Java™ Michael T. Goodrich, Roberto Tamassia Michael H. Goldwasser, 2014 John Wiley & Sons, Inc.
Main references (sources)	Introduction to Programming Using Java Version 7.0, August 2014 David J. Eck
Recommended books and references (scientific journals, reports...)	Introduction To Java Programming And Data Structures Comprehensive Version Eleventh Edition Global Edition Y. Daniel Liang
Electronic References, Websites	<ul style="list-style-type: none"> <li>• <a href="https://www.w3schools.com/java">https://www.w3schools.com/java</a></li> <li>• <a href="https://www.w3resource.com/java-exercises/">https://www.w3resource.com/java-exercises/</a></li> </ul>

## Course Description Form of Mathematical Modeling and Communication Systems

1. Course Name:	
Mathematical Modeling and Communication Systems	
2. Course Code:	
COE207	
3. Semester / Year:	
1st & 2nd / Academic Year 2023- 2024	
4. Description Preparation Date:	
February 17	
5. Available Attendance Forms:	
They attend full day program in face-to-face mode. The academic year composed of 30-week regular subjects	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90 rs. / 3 hrs. per week Theory .	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Labeeb Mohsin Abdullah	
Email: <a href="mailto:labeeb.m@coeng.uobaghdad.edu.iq">labeeb.m@coeng.uobaghdad.edu.iq</a>	
8. Course Objectives	
<b>Course Objective</b>	<p>1.To provide a comprehensive understanding of the principles and techniques behind mathematical modeling in digital communication systems.</p> <p>2. To enhance knowledge in various digital modulation techniques and understand the probabilities of errors in binary signals.</p> <p>3. To offer a deep understanding of information theory, including information measurement and channel capacity.</p> <p>4.To introduce students to different types of source coding</p>



	<p>and channel coding methods.</p> <p>5.To strengthen problem-solving skills, analysis, and critical thinking within the context of modeling and analyzing communication systems</p>
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**9. Teaching and Learning Strategies**

<b>Strate</b>	<ol style="list-style-type: none"> <li>1) Lectures.</li> <li>2) Educational lessons.</li> <li>3) Homework and assignments.</li> <li>4) Tests and exams.</li> <li>5) Questions and discussions within the classroom.</li> <li>6) Extracurricular activities.</li> <li>7) Seminars.</li> <li>8) Oral conversations inside and outside the classroom.</li> </ol> <p>Teaching and Learning Methods.</p> <ol style="list-style-type: none"> <li>9. Lectures.</li> <li>10. Tutorials.</li> <li>11. Homework and Assignments.</li> <li>12. Tests and Exams.</li> <li>13. In-Class Questions and Discussions.</li> <li>14. Connection between Theory and Application.</li> <li>15. Seminars.</li> <li>16. In- and Out-Class oral conservations.</li> </ol> <p><u>Teaching and Learning Methods</u></p> <p>1-Tests, quizzes.</p>
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	2- Activities. 3- Participate during lectures <u>Assessment methods</u>
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3theoretical discussion	<p>.1To provide a comprehensive understanding of the principles and techniques behind mathematical modeling in digital communications systems.</p> <p>.2To improve knowledge in different digital modulation techniques and understand error possibilities in binary signals.</p> <p>.3To provide a deep understanding of information theory, including information measurement and channel</p>	<p>.1To provide a comprehensive understanding of the principles and techniques behind mathematical modeling in digital communications systems.</p>	<p>(1Lectures.            (2Educational lessons.            (3Homework and assignments.            (4Tests and exams.            (5Questions and discussions in class.            (6 Extracurricular activities.            (7Seminars.            (8Oral conversation inside and outside the classroom.</p>	<p>.1Quizzes            2. Tasks            .3 Projects/laboratory work            .4Report            .5Final exam</p>

		<p>capacity.</p> <p>.4To introduce students to different types of source coding and channel coding methods.</p> <p>.5To enhance problem-solving, analytical, and critical thinking skills in the context of communication system modeling and analysis.</p>			
2	3theoretical discussion		.1To provide a comprehensive understanding of the principles and techniques behind mathematical modeling in digital communications systems.		
3	3theoretical discussion		.2To improve knowledge in different digital modulation techniques and understand their possibilities in binary signals		
4	3theoretical discussion		.2To improve knowledge in different digital modulation techniques and		

			understand er possibilities in bin signals		
5	3theoretica discussion		Digital communicat system: code pu coding		
6	3theoretica discussion		Digital communicat system: differen symbolic pulse cod (DPCM)		
7	3theoretica discussion		Digital communicati system: delta cod and modulation (DM		
8	3theoretica discussion		Digital Communicat System: Time Divis Coordination (TDM)		
9	3theoretica discussion		Error probability o binary signal: The er probability of unipolar transmissio		
10	3theoretica discussion		Binary Signal Er Probability: The er probability of bipo transmission		
11	3theoretica discussion		Error Probability o Binary Signal: Optimal Decision Lev		
12	3theoretica discussion		Introduction to dig editing techniques		
13	3theoretica discussion		Digital modulatio techniques: Amplitu		

			shift modulation (AS		
14	3theoretical discussion		Digital Modulation Techniques: Frequency Shift Modulation (FS		
15	3theoretical discussion		Comparison between ASK and FSK		
16	3theoretical discussion		Introduction to digital editing techniques and their types		
17	3theoretical discussion		Digital modulation techniques: Phase shift modulation (PS performance of various digital modulation techniques		
18	3theoretical discussion		Definition and measurement of information: general model of information transmission system information theory		
19	3theoretical discussion		Definition and measurement of information: general model of information transmission system information theory		
20	3theoretical discussion		Mathematical model of information source: intermittent and continuous source quantity of information		
21	3theoretical discussion		Mathematical model of information source: intermittent and continuous source quantity of information		

22	3theoretical discussion		Axiomat Information personal information,		
23	3theoretical discussion		,source entro source entropy rate		
24	3theoretical discussion		Channel Capacity: channel capacity symmetric asymmetric intermittent channe		
25	3theoretical discussion		Channel Capacity: channel capacity symmetric asymmetric intermittent channe		
26	3theoretical discussion		Source encoding: so definitions, sou encoding intermittent redundancy, fix length codes		
27	3theoretical discussion		Variable length cod Haffman codes,		
28	3theoretical discussion		Shannon-Fano cod Haffman binary code		
29	3theoretical discussion		Introduction to chan coding: purpose channel codi applications and ty of channel codi error detection code		
30	3theoretical discussion		Seasonal exam		

#### 11. Course Evaluation

The student's grade is calculated based on the semester system, out of 100, and is divided as follows:

a- Annual quest of 40%.

The annual pursuit grade depends on the following types of evaluations:

1- Monthly exams (20%)

2- Daily exams, Homework, Seminars and reports, Attendance, oral exams,

Student activity in the classroom (20%).

b- The end year exam is 60%

## 12. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	"Digital Communications" by John G. Proakis and Masoud Salehi
Main references (sources)	<b>B.P. Lathi - Modern Digital and Analog Communication System</b>
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

# Third Year



## Course Description Form of Computer Architecture I

<b>1. Course Name</b>					
Computer Architecture I					
<b>2. Course Code:</b>					
COE301					
<b>3. Semester / Year:</b>					
2023-2024					
<b>4. Description Preparation Date:</b>					
February-2024					
<b>5. Available Attendance Forms:</b>					
Annual System; There is only one mode of Attendance, which is a “Day Program”. The students are full time on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects.					
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>					
90 hour / 6 units					
<b>7. Course administrator's name (mention all, if more than one name)</b>					
Name: Mohammed A. Nasrullah  Email: mhmdnsrla@coeng.uobaghdad.edu.iq					
<b>8. Course Objectives</b>					
<b>Course Objectives</b>		<ul style="list-style-type: none"> <li>• Understand the register transfer operations.</li> <li>• Design the processor.</li> <li>• Design some arithmetic circuits</li> </ul>			
<b>9. Teaching and Learning Strategies</b>					
<b>Strategy</b>		<ul style="list-style-type: none"> <li>• Explanation and presentations</li> <li>• Solving problems with students</li> <li>• Tests and evaluation</li> </ul>			
<b>10. Course Structure</b>					
<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>

1	3	Understand the digital circuits. Know the number conversions	Introduction to Digital Circuits and Data Representation	Lecture	Exam
2,3	6	Write RTL for hardware jobs. Design arithmetic and logic circuit	Register Transfer and Microoperations	Lecture	Exam
4-7	12	Define and explain the principles of computer architecture and the interfacing between its hardware and software components	Basic Computer Organization and Design	Lecture	Exam
8-10	9	Understand the microprogrammed control organization	Microprogrammed Control	Lecture	Exam
11-12	9	Know the organization and architecture of the CPU with an emphasis on the user's view of the computer	Central Processing Unit	Lecture	Exam
13,14	6	Understand parallel processing and pipeline	Pipeline and Vector Processing	Lecture	Exam
15-17	9	Understand architectural blocks involved in	Computer Arithmetic	Lecture	Exam

		computer arithmetic, both integer and floating point			
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### 11.Course Evaluation

The student's grade is calculated based on the semester system, out of 100, and is divided as follows:

a- Annual quest of 30%.

The annual pursuit grade depends on the following types of evaluations:

1- Monthly exams (15%)

2- Daily exams, Homework, Seminars and reports, Attendance, oral exams, Student activity in the classroom (15%).

b- The end year exam is 70%

### 12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	<ul style="list-style-type: none"> <li>• M. Morris. Mano, "Computer System Architecture" 3rd Edition</li> <li>• William Stalling, "Computer Organization and Architecture" 6th edition.</li> </ul>
Main references (sources)	Computer Architecture A Quantitative Approach Sixth Edition, John L. Hennessy, David Patterson, 2019.
Recommended books and references (scientific journals, reports...)	<ul style="list-style-type: none"> <li>• P. Trivedi and R. P. Tripathi, "Design &amp; analysis of 16 bit RISC processor using low power pipelining," International Conference on Computing, Communication &amp; Automation, Noida, 2015, pp. 1294-1297.</li> <li>• B. W. Bomar, "Implementation of microprogrammed control in FPGAs," in IEEE Transactions on Industrial Electronics, vol. 49, no. 2, pp. 415-422, Apr 2002.</li> </ul>
Electronic Websites	<ul style="list-style-type: none"> <li>• J. L. Cruz, A. Gonzalez, M. Valero and N. P. Topham, "Multiple-banked register file architectures," Proceedings of 27th International Symposium on Computer</li> </ul>

	<p>Architecture (IEEE Cat. No.RS00201), Vancouver, BC, Canada, 2000, pp. 316-325.</p> <ul style="list-style-type: none"><li>• C. Hamacher, Z. Vranesic, S. Zaky, N. Manjikian "Computer Organization and Embedded Systems", Sixth Edition</li></ul>
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## Course Description Form of Digital Control System

<b>1. Course Name:</b>	
Digital Control Systems	
<b>2. Course Code:</b>	
COE 302	
<b>3. Semester / Year:</b>	
2024-2023	
<b>4. Description Preparation Date:</b>	
February-2024	
<b>5. Available Attendance Forms:</b>	
3 hrs. per week in class/2 hrs. per week in lab	
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>	
150 hours / 6 units	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: Omar Waleed Abdulwahhab	
Email: omar.waleed@coeng.uobaghdad.edu.iq	
<b>8. Course Objectives</b>	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• This subject has been prepared as a comprehensive for a first study of control engineering.</li> <li>• This subject also helps the students to design control systems for variety of engineering applications</li> <li>• This subject covers both conventional control theory and modern control theory in digital and continuous systems.</li> </ul>
<b>9. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<p>1- Lectures. 2- Tutorials. 3- Homework and Assignments. 4- Lab. Experiments and Reports.</p> <p>5- Tests and Exams. 6- In-Class Questions and Discussions.</p> <p>7- Connection between Theory and Application. 8- Seminars.</p>

9- In- and Out-Class oral conservations.

10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	2 theory 1 tutorial 2 labs	Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems	Open loop system closed loop system,	From 1 to 9 of Teaching and Learning Methods	Examinations, Tests, and Quizzes.
3-4	2 theory 1 tutorial 2 labs	Learn to find transfer functions for linear time-invariant electrical, mechanical and electromechanical systems	Classification of feedback control system  Mathematical models : Models of electrical systems, Mechanical, thermal and liquid system,	From 1 to 9 of Teaching and Learning Methods	Examinations, Tests, and Quiz
5	2 theory 1 tutorial 2 labs	Learn to find transfer functions for linear time-invariant electrical, mechanical and electromechanical systems	Transfer function concept, D.C. servo and A.C. servo motors as examples of electromechanical system,	From 1 to 9 of Teaching and Learning Methods	Examinations, Tests, and Quiz

6	2 theory 1 tutorial 2 labs	Learn to find transfer functions for linear time-invariant electrical, mechanical and electromechanical system  Learn to find transfer functions for linear time-invariant electrical, mechanical and electromechanical systems	Block diagram algebra, signal flow graphs.	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
7	2 theory 1 tutorial 2 labs	Learn how to describe and quantify transients-response specifications of first and second-order systems	Transient response analysis - Transient response specification	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
8-10	2 theory 1 tutorial 2 labs	Learn how to find the steady-state error for unity and non-unity-gain feedback  Learn how to determine the stability of a system	Stability. - Routh's stability criterion. Study state error coefficient. Static error coefficients. Dynamic error coefficients	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz

11-14	2 theory 1 tutorial 2 labs	Learn how to use root-locus and frequency domain methods to design basic controllers	Root locus method of analysis and design Sketch the Root locus for first order system, second order system and higher order system	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
15-18	2 theory 1 tutorial 2 labs	Learn how to use root-locus and frequency domain methods to design basic controllers	Frequency response methods : Introduction Main concept of Bode. Frequency response measurements. Performance Specifications in frequency domain. Log magnitude and phase Diagrams	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
19	2 theory 1 tutorial 2 labs	Learn how to determine the stability of a system Learn how to use root-locus and frequency domain methods to design basic	Stability in Frequency domain: Nyquist Criterion	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz



		controllers			
20	2 theory 1 tutorial 2 labs	Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems	Introduction to digital control systems	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
21	2 theory 1 tutorial 2 labs	Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems	Digital Computer Control System Applications	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
22	2 theory 1 tutorial 2 labs	Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems	Sampled-Data Systems	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
23	2	Learn how to determine the	Stability of Digital Systems:	From 1 to 9 of	Examinations, Tests, and

	theory 1 tutorial 2 labs	stability of a system	Jury Test	Teaching Learning Method	Quiz
24	2 theory 1 tutorial 2 labs	Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems.  Learn how to determine the stability of a system	Closed-Loop Feedback Sampled-Data Systems	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
25	2 theory 1 tutorial 2 labs	Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems.  Learn how to determine the stability of a system	Closed-Loop Systems with Digital Computer Compensation	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
26-28	2 theory 1	Learn the basic components of a control system, the concept of	Design of digital controller based on root locus	From 1 to 9 of Teaching and	Examinations, Tests, and Quiz

	tutorial 2 labs	feedback, closed loop control versus open-loop control. For continuous and digital systems.  Learn how to determine the stability of a system		Learning Method	
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29-30	2 theory 1 tutorial 2 labs	Learn the basic components of a control system, the concept of feedback, closed loop control versus open-loop control. For continuous and digital systems.  Learn how to determine the stability of a system	Design of digital controller based on continuous controller	From 1 to 9 of Teaching and Learning Method	Examinations, Tests, and Quiz
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11.

- 25% (Quizzes, Mid-terms, daily participation, and attendance)
- 15% (Laboratory work)
- 10% (Laboratory final exam)
- 50% (Final exam)

12. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	Modern Control Engineering, Ogata K. Fourth edition , Prentice-Hall ,2002.  Modern Control System Analysis and Design Using MATLAB
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	and Simulink, Bishop R., Addison-Wesley ,2000.
Main references (sources)	Modern control systems, Drof R. C. and Bishop R, 12 <sup>th</sup> edition ,Prentice-Hall, 2010  Feedback control of dynamic systems, Franklin G.F. and et.al., Prentice-Hall, 2006.
Recommended books and references (scientific journals, reports...)	...
Electronic References, Websites	...

## Course Description Form of Microprocessors and Microcomputers II

1. Course Name:	
Microprocessors and Microcomputers II	
2. Course Code:	
COE 303	
3. Semester / Year:	
1 <sup>st</sup> & 2 <sup>nd</sup> semester / Academic Year 2023 – 2024	
4. Description Preparation Date:	
February 2024	
5. Available Attendance Forms:	
Full time and on campus. Annual system.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150 hours / 6 units	
2 Theory hours per week (60 hours total)	
1 Tutorial hour per week (30 hours total)	
2 Lab. hours per week (60 hours total)	
7. Course administrator's name (mention all, if more than one name)	
Name: Wameedh Nazar Flayyih, Hala Jassim	
Email: wam.nazar@coeng.uobaghdad.edu.iq	
8. Course Objectives	
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. How to relate the skills and concepts learned from Microprocessor/ Microcomputer I to understand Microprocessor/Microcomputer II</li> <li>2. Teaching students how to design microprocessor-based embedded systems.</li> <li>3. Understand the different components of a microcomputer system.</li> <li>4. Design some parts of a microcomputer system</li> <li>5. Develop the required software to program it</li> </ol> <p><u>Learning outcomes:</u></p> <p>L1. Understanding of Peripheral interfaces</p>

	<p>L2. Interface and control different I/O devices</p> <p>L3. Understand interrupt driven operation and interface</p> <p>L4. interface the interrupt controller interface and develop interrupt service procedures</p> <p>L5. Understand the memory management</p> <p>L6. Understand multibank memory interface</p>
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**9. Teaching and Learning Strategies**

<b>Strategy</b>	<p>Teaching and Learning Methods</p> <p>T1. Lectures</p> <p>T2. Homework</p> <p>T3. Classwork</p> <p>T4. Lab. Experiments.</p> <p>T5. Discussions</p> <p>Evaluation Methods:</p> <p>E1. Lab</p> <p>E2. Quizzes and exams</p> <p>E3. Homework</p> <p>E4. Assignments</p>
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**10. Course Structure**

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	(L1) Understanding of Peripheral interfaces	Basic I/O interface	T1-T5	E1-E4
2-3	10	(L1) Understanding	Basic I/O	T1-T5	E1-E4

		of Peripheral interfaces	interface and studying some I/O devices		
4-10	35	(L2) Interface and control different I/O devices	8255 Programmable peripheral controller mode 0	T1-T5	E1-E4
11-13	15	(L2) Interface and control different I/O devices	8255 Programmable peripheral controller mode 1 and 2	T1-T3	E1-E4
14-16	15	(L2) Interface and control different I/O devices	8279 Keyboard/display interface	T1-T3, T5	E2-E4
17-19	15	(L2) Interface and control different I/O devices	8254 Programmable interval timer	T1-T3, T5	E2-E4
20-21	10	(L3) Understand interrupt driven operation and interface	Interrupt driven I/O devices	T1-T3, T5	E2-E4
22-24	15	(L4) interface the interrupt controller interface and develop interrupt service	8259 Programmable Interrupt controller	T1-T3, T5	E2-E4

25	5	procedures  (L2) Interface and control different I/O devices	Direct Memory Access I/O devices	T1-T3, T5	E2-E4
26	5	(L2) Interface and control different I/O devices	16550 serial communication interface	T1-T3, T5	E2-E4
27	5	(L5) Understand the memory management	Memory management in protected mode	T1-T3, T5	E2-E4
28-29	10	(L6) Understand multibank memory interface	16, 32, and 64 bit memory interface	T1-T3, T5	E2-E4

### 11. Course Evaluation

60% Final Exam (10% Lab + 50% Theoretical), 40% (10% Lab reports +30% quizzes, homework, assignments)

### 12. Learning and Teaching Resources

Required textbooks (curricular books, any)	The Intel Microprocessors, 8086/8088, 80186/80188, 80286,... Core” by Barry B, Brey
Main references (sources)	The Intel Microprocessors, 8086/80186/80188, 80286,... Core” by Barry B, Brey
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	



## Course Description Form of Operating System

<b>1. Course Name:</b>	
Operating Systems	
<b>2. Course Code:</b>	
COE 304	
<b>3. Semester / Year:</b>	
Two semesters/2023-2024	
<b>4. Description Preparation Date:</b>	
February 2024	
<b>5. Available Attendance Forms:</b>	
Annual System; There is only one mode of Attendance, which is a “Day Program” The students are full time on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects	
<b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>	
3/90	
<b>7. Course administrator's name (mention all, if more than one name)</b>	
Name: Mohammed Sadoon Hathal	
Email: <a href="mailto:dr.mohammed.s.h@coeng.uobaghdad.edu.iq">dr.mohammed.s.h@coeng.uobaghdad.edu.iq</a>	
<b>8. Course Objectives</b>	
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. Presenting the nature and characteristics of modern operating systems as clearly and accurately as possible</li> <li>2. Provide an in-depth discussion of the basics of operating system design and link them to contemporary design issues and current trends in operating system development</li> <li>3. The course mainly studies: operations management Synchronization, via reference operations, of operations performed within shared memory. Mapping the virtual address to the physical addresses in the paged and hashed virtual memory system. Page fault and page replacement algorithms in virtual memory system</li> </ol>
<b>9. Teaching and Learning Strategies</b>	
<b>Strategy</b>	<ol style="list-style-type: none"> <li>1. Understand process management, process description, process states, process control block, process switching, and mode switching</li> <li>2. Understanding memory management: partitioning, paging, fragmentation</li> </ol>

3. Understanding virtual memory: paging, fragmentation, virtual .memory; Instrumentation and control structures
4. Processor scheduling: types of processor scheduling, processor .scheduling algorithms
5. .Synchronization, simultaneity and mutual exclusion

Evaluation Methods:

- A1. Lab
- A2. Quizzes and exams
- A3. Homework
- A4. Assignments

#### 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 the.	Item 1	Computer Organization, processor registers instruction	From 1 to 5 of T-methods	From 1 to4 of A-methods
2	3 the.	Items 1 and 2	Interrupts, memory organization	From 1 to 5 of T-methods	From 1 to4 of A-methods
3	3 the.	Item 1	I/O Communication Techniques	From 1 to 5 of T-methods	From 1 to4 of A-methods
4	3 the.	Item 1	The evolution of operating systems, modern OS	From 1 t to 5 of T-methods	From 1 to4 of A-methods
5	3 the.	Item 4	Time-Sharing, multitasking	From 1 to 5 of T-methods	From 1 to4 of A-methods
6	3 the.	Item 1	Process Description	From 1 to 5 of T-methods	From 1 to4 of A-methods
7	3 the.	Item 1	Process states	From 1 to 5 of T-methods	From 1 to4 of A-methods
8	3 the.	Item 1	Process Control Block	From 1 to 5 of T-methods	From 1 to4 of A-methods
9	3 the.	Item 1	Process switching, mode	From 1 to 5	From 1 to4

			switching	of T-methods	of A-methods
10	3 the.	Item 1	Operating system Kernel	From 1 to 5 of T-methods	From 1 to4 of A-methods
11	3 the.	Item 2	Memory Management Requirements, partitioning	From 1 to 5 of T-methods	From 1 to4 of A-methods
12	3 the.	Item 2	Paging	From 1 to 5 of T-methods	From 1 to4 of A-methods
13	3 the.	Item 2	Segmentation	From 1 to 5 of T-methods	From 1 to4 of A-methods
14	3 the.	Item 3	Virtual memory: paging	From 1 to 5 of T-methods	From 1 to4 of A-methods
15	3 the.	Item 3	Virtual memory: Segmentation	From 1 to 5 of T-methods	From 1 to4 of A-methods
16	3 the.	Item 3	VM; Hardware and control structures	From 1 to 5 of T-methods	From 1 to4 of A-methods
17	3 the.	Item 3	VM: Operating Systems Software	From 1 to 5 of T-methods	From 1 to4 of A-methods
18	3 the.	Item 3	Page faulting: page Replacement Algorithms	From 1 to 5 of T-methods	From 1 to4 of A-methods
19	3 the.	Item 4	Processor Scheduling	From 1 to 5 of T-methods	From 1 to4 of A-methods
20	3 the.	Item 4	Types of Scheduling	From 1 to 5 of T-methods	From 1 to4 of A-methods
21	3 the.	Item 4	Processor Scheduling Algorithms	From 1 to 5 of T-methods	From 1 to4 of A-methods
22	3 the.	Item 5	Principles of Concurrency	From 1 to 5 of T-methods	From 1 to4 of A-methods
23	3 the.	Item 5	Mutual Exclusion	From 1 to 5 of	From 1 to4 of

				T-methods	A-methods
24	2 the. 2 exp.	Item 5	Synchronization	From 1 to 5 of T-methods	From 1 to 4 of A-methods
25	3 the.	Item 5	Mutual Exclusion: Software Support	From 1 to 5 of T-methods	From 1 to 4 of A-methods
26	3 the.	Item 5	Mutual Exclusion: Hardware Support	From 1 to 5 of T-methods	From 1 to 4 of A-methods
27	3 the.	Item 5	Starvation, Deadlock	From 1 to 5 of T-methods	From 1 to 4 of A-methods
28	3 the.	Item 5	Special Machine Instructions	From 1 to 5 of T-methods	From 1 to 4 of A-methods
29	3 the.	Item 5	Semaphores	From 1 to 5 of T-methods	From 1 to 4 of A-methods
30	3 the.	Item 5	Message Passing	From 1 to 5 of T-methods	From 1 to 4 of A-methods

### 11. Course Evaluation

The student's grade is calculated based on the semester system, out of 100, and is divided as follows:

a- Annual quest of 30%.

The annual pursuit grade depends on the following types of evaluations:

1- Monthly exams (15%)

2- Daily exams, Homework, Seminars and reports, Attendance, oral exams, Student activity in the classroom (15%).

b- The end year exam is 70%

### 3- Learning and Teaching Resources

Required textbooks (curricular books, any)	Operating Systems by William Stallin Pearson International Edition, Eig Edition, 2015.
Main references (sources)	Operating Systems Concepts by: Abraham Silberscatz, Peter B. galvin, International Student Edition, 8 <sup>th</sup> Edition, 2010.

<p>Recommended books and references (scientific journals, reports...)</p>	<p>Comparison of different Operating System by Niti gupta , Amrita ticku, Manoj kumar. Proceedings of National Conference on Recent Advances in Electronics and Communication Engineering (RACE-2014, 28-29 March .2014</p> <p>Operating System and Decision Making by: Hussain A. Alhassan, Dr. Christian Bach. ASEE 2014 Zone I Conference, April 3-5, 2014, University of .Bridgeport, Bridgpeort, CT, USA</p> <p>Comparative Study of Different Mobil Operating Systems by: T.N.Sharma Mahender Kr. Beniwal, Arpita Sharma International Journal of Advancements Research &amp; Technology, Volume 2, Issue March-2013</p>
<p>Electronic References, Websites</p>	<p>Extra lectures by foreign guest lecturers</p> <p>Available websites related to the subject</p>

## Course Description Form of Computer Networks

1. Course Name:	
Computer Networks	
2. Course Code:	
COE 305	
3. Semester / Year:	
1st & 2nd semester / Academic Year 2022 – 2023.	
4. Description Preparation Date:	
February/2024	
5. Available Attendance Forms:	
Annual System; There is only one mode of Attendance, which is a “Day Program”. The students are full time on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90 hrs. / 3 hrs. per week Theory. 60 hrs. / 2 hrs. per week Lab. (150 hours)  6 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Prof. Dr. Alaa M. Abdul-Hadi  Email: <a href="mailto:alaa.m.abdulahadi@coeng.uobaghdad.edu.iq">alaa.m.abdulahadi@coeng.uobaghdad.edu.iq</a>	
8. Course Objectives	
<b>Course Objectives</b>	<p><b>Learning Outcomes</b></p> <p>A1. Introduce the concepts and meaning of network in live and work.</p> <p>A2. Understand "How Networks Work?" of every little detail of information transmit from sender to receiver through whole media.</p> <p>A3. Compare the differences of using certain media instead of others</p> <p>A4. Ability to cope with the accelerated knowledge of the computer networks fields.</p>

A5. Learning the concepts of common network devices, such routers, switches, servers etc, which are the nerves of any network all over the world.

### 9. Teaching and Learning Strategies

<b>Strategy</b>	<p>Teaching and Learning Methods (T-Methods).</p> <ol style="list-style-type: none"> <li>1. Lectures.</li> <li>2. Tutorials.</li> <li>3. Homework and Assignments.</li> <li>4. Lab. Experiments.</li> <li>5. Tests and Exams.</li> <li>6. In-Class Questions and Discussions.</li> <li>7. Connection between Theory and Application.</li> <li>8. Field Trips.</li> <li>9. Extracurricular Activities.</li> <li>10. Seminars.</li> <li>11. In- and Out-Class oral conversations.</li> <li>12. Reports, Presentations, and Posters.</li> </ol>
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### 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 the. 2 exp.	Item A1	Introduction to computer Networks	From 1 to12 of T-Methods	From 1 to4 of A-Methods
2	3 the. 2 exp.	Item A1, A3	Introduction to computer Networks	From 1 to12 of T-Methods	From 1 to4 of A-Methods
3	3 the. 2 exp.	Item A1	Introduction to computer Networks	From 1 to12 of T-Methods	From 1 to4 of A-Methods
4	3 the. 2 exp.	Item A2	Principles of Network Applications	From 1 to12 of T-Methods	From 1 to4 of A-Methods

5	3 the. 2 exp.	Item A2, A5	The Web and HTTP	From 1 to12 of T-Methods	From 1 to4 of A-Methods
6	3 the. 2 exp.	Item A2, A5	The Web and HTTP	From 1 to12 of T-Methods	From 1 to4 of A-Methods
7	3 the. 2 exp.	Item A2, A5	DNS	From 1 to12 of T-Methods	From 1 to4 of A-Methods
8	3 the. 2 exp.	Item A2	Introduction to Transport Layer	From 1 to12 of T-Methods	From 1 to4 of A-Methods
9	3 the. 2 exp.	Item A2	UDP	From 1 to12 of T-Methods	From 1 to4 of A-Methods
10	3 the. 2 exp.	Item A2	Principles of Reliable Data Transfer	From 1 to12 of T-Methods	From 1 to4 of A-Methods
11	3 the. 2 exp.	Item A2	TCP	From 1 to12 of T-Methods	From 1 to4 of A-Methods
12	3 the. 2 exp.	Item A2	Pipelined Protocols	From 1 to12 of T-Methods	From 1 to4 of A-Methods
13	3 the. 2 exp.	Item A2	Flow control	From 1 to12 of T-Methods	From 1 to4 of A-Methods



14	3 the. 2 exp.	Item A2	Principles of Congestion Control	From 1 to12 of T-Methods	From 1 to4 of A-Methods
15	3 the. 2 exp.	Item A2	TCP Congestion Control	From 1 to12 of T-Methods	From 1 to4 of A-Methods
16	3 the. 2 exp.	Item A2	Introduction to Network Layer	From 1 to12 of T-Methods	From 1 to4 of A-Methods
17	3 the. 2 exp.	Item A2	Virtual Circuit and Datagram Networks	From 1 to12 of T-Methods	From 1 to4 of A-Methods
18	3 the. 2 exp.	Item A2, A5	The Router Internals	From 1 to12 of T-Methods	From 1 to4 of A-Methods
19	3 the. 2 exp.	Item A2	The Internet Protocol (IP)	From 1 to12 of T-Methods	From 1 to4 of A-Methods
20	3 the. 2 exp.	Item A2	Routing Algorithms	From 1 to12 of T-Methods	From 1 to4 of A-Methods
21	3 the. 2 exp.	Item A2	Routing Algorithms	From 1 to12 of T-Methods	From 1 to4 of A-Methods
22	3 the. 2 exp.	Item A2	Routing in the Internet	From 1 to12 of T-Methods	From 1 to4 of A-Methods

23	3 the. 2 exp.	Item A2	Broadcast and Multicast Routing	From 1 to12 of T-Methods	From 1 to4 of A-Methods
24	3 the. 2 exp.	Item A3	Introduction to Data Link Layer	From 1 to12 of T-Methods	From 1 to4 of A-Methods
25	3 the. 2 exp.	Item A3	Error Detection and Correction Techniques	From 1 to12 of T-Methods	From 1 to4 of A-Methods
26	3 the. 2 exp.	Item A3	Multiple Access Links and Protocols	From 1 to12 of T-Methods	From 1 to4 of A-Methods
27	3 the. 2 exp.	Item A4, A5	Switched LANs	From 1 to12 of T-Methods	From 1 to4 of A-Methods
28	3 the. 2 exp.	Item A4, A5	LAN Virtualization	From 1 to12 of T-Methods	From 1 to4 of A-Methods
29	3 the. 2 exp.	Item A4, A5	Data Center Networking	From 1 to12 of T-Methods	From 1 to4 of A-Methods
30	3 the. 2 exp.	Item A4, A5	Physical Layer	From 1 to12 of T-Methods	From 1 to4 of A-Methods

#### 11. Course Evaluation

- 25% (Quizzes, Mid-terms, daily participation, and attendance)
- 15% (Laboratory work)
- 10% (Laboratory final exam)

<ul style="list-style-type: none"> <li>50% (Final exam)</li> </ul>	
12. Learning and Teaching Resources	
Required textbooks	<ul style="list-style-type: none"> <li>Computer Network A Top Down Approach, by <i>James F. Kourse</i>, 8 th edition 2022.</li> </ul>
Main references (sources)	<ul style="list-style-type: none"> <li>Data Communications and Networking, by <i>Behrouz A. Forouzan</i> , 5th Edition 2013.</li> <li>Computer Network by <i>Andrew S. Tanenbaum</i>, 5th Edition 2011.</li> <li>TCP/IP Protocol Suite, by <i>Behrouz A. Forouzan</i> , 4th Edition 2010.</li> <li>Data and Computer Communications, by <i>William Stallings</i>, 10th Edition 2014.</li> </ul>
Recommended books and references (scientific journals, reports...)	<ul style="list-style-type: none"> <li>Paper1: Wu, C., et al.: WILL: Wireless indoor Localization without site survey. IEEE Trans. Parallel Distrib. Syst. 24(4), 839-848(2013).</li> <li>Paper2: Vucic, J. and Langer, K.-D., "High-speed visible light communications: State-of-the-art," in [Optical Fiber Communication Conference and Exposition (OFC/NFOEC), 2012 and the National Fiber Optic Engineers Conference], 1–3 (2012).</li> <li>J. Korhonen, Y. Wang, "Effect of packet size on loss rate and delay in wireless links," Wireless Communications and Networking Conference, 2005 IEEE , vol.3, no., pp. 1608- 1613 Vol. 3, 13-17 March.</li> </ul>
Electronic References, Websites	<a href="https://gaia.cs.umass.edu/kurose">https://gaia.cs.umass.edu/kurose</a>

## Course Description Form of Digital Signal Processing

1. Course Name:	
Digital Signal Processing (DSP)	
2. Course Code:	
COE 306	
3. Semester / Year:	
1st & 2nd semester / Academic Year 2023 – 2024.	
4. Description Preparation Date:	
February- 2024	
5. Available Attendance Forms:	
Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 rs. / 2 hrs. per week.	
7. Course administrator's name (mention all, if more than one name)	
Name: Basheera M. Mahmmod Email: basheera.m@coeng.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	<p>As a brief description, the Goals, and objectives by the completion of the course are:</p> <ul style="list-style-type: none"> <li>• To learn the distinction between continuous-time and discrete-time systems and their applications, then provide a thorough discussion of the fundamentals of this system and to relate these to the current directions in the development of digital system.</li> <li>• To understand the specific ways to design digital filters.</li> </ul>

- To make use of frequency domain properties and learn the nature of signals and systems.

## 9. Teaching and Learning Strategies

Strategy	<p>Learning Outcomes, Teaching, Learning and Assessment Method</p> <p>A- <u>Cognitive goals.</u></p> <p>A1. An ability to read and understand DSP literature at an appropriate level.</p> <p>A2. An ability both to follow correctly and to construct mathematical proofs of appropriate degrees of complexity.</p> <p>A3. An understanding of time-domain and frequency-domain analysis.</p> <p>A4. An appreciation of the importance of DSP for computer engineers.</p> <p>A5. The ability to solve design problems in analog and digital systems.</p> <p>A6. Understanding and applying the properties of different transforms for designing digital systems that can be applied in different areas of DSP applications.</p> <p>A7. Understanding and knowing how to use the methods and tools for the development and refinement of programs implemented on DSPs.</p> <p>B. <u>The skills goals special to the course.</u></p> <p>B1. Develop the ability of Digital filter design.</p> <p>B2. Increase the ability of mathematic analysis.</p> <p>B3. Develop the ability of DSP design using computer system.</p> <p>B4. Mathematical concepts and basic algorithms for describing and solving engineering problems.</p> <p>Teaching and Learning Methods</p> <ol style="list-style-type: none"> <li>1. Lectures.</li> <li>2. Tutorials.</li> </ol>
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3. Homework and Assignments.
4. Quizzes and Exams.
5. Seminars.
6. Reports, Presentations, and Posters.
7. Oral Quizzes.

Evaluation methods

- E1. Exams and tests.
- E2. Extracurricular activities.
- E3. Homework.
- E4. Student participation during lectures
- E5. Students' answers to pre-researched questionnaires.
- E6. Reports, presentations and posters.
- E7. Oral exams.

C. Affective and value goals

- C1. Minimization using mathematical simplification.
- C2. Developing systems by digital features.
- C3. Thinking to live in digital world.

Teaching and Learning Methods

1. Lectures
2. Homework
3. Participate during lectures.
4. Discussions

Assessment methods

1. Quizzes and exams
2. homework
3. Participate during lectures
4. assignments

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

- D1. Ability to carry out independent study to take notes, to carry out background reading.
- D2. Problem Solving based on understanding.
- D3. Ability to learn and remember key facts.
- D4. Self-discipline and self-motivation

### 10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 the.	Items A1 & A4	Basic Concepts of DSP	The learning method of section 9	Evaluation methods in section 9 and 11
2	2 the	Items A1 & A4	Properties of systems and signals	The learning method of section 9	Evaluation methods in section 9 and 11
3	2 the	Items A1 & A4	linear Time-Invariant (LTI) systems	The learning method of section 9	Evaluation methods in section 9 and 11
4	2 the	Items A1 & A2	Basic types of discrete-time signals	The learning method of section 9	Evaluation methods in section 9 and 11
5	2 the	Items A1 & A2	Sampling Theory	The learning method of section 9	Evaluation methods in section 9 and 11
6	2 the	Items A1 & A2	Quantization Theory	The learning method of section 9	Evaluation methods in section 9 and 11

7	2 the	Items A1 & A2	Quantization Theory + Quiz	The learning method of section 9	Evaluation methods in section 9 and 11
8	2 the	Items A1 & A2	Difference equations	The learning method of section 9	Evaluation methods in section 9 and 11
9	2 the	Items A1 – A3	Convolution	The learning method of section 9	Evaluation methods in section 9 and 11
10	2 the	Items A1 – A3	Discrete Convolution	The learning method of section 9	Evaluation methods in section 9 and 11
11	2 the	Items A1 – A3	Frequency domain analysis+ Quiz	The learning method of section 9	Evaluation methods in section 9 and 11
12	2 the	Items A1 – A3	Frequency response	The learning method of section 9	Evaluation methods in section 9 and 11
13	2 the	Items A1 – A3	The discrete Fourier Series (DFS)	The learning method of section 9	Evaluation methods in section 9 and 11
14	2 the	Items A1 – A3	The discrete-time Fourier transform (DTFT)	The learning method of section 9	Evaluation methods in section 9 and 11
15	2 the	Items A1 – A4	The discrete Fourier transform (DFT)	The learning method of section 9	Evaluation methods in section 9 and 11



16	2 the	Items A1 – A4	The fast Fourier transform (FFT)	The learning method of section 9	Evaluation methods in section 9 and 11
17	2 the	Items A1 – A4	Quiz	The learning method of section 9	Evaluation methods in section 9 and 11
18	2 the	Items A1 – A3	The Z-transform	The learning method of section 9	Evaluation methods in section 9 and 11
19	2 the	Items A1 – A3	The Inverse of Z-transform	The learning method of section 9	Evaluation methods in section 9 and 11
20	2 the	Items A4 – A6	Infinite Impulse Response Filter Design (IIR design Part 1)	The learning method of section 9	Evaluation methods in section 9 and 11
21	2 the	Items A4 – A6	Infinite Impulse Response Filter Design (IIR design Part 2)	The learning method of section 9	Evaluation methods in section 9 and 11
22	2 the	Items A4 – A6	The windowing method	The learning method of section 9	Evaluation methods in section 9 and 11
23	2 the	Items A1 – A3	The finite-impulse response (FIR) digital filters	The learning method of section 9	Evaluation methods in section 9 and 11
24	2 the	Items A1 –	Design of FIR	The learning	Evaluation methods in

		A6	digital filters	method of section 9	section 9 and 11
25	2 the	Items A1 - A3	Quiz+ Seminars	The learning method of section 9	Evaluation methods in section 9 and 11
26	2 the	Items A1 - A6	Analog filter design	The learning method of section 9	Evaluation methods in section 9 and 11
27	2 the	Items A4 - A6	The impulse invariance method	The learning method of section 9	Evaluation methods in section 9 and 11
28	2 the	Items A1 - A6	Quiz+ Seminars	The learning method of section 9	Evaluation methods in section 9 and 11
29	2 the	Items A1 - A7	The bilinear transformation method	The learning method of section 9	Evaluation methods in section 9 and 11
30	2 the	Items A1 - A7	The bilinear transformation method	The learning method of section 9	Evaluation methods in section 9 and 11

### 11. Course Evaluation

The student's grade is calculated based on the semester system, out of 100, and is divided as follows:

- Annual quest of 30%. The annual pursuit grade depends on the following types of evaluations: 1- Monthly exams (15%). 2- Daily exams, Homework, Seminars and reports, Attendance, oral exams, Student activity in the classroom (15%).
- The end year exam is 70%

### 12. Learning and Teaching Resources

Required textbooks.	<ul style="list-style-type: none"> <li>• Tan, Lizhe, and Jean Jiang. Digital signal processing: fundamentals and applications. Academic Press, 2018.</li> <li>• Proakis, J.G., Digital signal processing: principles, algorithms and applications. 2001: Pearson Education Inc.</li> </ul>
Main references (sources).	<ul style="list-style-type: none"> <li>• Smith, S. (2013). Digital signal processing: a practical guide for engineers and scientists. Elsevier.</li> <li>• Lectures on Statistical Signal Processing Paperback – June 5, 2016 by Prof Nuha A. S. Alwan.</li> </ul>
Recommended books and references (scientific journals, reports...)	<ul style="list-style-type: none"> <li>• Tian, Haowen, et al. "Design and implementation of a real-time multi-beam sonar system based on FPGA and DSP." Sensors 21.4 (2021): 1425.</li> <li>• Leis, John W. Digital signal processing using MATLAB for students and researchers. John Wiley &amp; Sons, 2011.</li> </ul>
Electronic References, Websites	<a href="https://electronics.stackexchange.com/questions/86489/reason-and-difference-between-fourier-laplace-and-z-transforms">https://electronics.stackexchange.com/questions/86489/reason-and-difference-between-fourier-laplace-and-z-transforms</a>

### Course Description Form of Database System

1. Course Name:	Database System
2. Course Code:	COE 307
3. Semester / Year:	1st & 2nd semester / Academic Year 2023 – 2024.
4. Description Preparation Date:	19-2-2024
5. Available Attendance Forms:	Classroom
6. Number of Credit Hours (Total) / Number of Units (Total)	60 hour / 4 units

7. Course administrator's name (mention all, if more than one name)

Name: Manal Fadhil Younis

Email: manal.fadhel@coeng.uobaghdad.edu.iq

8. Course Objectives

<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• Discuss Database management systems, databases, and their applications</li> <li>• Familiarize the students with a good formal foundation on the relational model</li> <li>• Outline the various systematic database design approaches</li> </ul>
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9. Teaching and Learning Strategies

<b>Strategy</b>	<ul style="list-style-type: none"> <li>• Explanation and presentations</li> <li>• Solving problems with students</li> <li>• Tests and evaluation</li> <li>• Projects1</li> </ul>
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand database concepts	File systems and database	Lecture and Lab.	Exam
2-3	4	Understand database models	Data Models	Lecture and Lab.	Exam
4-5	4	Learn RDBM	Design concepts The Relational Database Model	Lecture and Lab.	Exam
6-7	4	Learn RDBM	Design concepts Entity Relationships (ER) Modeling	Lecture and Lab.	Exam
8-9	4	Understand design database	Design concepts Relational Algebra	Lecture and Lab.	Exam

10-12	4	Learn to develop ERD	Developing an ER Diagram	Lecture Lab.	Exam
13-15	6	Normalize database	Normalization	Lecture Lab.	Exam
16-17	4	Understand database modeling	Advanced Database Modeling	Lecture Lab.	Exam
18-20	6	Define EERM	The Extended Entity Relationship Model	Lecture Lab.	Exam
21-23	6	Define database information system	Database Design The Information System	Lecture Lab.	Exam
24-26	6	Learn to design distributed system	Distributed system	Lecture Lab.	Exam
27-30	8	Learn to develop databaseser system	Projects	Lecture Lab.	Exam

### 11. Course Evaluation

- 20% (Quizzes, Mid-terms, daily participation, and attendance)
- 10% (Laboratory work)
- 10% (Laboratory final exam)
- 10% (Projects)
- 50% (Final exam)

### 12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Database systems (design, implementation and management).by Beter Rob and Carlos Coronel, 14 <sup>th</sup> Edition 2019.
Main references (sources)	1 -Database Design, and Application Development & Administration

Recommended books and references (scientific journals, reports...)	<p>1- Centralized vs. Distributed Databases. Case Study, by Nicoleta Magdalena Iacob<sup>1</sup> , Mirela Liliana Moise<sup>2</sup>, 2015</p> <p>2- A Comparative Study of Databases with Different Methods of Internal Data Management, by Mokhtar A. Alworafi , Atyaf Dhari, Asma A. Al-Hashmi, 2016.</p>	
Electronic Websites	<ul style="list-style-type: none"> <li>• Available websites related to the subject</li> <li>Extra lectures by foreign guest lecturers</li> </ul>	

# Fourth Year

## Course Description Form Artificial Intelligent and Robotics

<b>13.Course Name:</b>	
Artificial Intelligent and Robotics	
<b>14.Course Code:</b>	
COE 405	
<b>15.Semester / Year:</b>	
2023-2024	
<b>16.Description Preparation Date:</b>	
February 19 <sup>th</sup> 2024	
<b>17.Available Attendance Forms:</b>	
The students are a full-time students, and on campus. They attend full of programs in face-to-face mode. The academic year is composed of 30-week regular subjects.	
<b>18.Number of Credit Hours (Total) / Number of Units (Total)</b>	
90 hours/ 5 units	
<b>19.Course administrator's name (mention all, if more than one name)</b>	
Name: Nadia Adnan Shiltagh	
Email: <a href="mailto:nadia.aljamali@coeng.uobaghdad.edu.iq">nadia.aljamali@coeng.uobaghdad.edu.iq</a>	
<b>20.Course Objectives</b>	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• <b>Offer a comprehensive introduction to the world of AI and Robotics systems, equipping students with the necessary knowledge and skills to design, implement, and optimize AI systems for various applications.</b></li> <li>• <b>Delve into the fundamental concepts and techniques related to Robotics systems, which are computer systems designed to perform specific tasks with dedicated functionality.</b></li> </ul>
<b>21.Teaching and Learning Strategies</b>	
<b>Strategy</b>	<p>A. Cognitive goal</p> <p>A1. Design, program and evaluate systems in real time.</p> <p>A2. Designing artificial intelligent for the processing information in communications and control systems.</p> <p>A3. The ability to analyze, design, test and maintain complex AI systems.</p> <p>A4. The ability to evaluate hardware and software</p>



requirements for communication and control applications.  
A5. The ability to solve industrial problems in control and automation systems.  
A6. Understanding and applying the properties of AI in designing systems that integrate measurement and behavior in different areas of industrial production.  
A7. Understanding and knowing how to use the methods and tools for the development and refinement of programs implemented on robotics systems.

B. The skills goals special to the course

B1- Mathematical concepts and basic algorithms describing and solving engineering problems.

B2 - Initial developments in AI systems majors.

B3 - developing the ability to conduct experiments and analyze data.

B4- Identifying, formulating and solving AI systems problems using modern engineering tools, techniques, and skills,

B5 - cooperation in group projects,

B6 - Developing written and verbal communication skills through presentations from the project results,

B7 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.

Teaching and Learning Methods.

1. Lectures.
2. Tutorials.
3. Homework and Assignments.
4. Tests and Exams.
5. Seminars.
6. Reports, Presentations, and Posters.

Assessment Methods

1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students, Questionnaire about

Curriculum and Faculty Member (Instructor).

C. Affective and value goals

C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.

C2- Conducting a survey for each year to determine the extent to which students achieve the desired results

C3- The evaluation is based on student data during a questionnaire distributed to the educational students at academic courses.

Teaching and Learning Methods

1-Tests, quizzes.

2- Activities.

3- Participate during lectures

Assessment methods

1- Study the conditions of former graduates.

2- Relevant committees in management such as scientific QA.

3- The employee attitudes of our graduates, for example workplace and job title, will be tracked each year.

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1. Ability to carry out independent study to take notes, carry out background reading.

D2. Problem Solving based on understanding.

D3. Ability to learn and remember key facts.

D4. Self-discipline and self-motivation

#### 10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
2-1	2 theory 1	Item A1 section 9	Introduction What Is AI? The Foundations of	From 1 to 6 section 9	From 1 to 4 section 9

	tutorial		Artificial Intelligence The History of Artificial Intelligence The State of the Art		
3-4	2 theory 1 tutorial	Item A2 & of section 9	Intelligent Agents Agents and Environments. Good Behavior: The Concept of Rationality. The Nature of Environments. The Structure of Agents	From 1 to 6 section 9	From 1 to 4 section 9
5	2 theory 1 tutorial	Item A4 section 9	Learning Methods Examples	From 1 to 6 section 9	From 1 to 4 section 9
6	2 theory 1 tutorial	Item A4 section 9	Supervised Learning Learning Decision Trees Evaluating and Choosing the Best Hypothesis.	From 1 to 6 section 9	From 1 to 4 section 9
7-8	2	Item A1 to	The Theory of	From 1 to 6	From 1 to 4

	theory 1 tutorial	of section 9	Learning Regression and Classification with Linear Models.	section 9	section 9
9-10	2 theory 1 tutorial	Item A5 section 9	Artificial Neural Networks Nonparametric Models	From 1 to 6 section 9	From 1 to 4 section 9
11-12	2 theory 1 tutorial	Item A5 section 9	Training And Classification Using The Discrete Perceptron: Algorithm And Example	From 1 to 6 section 9	From 1 to 4 section 9
13	2 theory 1 tutorial	Item A5 section 9	Linearly Non Separable Pattern Classification	From 1 to 6 section 9	From 1 to 4 section 9
14	2 theory 1 tutorial	Item A5 section 9	Feedforward Recall And Error Back-Propagation Training	From 1 to 6 section 9	From 1 to 4 section 9
15	2 theory 1 tutorial	Item A6 section 9	Single-Layer Feedback Networks	From 1 to 6 section 9	From 1 to 4 section 9
16-17	2 theory	Item A6 section 9	Robotics	From 1 to 6 section 9	From 1 to 4 section 9

	1 tutorial		Introduction		
18-20	2 theory 1 tutorial	Item A7 section 9	Rigid Motions And Homogeneous Transformations	From 1 to 6 section 9	From 1 to 4 section 9
21-22	2 theory 1 tutorial	Item A7 section 9	Homogeneous Transformations	From 1 to 6 section 9	From 1 to 4 section 9
23-24	2 theory 1 tutorial	Item A7 section 9	Forward Kinematics: The Denavit- Hartenberg Convention	From 1 to 6 section 9	From 1 to 4 section 9
25	2 theory 1 tutorial	Item A7 section 9	Denavit Hartenberg Representation	From 1 to 6 section 9	From 1 to 4 section 9
26	2 theory 1 tutorial	Item A6 section 9	Examples Cylindrical Manipulator With Spherical Wrist	From 1 to 6 section 9	From 1 to 4 section 9
27	2 theory 1 tutorial	Item A5 section 9	Scara Manipulator	From 1 to 6 section 9	From 1 to 4 section 9

28-29	2 theory 1 tutorial	Item A7 section 9	Inverse Kinematics	From 1 to 6 section 9	From 1 to 4 section 9
30	2 theory 1 tutorial	Item A7 section 9	The General Inverse Kinematics Problem	From 1 to 6 section 9	From 1 to 4 section 9

### 11. Course Evaluation

- 30% (Quizzes, Mid-terms, daily participation, and attendance)
- 70% (Final exam)

### 12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	<ol style="list-style-type: none"> <li>1. Stuart J. Russell and Peter Norvig “Artificial Intelligence: A Modern Approach”, 2010 by Pearson Education, Inc., Third Edition.</li> <li>2. M.W.Spong , S. Hutchinson and M. Vidyasagar, “Robot Modeling and Control”, 2006.</li> <li>3. Kevin M. Lynch and Frank C. Park, “Modern Robotics Mechanics, Planning, And Control”, 2017.</li> </ol>
Main references (sources)	JACEK M. ZURADA, “Introduction to Artificial Neural Systems” , 1992.
Recommended books and references (scientific journals, reports...)	
Electronic Websites	<a href="https://engineering.louisville.edu/sites/introduction-to-artificial-neural-systems/">https://engineering.louisville.edu/sites/introduction-to-artificial-neural-systems/</a>

## Course Description of Computer Security

1- Course Name:	
Computer Security	
2- Course Code:	
COE 404	
3- Semester / Year:	
2023 / 2024	
4- Description Preparation Date:	
20/02/2024	
5- Available Attendance Forms:	
<p>Annual System; There is only one mode of delivery, which is a “Day Program”.</p> <p>The students are full time students, and on campus.</p> <p>They attend full day program in face-to-face mode.</p> <p>The academic year is composed of 30-week regular subjects.</p>	
6- Number of Credit Hours (Total) / Number of Units (Total)	
90 hrs. / 3 hrs. per week Theory.	
7- Course administrator's name (mention all, if more than one name)	
<p>Name: Assist. Prof. Dr. Alaa M. Abdul-Hadi</p> <p>Email: <a href="mailto:alaa.m.abdulahadi@coeng.uobaghdad.edu.iq">alaa.m.abdulahadi@coeng.uobaghdad.edu.iq</a></p>	
8- Course Objectives	
<p><b>Course Objectives</b></p>	<p><b>Learning Outcomes:</b></p> <p>A1. Understanding and dealing with OSI security architecture.</p>

A2. Design and analyze a basic model of classical encryption techniques.

A3. Evaluate the security models

A4. Diagnose the main weak point in security systems.

A5. Analyze advanced encryption techniques.

9- Teaching and Learning Strategies

<b>Strategy</b>	<ol style="list-style-type: none"> <li>1. Lectures.</li> <li>2. Tutorials.</li> <li>3. Homework and Assignments.</li> <li>4. Tests and Exams.</li> <li>5. In-Class Questions and Discussions</li> <li>6. Connection between Theory and Application.</li> <li>7. Seminars.</li> <li>8. In- and Out-Class oral conservations.</li> <li>9. Reports, Presentations, and Posters.</li> </ol>
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10- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 the.	From A1-A5	Introduction to Security Trends, OSI Architecture	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
2	3 the.	From A1-A5	A Model of network security	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods



3	3 the.	From A1-A5	Classical Encryption techniques	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
4	3 the.	From A1-A5	Symmetric Key Cryptography	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
5	3 the.	From A1-A5	DES	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
6	3 the.	From A1-A5	DES	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
7	3 the.	From A1-A5	Finite Field	From 1 to 12 of T-Methods	From 1 to 4 of A-Methods
8	3 the.	From A1-A5	AES	From 1 to 12 of T-Methods	From 1 to 4 of A-Methods
9	3 the.	From A1-A5	Modes of Operation	From 1 to 12 of T-Methods	From 1 to 4 of A-Methods
10	3 the.	From A1-A5	Message Authentication	From 1 to 12 of T-Methods	From 1 to 4 of A-Methods
11	3 the.	From A1-A5	Public Key Cryptography	From 1 to 12 of T-Methods	From 1 to 4 of A-Methods
12	3 the.	From A1-A5	Public Key Cryptography	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
13	3 the.	From A1-	Digital	From 1 to	From 1 to 4

		A5	Signature	9 of T-Methods	of A-Methods
14	3 the.	From A1- A5	User Authentication	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
15	3 the.	From A1- A5	User Authentication	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
16	3 the.	From A1- A5	Access Control	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
17	3 the.	From A1- A5	Access Control	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
18	3 the.	From A1- A5	Malware	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
19	3 the.	From A1- A5	Malware	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
20	3, the.	From A1- A5	Denial of Service Attacks	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
21	S3 the.	From A1- A5	Denial of Service Attacks	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
22	3 the.	From A1- A5	Firewall	From 1 to 9 of T-Methods	From 1 to4 of A-Methods
23	3 the.	From A1- A5	Firewall	From 1 to 9 of	From 1 to4 of

				T-Methods	A-Methods
24	3 the.	From A1-A5	Intrusion Detection System	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
25	3 the.	From A1-A5	Trusted Computing	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
26	3 the.	From A1-A5	Trusted Computing	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
27	3 the.	From A1-A5	Web Security	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
28	3 the.	From A1-A5	Web Security	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
29	3 the.	From A1-A5	Internet Security	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods
30	3 the.	From A1-A5	Internet Security	From 1 to 9 of T-Methods	From 1 to 4 of A-Methods

#### 11- Course Evaluation

1. Examinations (70 Marks) , Tests (10 Marks), and Quizzes (5 Marks).
2. Extracurricular Activities (5 Marks).
3. Student Engagement during Lectures (5 Marks).
4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor).

#### 12- Learning and Teaching Resources

Required textbooks (curricular books if any)	<ul style="list-style-type: none"> <li>▪ Computer Security, 3rd edition, William Stallings, 2015.</li> </ul>
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Main references (sources)	<ul style="list-style-type: none"> <li>▪ Cryptography and Network Security, 7<sup>th</sup> edition, William Stallings, 2017.</li> <li>▪ Applied Cryptography, 2<sup>nd</sup> edition, Bruce Schneier, 1996.</li> </ul>
Recommended books and references (scientific journals, reports...)	<ul style="list-style-type: none"> <li>▪ paper1: van der Veen, V.; Dutt-Sharma, N.; Cavallaro, L., and Bos, H. "Memory errors: the past, the present, and the future." in Proceedings of the 15th international conference on Research in Attacks, Intrusions, and Defenses (RAID'12), Springer-Verlag, pp. 86–106, 2012</li> <li>▪ Paper2: Felten, E. "Understanding Trusted Computing: Will Its Benefits Outweigh its Drawbacks?" <i>IEEE Security and Privacy</i>, May/June 2003.</li> <li>▪ Paper3: Cheng, T., et al. "Evasion Techniques: Sneaking through Your Intrusion Detection/Prevention Systems." <i>IEEE Communications Surveys &amp; Tutorials</i>, Fourth Quarter 2012.</li> </ul>
Electronic References, Websites	

**Course Description Form of Computer Vision and pattern Recognition.**

1- Course Name:	
Computer Vision and pattern Recognition	
2- Course Code:	
COE 406	
3- Semester / Year:	
2023-2024	
4- Description Preparation Date:	
February/2024	
5- Available Attendance Forms:	
Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects.	
6- Number of Credit Hours (Total) / Number of Units (Total)	
90 hrs. / 3 hrs. per week Theory.	
7- Course administrator's name (mention all, if more than one name)	
Name: Sadiq H. Abdul Hussain	
Email: sadiqhabeeb@coeng.uobaghdad.edu.iq	
8- Course Objectives	
<b>Course Objectives</b>	<p>What are the knowledge and skills expected to be attained by the student upon completion of the course (brief description)?</p> <ol style="list-style-type: none"> <li>1. Present, as clearly and completely as possible, the main principles of modern computer vision systems equipped with pattern recognition capabilities.</li> <li>2. Provide a thorough discussion of the fundamentals of computer vision basic algorithms and with emphasis to the analysis and implementation of certain algorithms from the literature.</li> <li>3. A study of different types of filters and how to apply them.</li> </ol> <p>The course study: the relation between computer vision and human vision system, color spaces and their relations, multi-level features, feature extraction and matching, optical flow, machine learning, and object detection.</p>
9- Teaching and Learning Strategies	

**Strategy****A. Knowledge and Understanding:**

- A1. Analyze scientific research and describe computer vision and pattern recognition/classification algorithms.
- A2. Acquire data from a camera source.
- A3. Process the acquired image/video data.
- A4. Extract discriminative features from the image/video data.
- A5. Apply pattern recognition/classification algorithms in order to distinguish different patterns.
- A6. Build a full computer vision system.
- A7. Analyze the performance of a full computer vision system.

**B. Subject-specific skills**

- B1. Realizing the relationship between computer vision and human visual system.
- B2. Understanding computer vision and pattern recognition algorithms.
- B3. Design and modeling a computer vision and pattern recognition algorithm.

**C. Thinking Skills**

- C1. Understanding the relationship between computer vision algorithm and human visual system.
- C2. Understanding features including feature extraction and feature matching
- C3. Understanding visual classification, tracking, and retrievals.

**D. General and Transferable Skills (other skills relevant to employability and personal development)**

- D1. Thinking of computer vision system as a system that is used to replace human visual system in computer system.
- D2. Help students to design and build their computer vision algorithms.
- D3. Design a computer vision and pattern recognition algorithm for embedded systems.

#### D4. Developing computer vision algorithms.

Design and develop algorithms for controlling devices interfaced to visual devices.

##### Teaching and Learning Methods.

1. Lectures.
2. Tutorials.
3. Homework and Assignments.
4. Tests and Exams.
5. In-Class Questions and Discussions
6. Connection between Theory and Application.
7. Seminars.
8. In- and Out-Class oral conversations.
9. Reports, Presentations, and Posters.
10. Oral Exam.

##### Assessment Methods

1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor).

##### Grading Policy

1. Exams and Quizzes: There will be at least seven closed books and notes exams and quizzes during the academic year.
2. Oral and written assessment: The students are encouraged to participate their ideas to solve the problems during the lecture. The oral and written assessment.
3. Final Exam: - The final exam will be comprehensive, closed books and notes.

C. Affective and value goals

C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.

C2- Conducting a survey for each year to determine the extent to which students achieve the desired results.

C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.

Teaching and Learning Methods

1-Tests, quizzes.

2- Activities.

3- Participate during lectures

Assessment methods

1-Study the conditions of former graduates.

2-Relevant committees in management such as scientific, QA.

3-The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.

D- General and rehabilitative transferred skills(other skills relevant to employability and personal development)

D1. Ability to carry out independent study to take notes, to carry out background reading.

D2. Problem Solving based on understanding.

D3. Ability to learn and remember key facts

D4. Self-discipline and self-motivation

**10- Course Structure**

<b>Week</b>	<b>Hours</b>	<b>Required Learning Outcomes</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>
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1	2 the. 1 tut.	Item A1	<b>Introduction to Computer Vision and Pattern Recognition.</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
2-3	4 the. 2 tut.	Items A1	<b>Human Vision, Color Spaces and Transforms</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
3-4	4 the. 2 tut.	Item A2	<b>Image coordinates and resizing</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
5-8	6 the. 3 tut.	Item A3	<b>Filters and convolutions</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
9-10	4 the. 2 tut.	Item A3	<b>Harris detector and matching</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
11-13	6 the. 3 tut.	Item A4	<b>Matching, RANSAC, HOG, and SIFT</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
13-14	4 the. 2 tut.	Item A4	<b>Optical Flow</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
15	2 the. 1 tut.	Item A5	<b>Machine Learning</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
16	2 the. 1 tut.	Item A5	<b>Machine Learning for Computer Vision</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11

17-18	4 the. 2 tut.	Item A4- A5	<b>Feature extraction</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
19-20	4 the. 2 tut.	Item A5	<b>Neural Networks</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
21-22	4 the. 2 tut.	Item A5	<b>Support Vector Machine</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
23	2 the. 1 tut.	Item A5	<b>Introduction to Convolutional Neural Networks</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
24-25	4 the. 2 tut.	Item A5	<b>Object Detection</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
26-27	4 the. 2 tut.	Item A4- A5	<b>Segmentation</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
27-28	4 the. 2 tut.	Item A6	<b>Face detection and recognition</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11
29-30	4 the. 2 tut.	Item A6- A7	<b>Seminars</b>	Learning methods in section 9	Evaluation methods in sections 9 and 11

#### 11- Course Evaluation

The student's grade is calculated based on the semester system, out of 100, and is divided as follows:

- a- Annual quest of 30%.

The annual pursuit grade depends on the following types of evaluations:

Monthly exams (15%)

Daily exams, Homework, Seminars and reports, Attendance, oral exams, Student activity in the classroom (15%).

b- The final year exam is 70%

## 12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	<ol style="list-style-type: none"> <li>1- Feature extraction image processing for computer vision, Nixon, Mark S and Aguado, Alberto S, 2012, Academic Press.</li> <li>2- Color image processing: methods and applications, Lukac, Rastislav and Plataniotis, Konstantinos N, 2006, CRC press.</li> </ol>
Main references (sources)	Computer Vision: Algorithms and Applications Rick Szeliski, 2010.
Recommended books and references (scientific journals, reports...)	<ol style="list-style-type: none"> <li>1- Abdulhussain, Sadiq H. and Ramli, Abd Rahman and Mahmmod, Bahseera M and Al-Haddad, S A R and Jassim, Wissam A. "Image Edge Detection Operators based on Orthogonal Polynomials." International Journal of Image and Data Fusion 8.3 (2017), 293-308.</li> <li>2- Mahmmod, Basheera M. and bin Ramli, Abd Rahman and Abdulhussain, Sadiq H and Al-Haddad, Syed Abdul Rahman and Jassim, Wissam A. "Signal compression and enhancement using a new orthogonal-polynomial-based discrete transform." IET Signal Processing 12.1(2018): 129-142.</li> <li>3- Lowe, David G. "Distinctive image features from scale-invariant keypoints." International journal of computer vision 60.2 (2004): 91-110.</li> </ol>
Electronic Websites	A Good Sounding system in the Lecture Hall.

## Course Description Form Internet Technology

1- Course Name:

Internet Technology

2- Course Code:

COE 401					
3- Semester / Year:					
1st & 2nd / Academic Year 2023 – 2024					
4- Description Preparation Date:					
25/2/2024					
5- Available Attendance Forms:					
Day Program					
6- Number of Credit Hours (Total) / Number of Units (Total):					
90 hrs. / 3 hrs. per week Theory					
60 hrs. / 2 hrs. per week Lab					
7- Course administrator's name (mention all, if more than one name)					
Name: Islam Mohammed Ahmed					
Email: islam.mohammed@coeng.uobaghdad.edu.iq					
8- Course Objectives					
<b>Course Objectives</b>		<ul style="list-style-type: none"> <li>• Develop the ability to apply knowledge of Internet Service Providers Types and Switching Types and the Important Internet Protocols and the type of the broadband connection to the end user.</li> <li>• Develop skills to communicate effectively through seminars and homework.</li> </ul> <p>Prepare students to be active at the practical life after graduate.</p>			
9- Teaching and Learning Strategies					
<b>Strategy</b>		<ol style="list-style-type: none"> <li>1. Lectures.</li> <li>2. Tutorials.</li> <li>3. Homework and Assignments.</li> <li>4. Tests and Exams.</li> <li>5. In-Class Questions and Discussions.</li> <li>6. Connection between Theory and Application.</li> <li>7. Seminars.</li> <li>8. In- and Out-Class oral conversations.</li> <li>9. Reports, Presentations, and Posters.</li> </ol>			
10- Course Structure					
<b>Week</b>	<b>Hours</b>	<b>Required Learning</b>	<b>Unit or subject name</b>	<b>Learning method</b>	<b>Evaluation method</b>

		<b>Outcomes</b>			
1	2 the. 2 exp.	Item 1 section 10	Introduction	From 1 to12 section 11	From 1 to4 section 12
2	2 the. 2 exp.	Item 1 section 10	ISP (Inter Service Provider	From 1 to12 section 11	From 1 to4 section 12
4	2 the. 2 exp.	Item 1 section 10	Web Hosting	From 1 to12 section 11	From 1 to4 section 12
5	2 the. 2 exp.	Item 1 &2 section 10	Content Delive Networks	From 1 to12 section 11	From 1 to4 section 12
6	2 the. 2 exp.	Item 1 & 2 section 10	Content Delive Networks	From 1 to12 section 11	From 1 to4 section 12
7	2 the. 2 exp.	Item 1&2 section 10	Circuit Switchin	From 1 to12 section 11	From 1 to4 section 12
8	2 the. 2 exp.	From 1 to 3 section 10	Circuit Switchin	From 1 to12 section 11	From 1 to4 section 12
9	2 the. 2 exp.	From 1 to 3 section 10	Dedicated Circu	From 1 to12 section 11	From 1 to4 section 12
10	2 the. 2 exp.	From 1 to 3 section 10	Dedicated Circu	From 1 to12 section 11	From 1 to4 section 12

11	2 the. 2 exp.	From 1 to 3 section 10	Dedicated Circu	From 1 to12 section 11	From 1 to4 section 12
12	2 the. 2 exp.	From 1 to 3 section 10	Packet Switchin	From 1 to12 section 11	From 1 to4 section 12
13	2 the. 2 exp.	From 1 to 3 section 10	Packet Switchin	From 1 to12 section 11	From 1 to4 section 12
14	2 the. 2 exp.	From 1 to 3 section 10	Packet Switchin	From 1 to12 section 11	From 1 to4 section 12
15	2 the. 2 exp.	From 1 to 3 section 10	Broadband Internet Acc Technologies.	From 1 to12 section 11	From 1 to4 section 12
16	2 the. 2 exp.	From 1 to 3 section 10	Broadband Internet Acc Technologies.	From 1 to12 section 11	From 1 to4 section 12
17	2 the. 2 exp.	From 1 to 3 section 10	Broadband Internet Acc Technologies.	From 1 to12 section 11	From 1 to4 section 12
18	2 the. 2 exp.	From 1 to 3 section 10	Broadband Internet Acc Technologies.	From 1 to12 section 11	From 1 to4 section 12
19	2 the. 2 exp.	From 1 to 3 section 10	ARP	From 1 to12 section 11	From 1 to4 section 12

20	2 the. 2 exp.	From 1 to 3 section 10	ARP	From 1 to12 section 11	From 1 to4 section 12
21	2 the. 2 exp.	From 1 to 3 section 10	FTP	From 1 to12 section 11	From 1 to4 section 12
22	2 the. 2 exp.	From 1 to 3 section 10	FTP	From 1 to12 section 11	From 1 to4 section 12
23	2 the. 2 exp.	From 1 to 3 section 10	Email.	From 1 to12 section 11	From 1 to4 section 12
24	2 the. 2 exp.	From 2 to 5 section 10	Email.	From 1 to12 section 11	From 1 to4 section 12
25	2 the. 2 exp.	From 2 to 5 section 10	Email.	From 1 to12 section 11	From 1 to4 section 12
26	2 the. 2 exp.	From 2 to 5 section 10	DNS	From 1 to12 section 11	From 1 to4 section 12
27	2 the. 2 exp.	From 2 to 5 section 10	DNS	From 1 to12 section 11	From 1 to4 section 12

#### 11- Course Evaluation

- Exams and Quizzes: There will be at least seven closed books and notes exams and quizzes during the academic year.
- Oral and written assessment: The students are encouraged to participate their ideas to solve the problems during the lecture. The oral and written assessment.
- Final Exam: - The final exam will be comprehensive, closed books and

notes.	
12- Learning and Teaching Resources	
Required textbooks (curriculum books, if any)	<ol style="list-style-type: none"> <li>1. Oliver Heckmann, "THE COMPETITIVE INTERNET SERVICE PROVIDER ", 2006, John Wiley &amp; Sons Ltd.</li> <li>2. Margaret Levine Young et al, " Internet: The Complete Reference ", 2nd Edition, 2002, McGraw-Hill.</li> <li>3. Edward Insam, " TCP/IP Embedded Internet Applications ", 1st publish Edition, 2003, Linacre House, Jordan Hill.</li> <li>4. Huub van Helvoort, " Next Generation SDH/SONET Evolution or Revolution?", 2005, John Wiley &amp; Sons Ltd.</li> <li>5. Eric A. Hall, " Internet Core Protocols The Definitive Guide", 2000, O'Reilly &amp; Associates, Inc.</li> </ol>
Main references (sources)	<ol style="list-style-type: none"> <li>1. Oliver Heckmann, "THE COMPETITIVE INTERNET SERVICE PROVIDER ", 2006, John Wiley &amp; Sons Ltd.</li> <li>2. Margaret Levine Young et al, " Internet: The Complete Reference ", 2nd Edition, 2002, McGraw-Hill.</li> </ol>
Recommended books and references (scientific journals, reports...)	<ol style="list-style-type: none"> <li>1. Pallis, George, and Athena Vakali. "Insight and perspectives for content delivery networks." Communications of the ACM 49.1 (2006): 101-106.</li> <li>2. Bertschek, Irene, Daniel Cerquera, and Gordon J. Klein. "More bits–more bucks? Measuring the impact of broadband internet on firm performance." Information Economics and Policy 25.3 (2013): 190-203.</li> <li>3. Van der Wee, Marlies, et al. "Techno-economic evaluation of open access on FTTH networks." IEEE/OSA Journal of Optical Communications and Networking 7.5 (2015): 433-444.</li> </ol>
Electronic Websites	<p>Referenc</p> <ul style="list-style-type: none"> <li>• Laboratory experiments in the (Computer network Lab) of the department.</li> </ul> <p>Available websites related to the subject Extra lectures by foreign guest lecturers</p>



## Course Description Form Computer Architecture II

1- Course Name:	
Computer Architecture II	
2- Course Code:	
COE 402	
3- Semester / Year:	
1 <sup>st</sup> and 2 <sup>nd</sup> /2023-2024	
4- Description Preparation Date:	
20-2-2024	
5- Available Attendance Forms:	
Annual System; There is only one mode of delivery, which is a “D Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed 30-week regular	
6- Number of Credit Hours (Total) / Number of Units (Total)	
90hrs., 3 hrs. per week / 6	
7- Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Mohammed Issam Younis Email: younismi@coeng.uobaghdad.edu.iq	
8- Course Objectives	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• Explore the advancement in computer architecture and makes the student ready to design and facilitate the current trends in computer architecture. This involve:</li> <li>• How to determine the performance of computer in both theoretical and practical manner.</li> <li>• Understanding the Moore’s law and its impact on computer engineering.</li> <li>• Understanding the pipelining principle for both static and dynamic pipeline and three hazards encounter in pipeline, namely: Structural hazards, Data hazards, and branch hazards. In addition, the current trends to solve these hazards. Furthermore, how to deal with Interrupt and Exception behavior from the computer architects point of view.</li> </ul>

	<ul style="list-style-type: none"> <li>• Understanding compiler optimization, loop unrolling, branch prediction.</li> <li>• Understanding ILP, TLP, DLP</li> <li>• Understanding the Advanced Pipelining, involve: super scalar, VLIW, and software pipelining.</li> <li>• Going from uncore to multicore and many core architecture, and discuss the principle of “lazy boy era is finished”. This involve: implicit and explicit threading and processing, fine-grained, coarse grained, and SMT multithreading from hardware point of view and leads to concrete understanding and imagination of the sole of this subject.</li> <li>• Understanding the memory Hierarchy design and Organization, how the cache memory work and the 4C’s principle in Cache memory.</li> </ul>
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#### 9- Teaching and Learning Strategies

<b>Strategy</b>	<p>A- Cognitive goals:</p> <p>A1. Write RTL for hardware jobs.</p> <p>A2. Define and explain the principles of Computer Architecture and the interfacing between its hardware and software components</p> <p>A3. Understand the data path inside Computer Architecture.</p> <p>A4. Understand the Computer Architecture organization</p> <p>A5. Know the organization and architecture of the Internet with an emphasis on the user's view of the computer Network.</p> <p>A6. An appreciation of the importance of proof, generalization and abstraction in the logical development of formal theories</p> <p>A7. Understand of architectural blocks involved in computer architecture.</p> <p>A8. Understand problems of Computer Architecture.</p> <p>A9. How to apply Engineering analysis (time, cost, performance) in Computer design.</p> <p>A10. Understand Internet architectures.</p>
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B. The skills goals special to the course

B1- Mathematical concepts and basic algorithms for describing and solving engineering problems.

B2 - Initial developments in Internet Technology majors.

B3 - developing the ability to conduct experiments and analyze data.

B5- Identifying, formulating and solving Internet Technology problems using modern engineering tools, techniques, and skills,

B6 - cooperation in group projects,

B7 - Developing written and verbal communication skills through presentations from the project results,

B8 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.

C. Affective and value goals

C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.

C2- Conducting a survey for each year to determine the extent to which students achieve the desired results

C3- The evaluation is based on student data during the questionnaire distributed to the educational students and academic courses.

D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D1. Ability to carry out Independent study to take notes, to carry out background reading.

D2. Problem Solving based on understanding.

D3. Ability to learn and remember key facts

D4. Self-discipline and self-motivation

10- Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-6	12	A1 A2 A3 A4 B1 B2 B3 C1 C2 C3	New Trends in Computer Architecture and CPU Performance Equations	Attract the student to the topics Guided Discovery Power Point Lecturing that summarizes the full text, in addition, a full text also available. Assignment Seminars Playing some Videos to stress and improve the student capability Do some practical examples that integrate the computer engineering subjects by Java programming language. Group Discussion	Motivation Quizzes Test Home work Peer assessment Oral assessment Discussion on Extra examples

7-12	12	A1 A2 A3 A4 B1 B2 B3 C1 C2 C3	Static and Dynamic Pipelining		
13-20	16	A1 A2 A3 A4 B1 B2 B3 C1	Super Scal		

<b>21-30</b>	<b>16</b>	<b>C2</b>	<b>Memory Hierarchy</b>					
		<b>C3</b>						
		<b>A1</b>						
		<b>A2</b>						
		<b>A3</b>						
		<b>A4</b>						
		<b>B1</b>						
	<b>B2</b>	<b>Overview Multi-Core Many-Core Architecture and Parallel Processing</b>						
	<b>B3</b>							
	<b>C1</b>							
	<b>C2</b>							
	<b>C3</b>							
	<b>1-30</b>					<b>30</b>	<b>A1</b>	<b>Review, Seminars, Project Discussion on update topics Computer Architecture</b>
							<b>A2</b>	
<b>A3</b>								
<b>A4</b>								
<b>A5</b>								
<b>A6</b>								
<b>B1</b>								
<b>B2</b>								
<b>B3</b>								
<b>B4</b>								
<b>C1</b>								
<b>C2</b>								
<b>C3</b>								

		<b>C4</b>			
		<b>C5</b>			
		<b>C6</b>			

#### 11- Course Evaluation

1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor).

#### 12- Learning and Teaching Resources

Required textbooks (curricular books if any)	<ol style="list-style-type: none"> <li>1. Computer Architecture a Quantitative Approach, Hennessey &amp; Patterson, (3rd, 4th, &amp; 5th editions), Elsevier, (2003, 2006, &amp; 2012).</li> <li>2. Computer Organization and Architecture Design for Performance, William Stalling, 9th edition, Pearson, 2013.</li> <li>3. Computer Organization and Design: The Hardware/Software Interface Patterson &amp; Hennessey, 4th edition, The Morgan Kaufmann Series in Computer Architecture and Design, 2008.</li> <li>4. Microprocessor Architecture, Jean-Loup Baer, Cambridge University Press, 2010.</li> <li>5. Structure Computer Organization, Tanenbaum, 5th edition, Prentice Hall, 2006.</li> <li>6. OpenCL Programming by Example, <b>Banger &amp; Bhattacharyya</b>, PACKT, 2013.</li> <li>7. Modern X86 Assembly Language</li> </ol>
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	<p>Programming_ 32-bit, 64-bit, SSE, and AVX, Kusswurm, APRESS, December 2014.</p> <p>8. The Java Tutorial, 6th Edition, Gallardo et. al., Addison-Wesley Professional, December 2014.</p>
Main references (sources)	<p>1. Computer Architecture a Quantitative Approach, Hennessey &amp; Patterson, (3rd, 4th, &amp; 5th editions), Elsevier, (2003, 2006, &amp; 2012).</p>
Recommended books and references (scientific journals, reports...)	<p>Papers:</p> <p>-P. Trivedi and R. P. Tripathi, "Design &amp; analysis of 16-bit RISC processor using low power pipelining," International Conference on Computing, Communication &amp; Automation, Noida, 2015, pp. 1294-1297.</p> <p>-B. W. Bomar, "Implementation of microprogrammed control in FPGAs," in IEEE Transactions on Industrial Electronics, vol. 49, no. 2, pp. 415-422, Apr 2002.</p> <p>J. L. Cruz, A. Gonzalez, M. Valero and N. P. Topham, "Multiple-bank register file architectures," Proceedings of 27th International Symposium Computer Architecture (IEEE C No.RS00201), Vancouver, BC, Canada 2000, pp. 316-325.</p>
Electronic References, Websites	NA



## Course Description Form Embedded Systems

<b>1- Course Name:</b>	
Embedded Systems	
<b>2- Course Code:</b>	
COE 403	
<b>3- Semester / Year:</b>	
2023-2024	
<b>4- Description Preparation Date:</b>	
February 19 <sup>th</sup> 2024	
<b>5- Available Attendance Forms:</b>	
The students are full-time students, and on campus. They attend full of programs in face-to-face mode. The academic year is composed of 30-week regular subjects.	
<b>6- Number of Credit Hours (Total) / Number of Units (Total)</b>	
150 hours/ 6 units	
<b>7- Course administrator's name (mention all, if more than one name)</b>	
Name: Hayder Saadi Radeaf	
Email: <a href="mailto:haydersaadi@coeng.uobaghdad.edu.iq">haydersaadi@coeng.uobaghdad.edu.iq</a>	
<b>8- Course Objectives</b>	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• Offer a comprehensive introduction to the world of embedded systems, equipping students with the necessary knowledge and skills to design, implement, and optimize embedded systems for various applications.</li> <li>• Delve into the fundamental concepts and techniques related to embedded systems, which are computing systems designed to perform specific tasks with dedicated functionality.</li> </ul>
<b>9- Teaching and Learning Strategies</b>	
<b>Strategy</b>	<p style="margin-left: 40px;">B. Cognitive goal</p> <p style="margin-left: 40px;">A1. Design, program and evaluate systems in real time.</p> <p style="margin-left: 40px;">A2. Designing electronic circuits for the processing information in communications and control systems.</p> <p style="margin-left: 40px;">A3. The ability to analyze, design, test and maintain complex embedded systems.</p> <p style="margin-left: 40px;">A4. The ability to evaluate hardware and software requirements for communication and control applications.</p>

A5. The ability to solve industrial problems in control and automation systems.

A6. Understanding and applying the properties of sensors designing electronic systems that integrate measurement and behavior in different areas of industrial production.

A7. Understanding and knowing how to use the methods and tools for the development and refinement of programs implemented on microprocessors, microcontrollers and DSP.

B. The skills goals special to the course

B1- Mathematical concepts and basic algorithms describing and solving engineering problems.

B2 - Initial developments in Embedded systems majors.

B3 - developing the ability to conduct experiments and analyze data.

B4- Identifying, formulating and solving Embedded systems problems using modern engineering tools, techniques, and skills,

B5 - cooperation in group projects,

B6 - Developing written and verbal communication skills through presentations from the project results,

B7 - obtaining an appreciation for some of the ethical problems that exist in the practice of the profession.

Teaching and Learning Methods.

1. Lectures.
2. Tutorials.
3. Homework and Assignments.
4. Tests and Exams.
5. Seminars.
6. Reports, Presentations, and Posters.

Assessment Methods

1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor).

C. Affective and value goals  
 C1-Student collaborative evaluation data is obtained from students at the end of the cooperative experiment.  
 C2- Conducting a survey for each year to determine the extent to which students achieve the desired results  
 C3- The evaluation is based on student data during a questionnaire distributed to the educational students at the end of academic courses.

Teaching and Learning Methods

- 1-Tests, quizzes.
- 2- Activities.
- 3- Participate during lectures

Assessment methods

- 1- Study the conditions of former graduates.
- 2- Relevant committees in management such as scientific committees, QA.
- 3- The employee attitudes of our graduates, for example, workplace and job title, will be tracked each year.

D- General and rehabilitative transferred skills (other skills relevant to employability and personal development)

- D1. Ability to carry out independent study to take notes, carry out background reading.
- D2. Problem Solving based on understanding.
- D3. Ability to learn and remember key facts.
- D4. Self-discipline and self-motivation

13- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 the. 2 exp.	Item A1 section 9	Review of microcontrollers and Digital Signal Processors (DSP), architecture,	From 1 to 6 section 9	From 1 to 4 section 9

			peripheral modules.		
2	3 the. 2 exp.	Item A2 & of section 9	Embedded micro controller cores (ARM, RISC, CISC, SOC), addressing modes.	From 1 to 6 section 9	From 1 to 4 section 9
3	3 the. 2 exp.	Item A4 section 9	Interrupts structure, hardware multiplier, pipelining.	From 1 to 6 section 9	From 1 to 4 section 9
4	3 the. 2 exp.	Item A4 section 9	Hardware/Software co-design. Architecture of embedded systems.	From 1 to 6 section 9	From 1 to 4 section 9
5	3 the. 2 exp.	Item A1 to of section 9	Tutorials & Quiz	From 1 to 6 section 9	From 1 to 4 section 9
6	3 the. 2 exp.	Item A5 section 9	Assemblers, linkers and loaders. Binary file formats for processor executable files.	From 1 to 6 section 9	From 1 to 4 section 9
7	3 the. 2 exp.	Item A5 section 9	Typical structure of timer-interrupt driven programs.	From 1 to 6 section 9	From 1 to 4 section 9
8	3 the. 2 exp.	Item A5 section 9	GNU-GCC compiler introduction, programming with Linux environment and gnu debugging.	From 1 to 6 section 9	From 1 to 4 section 9
9	3 the. 2 exp.	Item A5 section 9	GNU insight with step level trace debugging, make file interaction, building and execution.	From 1 to 6 section 9	From 1 to 4 section 9
10	3 the. 2 exp.	Item A6 section 9	Introduction to ARM instruction set, addressing modes,	From 1 to 6 section 9	From 1 to 4 section 9

			operating modes with ARM core.		
11	3 the. 2 exp.	Item A6 section 9	ARM TDMI modes, ADC, Timers, Interrupt structure.	From 1 to 6 section 9	From 1 to 4 section 9
12	3 the. 2 exp.	Item A7 section 9	Byte ordering (LE, BE), Thumb mode normal mode instructions changes.	From 1 to 6 section 9	From 1 to 4 section 9
13	3 the. 2 exp.	Item A7 section 9	Pipeline utilization with all register allocations.	From 1 to 6 section 9	From 1 to 4 section 9
14	3 the. 2 exp.	Item A7 section 9	Compare the ARM7, ARM9, and ARM11 with new features additions. System design with ARM processor.	From 1 to 6 section 9	From 1 to 4 section 9
15	3 the. 2 exp.	Item A7 section 9	Interfacing switches, keyboards, LED's and LCD's.	From 1 to 6 section 9	From 1 to 4 section 9
16	3 the. 2 exp.	Item A6 section 9	Transistors used for digital-controlled switches, digital-controlled relays, solenoids & Quiz	From 1 to 6 section 9	From 1 to 4 section 9
17	3 the. 2 exp.	Item A5 section 9	Interfacing of DC, AC and stepper motors.	From 1 to 6 section 9	From 1 to 4 section 9
18	3 the. 2 exp.	Item A7 section 9	Analog interfacing and data acquisition systems.	From 1 to 6 section 9	From 1 to 4 section 9
19	3 the. 2 exp.	Item A7 section 9	Real Time Operating System Concepts, Kernel Structure.	From 1 to 6 section 9	From 1 to 4 section 9

20	3 the. 2 exp.	Item A6 section 9	Critical Sections, Multitasking, Task Management.	From 1 to 6 section 9	From 1 to 4 section 9
21	3 the. 2 exp.	Item A5 section 9	Time Management, Schedulers, Event Control	From 1 to 6 section 9	From 1 to 4 section 9
22	3 the. 2 exp.	Item A4 section 9	Blocks, Priorities, Deadlocks.	From 1 to 6 section 9	From 1 to 4 section 9
23	3 the. 2 exp.	From A5 A7 of sect 9	Tutorial & Quiz	From 1 to 6 section 9	From 1 to 4 section 9
24	3 the. 2 exp.	Item A7 section 9	Synchronization, Semaphore Management, Mutual Exclusion.	From 1 to 6 section 9	From 1 to 4 section 9
25	3 the. 2 exp.	Item A7 section 9	Message Mailbox Management, Message Queue Management, Memory Management	From 1 to 6 section 9	From 1 to 4 section 9
26	3 the. 2 exp.	Item A3 section 9	Tutorial & Quiz	From 1 to 6 section 9	From 1 to 4 section 9
27	3 the. 2 exp.	Item A2 section 9	Applications of Embedded Systems	From 1 to 6 section 9	From 1 to 4 section 9
28	3 the. 2 exp.	Item A7 section 9	Applications of Embedded Systems	From 1 to 6 section 9	From 1 to 4 section 9
29	3 the. 2 exp.	Item A7 section 9	Applications of Embedded Systems	From 1 to 6 section 9	From 1 to 4 section 9
30	3 the. 2 exp.	From A1 A7 of sect 9	Tutorial & Quiz	From 1 to 6 section 9	From 1 to 4 section 9

14- Course Evaluation	
<ul style="list-style-type: none"> <li>• 25% (Quizzes, Mid-terms, daily participation, and attendance)</li> <li>• 15% (Laboratory work)</li> <li>• 10% (Laboratory final exam)</li> <li>• 50% (Final exam)</li> </ul>	
15- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Embedded Systems, Architecture, Programming and Design - Raj Kamal -Tata McGraw Hill
Main references (sources)	<ul style="list-style-type: none"> <li>• ARM System Developer's Guide, Designing and Optimizing System Software - Andrew N. Sloss, Dominic Systems and Chris Wright - Elsevier Inc.</li> <li>• An Embedded Software Primer - David E. Simon - Pearson Education South Asia</li> </ul>
Recommended books and references (scientific journals, reports...)	<ul style="list-style-type: none"> <li>• S. Edwards, L. Lavagno, E. A. Lee and A. Sangiovanni Vincentelli, "Design of embedded systems: formal models, validation, and synthesis," in Proceedings of IEEE, vol. 85, no. 3, pp. 366-390, March 1997.</li> <li>• Daler Rakhmatov and Sarma Vrudhula. 2003. Energy management for battery-powered embedded systems. ACM Trans. Embed. Comput. Syst. 2, 3 (August 2003) 277-324.</li> </ul>
Electronic Websites	<ul style="list-style-type: none"> <li>• <a href="https://www.labcenter.com/">https://www.labcenter.com/</a></li> <li>• <a href="https://www.microchip.com/">https://www.microchip.com/</a></li> </ul>